

technology.^{32/} A successful transition depends on the fast and certain penetration of the new technology, but, for that to occur, consumers, manufacturers, and broadcasters must move forward in the same direction and at relatively the same pace. Such coordination can only be accomplished through government adoption of a standard, as the market alone simply is not suited to solve such "chicken-or-egg-first" coordination problems.^{33/}

Our experience with AM stereo demonstrates how the failure to respond to the challenge of open networked technologies can stifle the emergence of a broadcast technology. In that case, in 1981, the Commission decided not to adopt the transmission standard that industry favored and, as a result, radio stations were reluctant to opt for the stereo system, for fear that other stations would not follow their lead. The benefits of AM stereo broadcasting could not overcome this drag on the adoption of the new technology, because a well-functioning, but lower quality, technology already existed and the likely demand for the new technology was uncertain -- as will be true with DTV.^{34/} In the end, this wait-and-see approach created "excess inertia" in the market and prevented the adoption of the new technology.^{35/} Senator Pressler, introducing a bill in 1991 that would have required the Commission to set an AM stereo standard, noted that

^{32/} See id.

^{33/} See Owen, at 273 and Farrell, *Standard Setting in High Definition Television*, at 29.

^{34/} See S.M. Besen and L.L. Johnson, Compatibility Standards, Competition, and Innovation in the Broadcasting Industry (1986), at 58.

^{35/} *Excess inertia* exists when a less efficient old technology is locked in, despite the existence of several new technologies, because users who do not coordinate the choice of the new technology underestimate the mutual benefit of using a single new technology. See Owen, at 270f. The danger of excess inertia with respect to the NTSC standard is especially great because (a) no single firm is able to control all of the components required to implement a competing standard (e.g., the transmission and reception capabilities) and (b) the system components have no value independent of the other components. See id., at 291.

the "delay in accepting AM stereo technology is prolonged by the absence of an accepted equipment standard . . . the inability of the market to decide between competing systems has left consumers, equipment producers, and broadcasters in limbo."^{36/}

Even assuming the proliferation of multiple transmission standards did not utterly block the introduction of DTV, it would not serve the consumer well. The value of a television set that could not receive all television signals would plummet, although the cost to produce such a set might rise as the market fractured. Similarly, the availability of programming might decline as the costs of mass distribution increased. Standardization and the economies of scale it promotes in product development can prevent this escalation of price that accompanies the decline of product utility. Standardization also can supply the coordination that the market cannot to broadcast technologies in transition. Finally, standardization can remedy the consumer's lack of information about technology choices and the benefits of positive network externalities.^{37/}

B. INDUSTRY CONSENSUS DOES NOT NEGATE THE NEED FOR A STANDARD.

As explained above, the DTV Standard was developed through a remarkable process of industry cooperation, and consequently has broad inter-industry acceptance. The potential benefits of the consensus that has been achieved will not be realized, however, unless comprehensive implementation is assured; the Commission's adoption of the DTV Standard is needed to provide that assurance.

^{36/} 137 Cong. Rec. S. 6149 (daily ed. April 25, 1991) (statement of Sen. Pressler) in connection with the introduction of the AM Radio Improvement Act, S. 1101, 102nd Cong., 1st Sess. (1991).

^{37/} See Owen, at 275.

It is important to recognize that the widespread expectation, fostered by the Commission itself, that a standard ultimately would be adopted is what made the inter-industry cooperation and competition so productive.^{38/} All parties took seriously the Commission's promise to set a terrestrial DTV standard so as to avoid the AM stereo disappointment in which the Commission left the technology choice to the market but then left "the market to languish."^{39/} Without the promise of an adopted standard for DTV at the end of the road, it is quite possible that market forces would not have achieved the development of a consensus standard. The system proponents might not have devoted their resources to developing their systems; the broadcast industry and EIA might not have funded ATTC; ACATS might not have attracted the enormous private sector contribution it used to achieve its goals, and the competing systems might not have pooled their intellectual property to create the Grand Alliance system. A decision now *not* to adopt a mandatory standard would betray the initial expectations of the industries involved -- expectations that government was instrumental in creating -- and unsettle future industry collaboration on new technologies.

In addition, failure to adopt the DTV Standard could unravel the consensus by creating an opportunity for old and new disagreements about the standard to surface. For example, such a failure could invite satellite and cable operators, or film and computer industry representatives, to seek to divide the broadcast and other industries with competing standards tailored to their specific modes of distribution. As a

^{38/} There is at least a strong assumption that agency oversight of a procedure to select the best standard will result in agency selection of that standard. See, Farrell, *Standard Setting in High-Definition Television*, at 22.

^{39/} See id.

result, a prolonged period of confusion could ensue, during which multiple systems would compete and many consumers would choose to wait for the winner. Consumers who do not wait could be left with useless equipment and without free television service. In any battle over competing standards -- which would threaten compatibility and interconnection -- consumers would be sure losers.

By contrast, the choice to finalize the standard-selection process by adopting the DTV Standard will build on, rather than destroy, the consensus that now exists. The reasons why the Commission initially embarked on a standard-selection process aimed at ultimate adoption of a standard -- principally, to ensure that the transition to DTV would be as spectrum efficient, swift, and consumer-friendly as possible -- remain valid today. The success of technology introductions often depends on when technologies are put on the market. In this case, the Commission's adoption of the ATSC DTV Standard will accelerate the production of programs in HDTV format, conversion of existing material into HDTV, and delivery of HDTV signals to the home.^{40/}

The market simply cannot provide the coordination necessary to ensure that more than 1600 local DTV television stations broadcast to some 200 million sets, using compatible technologies with minimum interference to each other and other spectrum users and without expensive technological dead ends. The disruption that would be caused by any variance in the transmission technologies adopted is too great a

^{40/} See *id.*, at 4, 37. Furthermore, adoption of the DTV Standard would maximize the *public interest* in digital television by pushing the transition for the benefit of the public rather than for the benefit of individual market players. A single market player moving first might entirely determine the technology choice of the whole industry because of the "bandwagon effect." See Owen, at 269.

risk to accept. Any lack of certainty as to the adoption of a single standard would threaten the interests of consumers and delay and impede the investments of broadcasters, equipment manufacturers, and financial institutions.

C. ALTERNATIVES TO REQUIRING THE DTV STANDARD ARE INADEQUATE.

Alternatives, such as authorizing but not requiring a standard, adopting a standard only for allocation and assignment purposes, or requiring use of only some layers of the ATSC DTV Standard would fail to satisfy the need for certainty discussed above. See Fifth NPRM, at 18. The potential down-side of failing to adopt the entire DTV Standard is as great as its potential up-side is slim. The risk attached to a partial adoption of the DTV Standard is exacerbated by the complexity of the DTV Standard -- because of its multiple dimensions, there are numerous opportunities for variation, and for the emergence of many competing standards based on the same basic technology. Requiring only segments of the DTV Standard could be a useless effort if too few segments are adopted. And variation among segments could result in higher equipment costs for consumers because of the need for more complex or multiple pieces of equipment in order to accommodate the variations.

There is very little, if anything, that partial adoption would accomplish. To the extent that the goal were to encourage innovation, no such potential innovation has been identified that the DTV Standard could not accommodate and the DTV Standard has been specifically designed for maximum flexibility and "headroom." To the extent that the goal were to allow industry to proceed with the DTV Standard on its own, there would be a prolonged period of uncertainty that could derail the transition for no gains in innovation. Reliance on an industry standard rather than an adopted standard would be inadequate, because the risk that voluntary adherence would be incomplete is

too great. By contrast, the costs of providing the security that adoption of the entire DTV Standard would offer are negligible, in light of the broad industry acceptance of the DTV Standard and the substantial space it provides for innovation.

D. THE COMMISSION SHOULD REVIEW, NOT SUNSET THE DTV STANDARD.

The Notice questions whether adoption of the DTV Standard should be temporary. See Fifth NPRM, at 17. As the Telecommunications Act of 1996 recently underscored, the Commission always has the authority to review its rules. The Commission should exercise this authority to assess the continuing viability of the DTV Standard and consider modifications when such consideration becomes necessary. It should not set a specific review schedule or, even worse, establish a sunset provision now when there simply is no need to do so. Because the transition has not even reached its infancy, selecting any date now would be arbitrary and would inject an element of uncertainty into the complex transition process that cannot be justified in light of the alternative option of reviewing the standard in the normal course when and if it becomes appropriate to do so. The arbitrariness of setting a sunset date or review schedule now would result in part from the fact that the transition timetable is at present unknown, as is the timing of production and adoption by consumers of DTV sets. Given these unknown variables, the wiser course is to allow events to unfold.

III. CABLE AND OTHER VIDEO DISTRIBUTION MEDIA SHOULD BE PROHIBITED FROM FRUSTRATING THE ROLL-OUT OF DTV BY USING INCOMPATIBLE TECHNOLOGIES.

Broadcast signal carriers must not be permitted to frustrate consumers' access or destroy the compatibility benefits that the DTV Standard provides. Just as adoption of the DTV Standard is necessary for the effective roll-out of DTV, so mechanisms to ensure compatibility between broadcast television and other video

distribution media are necessary to reap the benefits of the DTV Standard. Without such direction from the Commission, the DTV Standard may not ultimately serve its purpose, broadcast spectrum will not be used effectively, and consumers will suffer unacceptable and unnecessary service losses. Specifically, unless multichannel video systems (cable in particular) adopt technologies that are maximally compatible with the DTV Standard, affordable equipment will not be produced that will allow access to both broadcast DTV and cable programming. To ensure that equipment manufacturers and consumers actually realize the economies of scale that adoption of the DTV Standard fosters, incompatible cable technologies must not encourage reliance on proprietary set-top boxes and duplicative and expensive decoders. The Commission can avoid future consumer confusion by mandating equipment compatibility now, instead of having to revisit this issue years from now.

The Notice seeks comment on whether the public interest would be served by the Commission's involvement to ensure compatibility between digital broadcast and other digital video delivery systems' technologies. See Fifth NPRM, at 24. As we have commented in the beginning of this proceeding^{41/} and in the last comment round,^{42/}

^{41/} In response to the Tentative Decision and Further Notice of Inquiry, MM Docket No. 87-268, 3 FCC Rcd. 6520 (1988) ("Tentative Decision"), we commented in Joint Broadcaster Comments (November 30, 1988), at 18-20:

The parallel development of alternative ATV delivery media that are incompatible or not interoperable with terrestrial broadcast, could well generate confusion and uncertainty . . . Intermedia compatibility or interoperability, on the other hand, holds the promise of providing each viewer with the widest choice of program sources and each programmer with the largest potential audience, and of reducing the cost of video equipment through the economies of mass production . . . [It] is important for the Commission to declare now not only that the Commission is 'sensitive' to the benefits of intermedia compatibility [Tentative Decision, at ¶4] but that it will take whatever steps appear necessary and appropriate, including mandating ATV receiver and signal standards, to assure that local broadcast ATV is not artificially inhibited by the development of incompatible nonbroadcast ATV

the answer is a resounding "yes." Without such involvement, the cable industry in particular may adopt multiple standards that are incompatible among cable systems and incompatible with the DTV Standard. The important consumer benefits and the rapid roll-out of DTV that adoption of the DTV Standard makes possible could be lost if equipment manufacturers have to outfit DTV sets with expensive cable decoders to accommodate this incompatibility. The same is true if the consumers must rely on set-top boxes in order to receive cable transmissions that are incompatible with sets designed to receive broadcast signals. The experience of the last ten years, during which the Commission and consumers have wrestled with set-top boxes, argues powerfully that the Commission should step in early to forestall a repeat of such confusion. Cable systems and other video delivery systems like DBS and MMDS will best serve the consumer by adopting a single standard in general and the ATSC DTV Standard in particular.^{43/} That way, sets will be manufactured that are capable of receiving all signals and are compatible with VCRs, without the mediation of expensive set-top boxes or additional chips.

systems.

^{42/} See Joint Broadcaster Comments to the Fourth NPRM (November 20, 1995) ("Joint Comments VI") at 38-39 ("The Commission should safeguard against the anti-competitive use of set-top boxes to create technological barriers that could deny the viewing public access to ATV programming. . . . [T]he technical standard the cable industry, or any part of that industry, selects should not be permitted to interfere with cable systems' fulfillment of their must carry and other obligations Any other result would render these must carry and other obligations meaningless, thereby undermining free over-the-air broadcast television and retarding the transition to ATV); Joint Broadcaster Reply Comments to the Fourth NPRM (January 22, 1996) ("Joint Comments VII"), at 19-21 ("Incompatible broadcast and cable ATV technologies will cause consumer confusion in the marketplace, raise the costs of receiving ATV, slow the penetration of cable-ready ATV sets, delay the transition to an all-digital broadcast service, and frustrate the Commission's goal of returning NTSC spectrum. . . . Thus, we urge the Commission to pursue maximum commonality between the cable and broadcast industries in the areas of modulation, transport, packetization structures, and compression protocols.").

^{43/} The Commission contemplated adopting the broadcast DTV standard for other video media early in the proceeding and referred such consideration to a separate docket.

**A. CONSUMERS BENEFIT FROM INTERMEDIA
COMPATIBILITY FORGED BY COMMON STANDARD.**

Compatibility will benefit the consumer in a number of ways:

First, the consumer will have access to the full range of television programming in the same quality in which it is transmitted with all the same signal attributes (closed captions and other data services comparable to Line 21 information in the analog world). Congress recognized the importance of this consumer benefit in enacting the must carry non-degradation requirement in the Cable Television Consumer Protection and Competition Act of 1992. 47 U.S.C. § 614(b)(4)(A).

Second, the consumer will benefit by paying less for DTV equipment. Incompatibility between cable and broadcast technologies will mean that the consumer will needlessly pay more, either for cable-ready sets made more expensive by the additional chips needed to decode both broadcast and cable signals or for similarly expensive set-top boxes that work with cheaper and dumber sets.^{44/} In contrast, the existence of sufficient commonality between broadcast and cable standards will lower the price of cable-ready DTV sets and so speed the transition. Such commonality also will lessen the cable industry's control of access by affording cable and other video distribution companies fewer opportunities to use set-top boxes to close the gateways of competition.

Third, insistence on cable compatibility will give clear direction to receiver manufacturers, thus spurring the mass production of digital sets and accelerating the DTV transition.

^{44/} See Comments of EIA to the Fourth NPRM, at 28-29.

Fourth, compatibility will enhance the usefulness of ancillary consumer equipment such as VCRs.

The desirability of these benefits was clear from the beginning of the ACATS process. In 1994, the Commission found that "standards for cable digital transmissions are desirable. These standards will be needed to ensure that compatibility is maintained as new digital cable technologies are introduced [We] will initiate a separate action on these issues as is necessary to assure continuing compatibility in the future."^{45/} Responding to this action, EIA and the cable industry filed jointly affirming the need to standardize the system used for digital transmissions.^{46/} In the instant proceeding, both the FCC and NCTA have endorsed efforts to ensure compatibility.^{47/} Mindful of these concerns, ACATS and ATSC took care to involve the cable industry in the standard-setting process and to ensure that the broadcast DTV standard would be designed to suit the cable industry's needs. The result is a standard that accommodates

^{45/} In re Implementation of the Cable Act -- Compatibility Between Cable Systems and Consumer Electronics Equipment, ET Docket No. 93-7, First Report and Order, May 4, 1994, at ¶4. See also ¶ 144 (recognizing the future need to deal with "the relationship of the cable digital system to the terrestrial broadcast ATV standard and multimedia"). The Commission revised and clarified its regulations for ensuring compatibility between cable systems and consumer electronics equipment in ET Docket No. 93-7, Memorandum Opinion and Order, April 10, 1996. It restated its commitment to "initiate a separate proceeding on [cable] digital standards issues in the future." *Id.*, at n.9.

^{46/} See Comments of Cable-Consumer Electronics Compatibility Advisory Group, ET Docket No. 93-7 (January 25, 1994), at 22 (stating the two industries were "anxious to move ahead with joint recommendations on digital standards as quickly as possible"), cited in Reply Comments of EIA to the Fourth NPRM (January 22, 1996), at 26.

^{47/} See Memorandum Opinion and Order/Third Report and Order/Third Report and Order/Third Further Notice of Proposed Rule Making, MM Docket No. 87-268, 7 FCC Rcd. 6924, 6984 (1992) ("We agree with NCTA that cable delivery of a quality ATV signal is critical to public acceptance of ATV. We also agree with EIA/ATV Committee that, as a practical matter, any ATV system selected must support ATV carriage over cable systems.").

cable's needs as well as it does others and includes a high data rate mode for cable use.^{48/}

Given the need for compatibility and the ease with which it could be obtained, the preferable regulatory alternative would be to require cable systems and other video distribution systems to adopt the DTV Standard. The next best, but far less preferable, alternative would be for the Commission to require intermediate levels of commonality that, while not yielding as much certainty as a common transmission system, would at least avoid severe disruption in the consumer equipment market and minimize disruption to consumers. Cable and other video delivery systems should bear the costs of ensuring sufficient commonality with the DTV Standard.

B. POSSIBLE ALTERNATIVE IMPLEMENTATION SCENARIOS.

For the reasons stated above, the conversion to digital will be hastened by cable's adoption of the DTV Standard. In addition, Commission action is required during the transition period to take into account the continued presence of NTSC sets and analog cable systems. Four different scenarios based on combinations of digital and analog cable systems delivering signals to digital and analog receivers during and after the transition to DTV must be considered.

Scenario I: DTV broadcast signal, analog cable system, NTSC set.

Scenario II: DTV broadcast signal, digital cable system, NTSC set.

Scenario III: DTV broadcast signal, analog cable system, DTV set.

Scenario IV: DTV broadcast signal, digital cable system, DTV set.

^{48/} This is a 16-VSB high data rate mode which can deliver 43 Mbits/s (sufficient for two HDTV high-action programs) over a single 6 MHz channel. This high data rate mode was tested under ACATS supervision and specifically recommended for inclusion in the ATSC DTV Standard.

In **Scenario I** (as in Scenario III below), the cable system simply should be required to pass the DTV signal through its system undegraded.^{49/} A “pass-through” requirement means that the cable company would not subject the broadcaster’s 6 MHz signal to any demodulation or remodulation. In Scenario I, the DTV signal would be visible on an NTSC-only set exclusively through the use of a decoder, presumably purchased by the consumer. Because analog cable systems are converting to digital at a fast pace, this scenario and Scenario III will become increasingly rare.

In **Scenario II**, the course most likely to ensure the swift transition to DTV would be to encourage consumers to purchase DTV sets capable of receiving undegraded DTV signals. Thus, ideally, the cable system would not down-convert any of the signals it carried to analog for reception on an NTSC set (although some consumers may choose to purchase equipment to accomplish the down-conversion at home). However, to the extent that a cable system down-converts digital cable programming to an analog format for reception by NTSC sets, it should not be permitted to discriminate against broadcast programming and thereby use the transition to DTV as a weapon against broadcast competitors. Any cable system that down-converts digital cable programming should be required similarly to convert broadcast DTV signals. Such a mandatory conversion rule based on non-discrimination principles would ensure that cable systems that adopt digital technology while their customers still rely on analog sets will give their customers equal access to the full range of broadcast and cable programming.

^{49/} See Joint Comments VI, at 33.

In **Scenario III**, the analog cable system should be required to pass through the broadcast DTV signal so that DTV sets may receive it in its original form (see Scenario I, above). Pass-through of the Grand Alliance 8-VSB standard was tested and found by ACATS to be technically feasible on a typical analog cable system. Thus, a consumer who purchased a digital receiver for broadcast programming would be able to receive it with the maximum quality the receiver is capable of displaying, whether or not the cable system had become digital.

In **Scenario IV**, the cable system should be required to adopt the ATSC DTV standard or digital technology sufficiently like the DTV Standard so that affordable receivers may be built to decode both cable and broadcast DTV signals delivered over the air. Such a requirement would impose no burden on cable systems that adopt the ATSC DTV Standard. To the extent that cable systems do not adopt the DTV Standard, a lesser level of commonality will be necessary or television sets will have to be manufactured with duplicative and prohibitively expensive decoders to receive both cable and broadcast signals.^{50/} The degree of commonality necessary probably can be attained through the cable industry's use of the transport layer element (and lower layers) of the ATSC DTV Standard.

The different permutations in the relationships among the various video media make consideration of compatibility issues very complex. Cable adoption of the DTV Standard would most effectively avoid some of the complexity and confusion inherent in the transition to DTV and is technically appropriate for cable transmission

^{50/} If a given cable system does not adopt the DTV Standard, it will have to demodulate the broadcast signal at the cable head-end for purposes of transmission. The broadcast signal would be reconstituted in the home in one of two ways -- either through the decoding capability built into a dual mode digital receiver or through the purchase or lease of a set-top box.

needs. Thus, as we have stated before, mandatory cable adoption of the DTV Standard in whole or in part is desirable.^{51/}

IV. RECEIVERS SHOULD BE REQUIRED TO MEET MINIMUM PERFORMANCE CHARACTERISTICS TO GIVE CONSUMERS ACCESS TO DTV IN ALL FORMATS AT ACCEPTABLE QUALITY LEVELS.

The Notice requests comment on whether receiver standards are necessary to ensure adequate performance of DTV and compatibility between receivers and broadcast signals. See Fifth NPRM, at 26. To ensure that consumers are able to enjoy DTV programming at the quality that the DTV Standard supports, receivers should be required to decode all formats and achieve minimal performance levels. As we stated in our comments to the Fourth NPRM, we believe that receivers should be required to "live up to the Grand Alliance prototype system's performance capabilities"^{52/} and to have "an all-mode decoding capability [so as] . . . to render the digital signal in a recognizable display."^{53/}

The Commission has the authority to set receiver standards under 47 U.S.C. § 302a. Congress added this section of the Communications Act in 1982 when it recognized that destructive interference to television service could be reduced most dramatically and most efficiently at the receiving, rather than the transmitting, end. Congress found that although "filtering mechanisms and anti-interference design cost only a few cents per unit," equipment manufacturers would not install these cures

^{51/} In this proceeding, the Commission should adopt firm principles regarding compatibility along the lines discussed above. Then, it should focus on the details of that compatibility in a separate proceeding so that consideration of this issue will not further delay the expeditious licensing of DTV channels.

^{52/} Joint Comments VI, at 37 and Broadcasters' Proposed ATV Allotment/Assignment Approach, MM Docket No. 87-268 (January 13, 1995), at 33.

^{53/} Joint Comments VII, at 8.

voluntarily and, therefore, it provided the FCC with the authority to act in this sphere.^{54/} The transition to DTV makes the stakes much higher now than they were in 1982. Although the DTV Standard did not specify receiver formats, the ATSC recognized that "[s]ervice providers need assurance that their programs will be correctly processed in all receivers, and receiver manufacturers need assurance that their receivers will function properly with all broadcasts."^{55/}

Critical steps to providing this assurance are adopting the DTV Standard and assigning DTV channels so as to replicate existing service areas with minimal interference. However, these steps will not achieve their aims unless receivers are designed to perform up to the minimum capabilities of the Grand Alliance system. If they do not so perform, service will be curtailed and interference will increase. Significantly, inadequate receiver performance will not simply mean that broadcast reception will be poorer. Digital signals are subject to a "cliff effect" whereby excessive multipath or other interference or man-made noise destroys them entirely. Thus, DTV receivers must be built to maintain a full-time lock on the signal. The Commission should assure consumers that through mandatory receiver standards, DTV receivers have the adaptive equalizer circuits, tuner performance and noise figures necessary to ensure, at a minimum, the interference immunity and signal quality that the Grand Alliance

^{54/} See Communications Amendments Act of 1982, Pub. L. No. 97-259, 96 Stat. 1087, S. Rep. No. 97-191, 97th Cong., 2d Sess. 7 (1982). See also, H.R. Conf. Rep. No. 97th Cong., 2d Sess. 21 (1982).

^{55/} ATSC Report, Annex E, at 61.

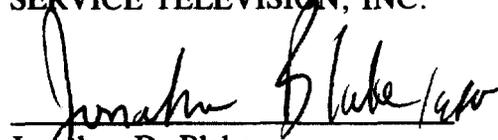
system permits. The successful transition to DTV depends on the consumer's ability to receive reliable, complete, and uninterrupted service over the air and over cable.^{56/}

* * * * *

For these reasons, we urge the Commission to adopt the ATSC DTV Standard in its entirety and to take the necessary steps to ensure affordable access to broadcast DTV signals and adequate performance of DTV sets. With these foundation stones in place, consumer equipment will be able to compete on quality and price without harming the public's free over-the-air television service.

Respectfully submitted,

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^{56/} The Notice, at 21, proposes the adoption of an emission mask to limit out-of-channel emissions. Broadcasters' comments on the adequacy of the Commission's proposal and the latest submission of the ATSC will be forthcoming.

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