

FCC FACT SHEET*

Cable Television Technical and Operational Standards
Report and Order– MB Docket No. 12-217

Background: In 2012, the Commission adopted the *Digital Cable Standards Notice of Proposed Rulemaking* to seek comment on proposed digital “proof of performance” (*i.e.*, signal quality) rules and signal leakage rules. The purpose of the proof-of-performance rules is to require cable operators to deliver good-quality video and audio to subscribers. The signal leakage rules prevent cable systems from emitting signals that can interfere with radio services, including certain aeronautical communication services. The Commission adopted its existing cable television signal leakage and signal quality rules before cable operators used digital technology. Today, all major cable operators use digital technology to deliver their video service. This allows them to provide better picture and sound quality than analog signals. The Report and Order takes steps to modernize the Commission’s signal quality and signal leakage rules to reflect this technology.

What the Order Would Do:

- Require digital cable operators to adhere to an accepted industry standard to ensure that they provide “good quality” video and audio to their subscribers;
- Decline to apply unnecessary certification and testing requirements for digital signal quality; and
- Modernize rules and testing procedures to detect and limit cable signal leakage in digital cable systems.

* This document is being released as part of a "permit-but-disclose" proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, must be filed in MB Docket No. 12-217, which may be accessed via the Electronic Comment Filing System (<https://www.fcc.gov/ecfs/>). Before filing, participants should familiarize themselves with the Commission’s *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission’s meeting. *See* 47 CFR § 1.1200 *et seq.*

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Cable Television Technical and Operational Standards)	MB Docket No. 12-217
)	
RCN Corporation Petition for Special Relief)	CSR-8166
)	
City of Burlington, VT, D/B/A Burlington Telecom Petition for Relief from Proof of Performance Testing Obligations)	CSR-8273-Z
)	
Massillon Cable TV, Inc. and Clear Picture, Inc. Petition for Special Relief)	CSR-8274-Z
)	
Bend Cable Communication, LLC Petition for Special Relief)	CSR-8294-Z
)	
RCN Corporation Petition for Special Relief)	CSR-8301-Z
)	
Jackson Energy Authority Petition for Special Relief)	CSR-6936-Z
)	
Service Electric Cablevision, Inc. Petition for Waiver of Sections 76.601, 76.605(a), and 76.1704 of the Commission's Rules)	

REPORT AND ORDER*

Adopted: []

Released: []

By the Commission:

I. INTRODUCTION AND SUMMARY

1. With this Report and Order (Order), we take another step toward modernizing our rules to reflect current technologies. Specifically, we update our signal leakage and signal quality rules that apply to cable operators to reflect the cable industry's transition from analog to digital systems.

* This document has been circulated for tentative consideration by the Commission at its September 2017 open meeting. The issues referenced in this document and the Commission's ultimate resolutions of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The Commission's *ex parte* rules apply and presentations are subject to "permit-but-disclose" *ex parte* rules. *See, e.g.*, 47 CFR §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. *See* 47 CFR §§ 1.1200(a), 1.1203.

In this Order, we

- Adopt the Society of Cable Telecommunications Engineers standard number 40 as the new performance benchmark for digital cable systems; this will ensure that cable operators provide “good quality” signals to their subscribers;
- Dismiss seven petitions for exemption from, or waiver of, our analog proof-of-performance rules because they are rendered moot by adoption of the new performance benchmark for digital cable systems;
- Remove unnecessary digital signal quality certification and testing requirements;
- Adopt new rules and testing procedures to detect and limit cable signal leakage in digital cable systems; and
- Correct and update rule sections throughout Part 76 of our rules.

II. BACKGROUND

2. In 2012, the Commission adopted the *Digital Cable Standards NPRM* to seek comment on proposed digital “proof of performance” (*i.e.*, signal quality) rules, signal leakage rules, and updates and corrections to our Part 76 rules.¹ As the Commission explained in that NPRM, the purpose of the proof-of-performance rules is to require cable operators to deliver good-quality video and audio to subscribers. The Commission’s authority for adopting such rules stems from Section 624 of the Communications Act of 1934, as amended (the “Act”).² The signal leakage rules prevent cable systems from emitting signals that can interfere with radio services, including certain aeronautical communication services.

3. The Commission originally adopted the current proof-of-performance and signal leakage rules before the advent of digital cable service, which is now widespread.³ According to SNL Kagan, almost 97 percent of cable video customers subscribe to digital service, and all major operators provide digital service.⁴ As a technical matter, our existing signal quality and interference rules are inapplicable to the digital technologies that cable operators use today.⁵ The Commission has not, to date, provided

¹ *Cable Television Technical and Operational Requirements*, Notice of Proposed Rulemaking, 27 FCC Rcd 9678 (2012) (“*Digital Cable Standards NPRM*”).

² 47 U.S.C. § 544(e) (directing the Commission to “establish minimum technical standards relating to cable systems’ technical operation and signal quality” and to “update such standards periodically to reflect improvements in technology”). Congress added Section 624(e) as part of The Cable Television Consumer Protection and Competition Act in 1992, but the Commission has maintained technical standards regarding signal quality since 1972. *Amendment of Part 74, Subpart K, of the Commission’s Rules and Regulations Relative to Community Antenna Television Systems*, Report and Order, 36 FCC 2d 143 (1972).

³ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9679-9680, paras. 2-3.

⁴S&P Global Market Intelligence, *Top Cable MSO’s Report*, June 2017 (showing that every multiple-system cable operator with at least 2,500 subscribers offers digital service). Digital service is superior to analog service, and therefore the Commission has encouraged cable operators to make that transition. *See, e.g., Carriage of Digital Television Broadcast Signals: Amendment to Part 76 of the Commission’s Rules*, 27 FCC Rcd 6529, 6543, para. 16 (2012); *Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices; Compatibility between Cable Systems and Consumer Electronics Equipment*, 25 FCC Rcd 14657, 14679-14681, paras. 45-49 (2010).

⁵ As the Commission explained in the *Digital Cable Standards NPRM*, “Digital (QAM) transmission differs from analog (NTSC) transmission in two key ways. First, the digital carrier encodes multiple video and audio streams as well as associated meta-data as a single data stream which is parsed by the subscriber’s equipment. Second, as a radio frequency signal, the QAM signal no longer contains the three distinct sub-carriers that make up an analog

(continued....)

clear guidance on how to ensure digital signal quality and safeguard against digital systems leaking electromagnetic signals into the aeronautical bands.⁶ Therefore, in the *Digital Cable Standards NPRM*, the Commission proposed to update its technical rules to incorporate standards and procedures that cable operators and local franchising authorities (LFAs) could use to test signal quality and signal leakage on digital cable systems.

4. The Commission's analog proof-of-performance rules currently include testing requirements,⁷ technical standards,⁸ testing methods,⁹ recordkeeping requirements,¹⁰ and procedures to resolve complaints about signal quality to ensure that cable operators provide their subscribers with good quality signals.¹¹ In the *Digital Cable Standards NPRM*, the Commission proposed to replicate this framework by adopting similar rules that would apply to digital cable service.¹² Specifically, the Commission proposed to require Quadrature Amplitude Modulation (QAM)¹³ based digital cable systems to test signals in accordance with the Society of Cable Telecommunications Engineers (SCTE) Digital Cable Network Interface Standard, SCTE 40¹⁴ and maintain records that demonstrate the results of such tests.¹⁵ The Commission sought comment on standards or guidance for testing cable systems that do not rely on QAM because non-QAM systems rely on varied technologies, and the Commission was not aware of any industry standards that non-QAM operators could use to test their signal quality.¹⁶ Accordingly,

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television signal, but instead appears in the spectrum in what is commonly referred to as a 'haystack.' Therefore, concepts such as the aural carrier separation from the video carrier are simply no longer applicable as these carriers are no longer distinct radio frequency components. Further, even where a signal characteristic could be measured for both an analog and digital signal, such as signal to noise ratio, the level of performance required for a digital QAM signal to be received and properly decoded is not the same as the signal to noise ratio required for the visual carrier of an analog television signal." *Digital Cable Standards NPRM*, 27 FCC Rcd at 9681, n.19.

⁶ See, e.g., *RCN Corporation Petition for Special Relief*, CSR-8166 and CSR-8301-Z (2010), *Bend Cable Communications, LLC, Petition for Special Relief*, CSR-8294-Z (2010), *Petition of the City of Burlington, VT, D/B/A Burlington Telecom, for Relief from Proof of Performance Testing*, CSR-8273-Z (2009), *Massillon Cable TV, Inc. and Clear Picture, Inc., Petition for Special Relief*, CSR-8274-Z (2010), *Jackson Energy Authority Petition for Special Relief*, CSR-6936-Z (2005).

⁷ 47 CFR § 76.601.

⁸ 47 CFR § 76.605.

⁹ 47 CFR § 76.609.

¹⁰ 47 CFR §§ 76.1704, 76.1705.

¹¹ 47 CFR § 76.1713.

¹² *Digital Cable Standards NPRM*, 27 FCC Rcd at 9682-89, paras. 8-22.

¹³ "Quadrature Amplitude Modulation, or QAM is a sophisticated modulation technique, using variations in signal amplitude and phase, that allows multiple bits to form a single 'symbol,' which is then impressed on a single sine wave. 'Quadrature' refers to the fact that four distinct amplitude levels are defined. 16 QAM creates a symbol of 4 bits through 16 distinct signal points, or variations in amplitude and phase (2 raised to the 4th power equals 16). 64 QAM, by extension, conveys 6 bits through 64 distinct signal points (2 raised to the 6th power equals 64). Accordingly, 256 QAM conveys 8 bits per symbol, and 1024 QAM conveys 10. See H. Newton, *Newton's Telecom Dictionary* 674, (20th ed. 2004)." *Digital Cable Standards NPRM*, 27 FCC Rcd at 9683, n.29.

¹⁴ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9684, paras. 10-11. The proposed rules would require cable operators to test Additive white Gaussian Noise (AWGN), Phase Noise, Micro-reflections, AM hum, Adjacent Channel Levels, Channel loading and Discrete interference across every QAM channel on the system. *Id.* at 9685, para. 11 (citing SCTE 40 2011 at Tables 5 & 6). In addition, the proposed rules would require cable operators to test whether subsets of channels meet the channel-specific standards for normal video channels contained in the Forward Application Transport Table. *Id.* (citing SCTE 40 2011 at Table 4).

¹⁵ *Id.* at 9687-91, paras. 17-25.

¹⁶ *Id.* at 9685-6, paras. 13-14.

the Commission sought comment on an alternative proposal under which non-QAM providers would file a proof-of-performance plan with the Commission.¹⁷ The Commission also asked whether there were “any entities currently analyzing and developing standards for visual signal quality,” or whether a subjective analysis of visual signal quality could be used to demonstrate proof-of-performance.¹⁸

5. As the Commission explained in the *Digital Cable Standards NPRM*, cable systems have the potential to interfere with over-the-air users of spectrum if the cable operator does not properly maintain its plant.¹⁹ The Commission’s existing rules are designed to minimize interference to aircraft communications, and include yearly testing and reporting requirements.²⁰ In the *Digital Cable Standards NPRM*, the Commission proposed to add new interference standards that would apply to digital signals to accompany the existing analog signal interference standards.²¹ The proposed digital standards would provide protection to aircraft communication from digital cable plant signal leakage that is equivalent to that provided via our existing analog standards. The Commission also sought comment on whether to make other modifications to the rules to protect other frequencies based on the increased bandwidth of modern cable systems.²²

6. The Commission also proposed updates to Part 76 of our rules. In the *Digital Cable Standards NPRM*, the Commission proposed to make necessary updates to various standards, reorganize certain sections of Part 76 to make them easier to read, make numerous rule corrections, and remove numerous obsolete rules and references from the Code of Federal Regulations.²³ These changes are minor and non-substantive and intended to make it easier to comprehend and comply with the Commission’s cable rules.

III. DISCUSSION

A. Digital Performance Standards

7. As the Commission proposed in the *Digital Cable Standards NPRM*, we will require cable operators to adhere to SCTE 40, the technical standard that ensures that cable operators provide “good quality” signals to their subscribers. We decline, however, to adopt the proof-of-performance testing and recordkeeping rules proposed in the *Digital Cable Standards NPRM*. The record and the Commission’s log of consumer complaints indicate that there is not a continuing pattern of technical problems with digital signals as historically existed with analog signals.²⁴ We attribute this, in part, to the process of error correction²⁵ that the QAM standard uses; it generally ensures that digital signals have suitable picture and audio quality even under suboptimal conditions.²⁶ Therefore, we conclude that a

¹⁷ *Id.* at 9687, para. 15.

¹⁸ *Id.* at 9686, para. 14.

¹⁹ *Id.* at 9682, para. 6.

²⁰ See 47 CFR §§ 76.610-76.617, 76.1803, 76.1804.

²¹ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9693-98, paras. 29-39.

²² *Id.* at 9697, para. 38.

²³ *Id.* at 9698-9700, paras. 40-44.

²⁴ Complaints about signal quality—which do not lead to enforcement action in all cases—have decreased since cable operators transitioned to digital service. A review of recent Commission complaints reveals that the Commission has received fewer than 200 cable signal quality complaints over the past year.

²⁵ Error correction is “the technique of adding extra bits to a transmitted signal, with the extra bits being used to detect and correct errors in the transmission.” WALTER CICIORA ET AL, *MODERN CABLE TELEVISION TECHNOLOGY* 1008 (2d ed. Morgan Kaufmann Publishers 2004).

²⁶ See NCTA Comments at 4-5, ACA Reply at 6. Unless otherwise noted, all references to comments and replies refer to those filed in MB Docket No. 12-217.

testing regime for digital service is not necessary, and that an operator's adherence to SCTE 40²⁷ is sufficient to ensure consumers are receiving good quality signals. We also decline at this time to adopt performance standards for non-QAM cable systems pending further developments and recommendations from industry standards bodies. Below, we discuss (1) why the SCTE 40 standard is the proper standard to ensure quality digital signals for QAM-based cable operators, (2) why we delay adoption of a standard for non-QAM-based cable operators, (3) why a rigid testing regime is unnecessary, and (4) why subjective testing and set-top box requirements are not necessary at this time. We also dismiss as moot pending requests for exemption from our proof-of-performance rules.

1. QAM-Based Proof of Performance Standard

8. We adopt the Commission's proposal to adopt the SCTE 40 standard. QAM-based cable operators that adhere to this standard provide good-quality signals to consumers, and a rule that requires cable operators to adhere to it will not increase their regulatory burden. SCTE 40, the "Digital Cable Network Interface Standard," was developed by the Society of Cable Telecommunications Engineers to define the characteristics and specifications of interface between a cable system and commercially available digital cable products, such as set-top boxes. The overwhelming majority of cable operators use QAM to modulate their digital services,²⁸ but as the Commission explained in the *Digital Cable Standards NPRM*, QAM use can vary across systems: "Unlike analog cable transmission . . . QAM is not uniform and may appear in a variety of configurations such as 64 QAM, 256 QAM, and potentially 1024 QAM, each requiring different performance standards."²⁹ The SCTE 40 standard recognizes these differences and incorporates different performance standards for each QAM configuration. Moreover, QAM-based cable operators have followed the SCTE 40 standard for more than a decade because the standard is an essential part of the cable industry's reliance on CableCARD.³⁰ Therefore, conforming to the standard should not add any additional burdens on cable operators³¹ and commenters generally supported its use for this purpose.³² The standard sets relative channel power limits, carrier-to-noise ratios, and adjacent-channel characteristics that reflect the minimum technical standards necessary to ensure that cable operators deliver quality QAM signals to their subscribers. For these reasons, we conclude that SCTE 40 provides the proper "minimum technical standards relating to cable systems"

²⁷ SCTE 40 2011 was superseded in September 2016 by an updated standard, SCTE 40 2016. To ensure that we reference the most up-to-date standard that the industry uses, we will incorporate that standard.

²⁸ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9681, para. 5.

²⁹ *Id.* at 9683, para. 9.

³⁰ Section 76.640 of the Commission's rules required cable operators to meet the 2003 version of the SCTE 40 standard. 47 CFR § 76.640(b)(1)(i). The D.C. Circuit vacated that rule section in a 2013 decision, but given that nearly all QAM-based cable operators rely on the standard to comply with the separate security requirement in Section 76.1204(a)(1) of our rules, we believe operators will continue to rely on the standard for the foreseeable future. *See Accessibility of User Interfaces, and Video Programming Guides and Menus*, Report and Order and Further Notice of Proposed Rulemaking, 28 FCC Rcd 17330, 17345, n.70 (2013) (citing *EchoStar Satellite L.L.C. v. FCC*, 704 F.3d 992 (D.C. Cir. 2013)).

³¹ NCTA Reply at 7 ("The cable and consumer electronics industry have relied on [SCTE 40's] specifications in system and equipment design.").

³² *See* NCTA Comments at 7 ("Operators . . . should be allowed to show compliance with the digital technical standards by certifying that the system is designed to provide good quality signals per SCTE 40 and that the system complies with those technical standards") and ACA Comments at 9 ("ACA supports NCTA's proposal that cable system operators be allowed to show compliance with the digital technical standards by certifying that the system is designed to provide good quality signals per SCTE 40 and that the system complies with those technical standards."). *See also* NYC DoITT Comments at 1 ("the City supports most of the specific standards described in the Notice").

technical operation and signal quality,” as required by Section 624(e) of the Act.³³ Consistent with Section 624(e)’s requirement that we update the standards in our rules “periodically to reflect improvements in technology”³⁴ and to reflect the technology that cable operators rely on today,³⁵ we incorporate the current version of SCTE 40, which was adopted in 2016.³⁶

9. The City of New York suggests that we set a timeframe for when we will next review these standards.³⁷ We agree that updating these performance standards in a timely manner is important, but because the SCTE standard is not updated on a set schedule, we do not believe that we need to develop a rigid timeline for review. The SCTE originally adopted the SCTE 40 standard in 2001, and updated it in 2003, 2004, 2011, and 2016.³⁸ If the SCTE updates the standard again, and the standard does not change fundamentally, we delegate rulemaking authority to the Media Bureau to update the Commission’s rules to reference the newest standard.

2. Non-QAM Based Proof of Performance Standard

10. We will delay adopting a proof-of-performance standard for non-QAM cable providers, such as Internet Protocol television (IPTV)-based providers, because the record before us does not include any minimum technical standards that could apply to non-QAM signals. As stated above, in the *Digital Cable Standards NPRM*, the Commission sought comment on whether any industry standards exist for signal quality in non-QAM digital cable systems.³⁹ Although the National Telecommunications Cooperative Association and The Organization for the Promotion and Advancement of Small Telecommunications Companies (NTCA/OPASTCO) reference certain standards that “may apply to IPTV systems,” they note that “these best practices and standards are relatively new, and a number of [rural local exchange carrier] IPTV systems utilizing many different types of equipment and software were deployed prior to their development and release” so they may not apply to all IPTV systems.⁴⁰ No other comments recommended a standard that could apply to these systems. Accordingly, we believe it would be better to allow industry more time to reach consensus on a non-QAM-specific proof-of-performance standard before adopting a standard for regulatory purposes. When parties can identify and

³³ 47 U.S.C. § 544(e). Several commenters argue that the Commission did not adequately justify the proposed proof-of-performance rules set forth in the *Digital Cable Standards NPRM*. CenturyLink Comments at 2, NTCA/OPASTCO Comments at 2-3; Verizon Comments at 1, Verizon Reply at 2. As discussed below, we depart from aspects of the proposed rules that commenters vigorously opposed. The light-touch proof-of-performance rules we adopt in this Report and Order will reduce malfunctions by setting minimum industry technical standards that are designed to ensure cable operators deliver high quality signals. NCTA Comments at 8; NATOA Comments at 12.

³⁴ 47 U.S.C. § 544(e).

³⁵ See H. Mark Bowers, *A Review of FCC Proof-of-Performance Testing Requirements*, BROADBAND LIBRARY, <https://broadbandlibrary.com/fcc-pop-testing/>.

³⁶ Although the *NPRM* asked about the 2011 version of the SCTE 40 standard, see *Digital Cable Standards NPRM*, 27 FCC Rcd at 9684, para. 10, the successor standard, SCTE 40 2016, is identical to the SCTE 40 2011 apart from minor changes to the preamble notice to the document, which has no effect on the technical requirements of the standard. Compare Digital Cable Network Interface Standard, SCTE 40 2016, <http://www.scte.org/SCTEDocs/Standards/SCTE%2040%202016.pdf> with Digital Cable Network Interface Standard, SCTE 40 2011, http://www.scte.org/documents/pdf/standards/SCTE_40_2011.pdf. Accordingly, because the technical requirements of the 2011 and 2016 versions are identical and the regulatory burdens are identical, we incorporate the 2016 version by reference into our rules to ensure our rules reflect current industry practice and the up-to-date version available from SCTE.

³⁷ NYC DoITT Comments at 5.

³⁸ See SAI Global, SCTE 40, History, <https://infostore.saiglobal.com/en-us/Standards/SCTE-40-2016-1881148/>.

³⁹ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9686, para. 14.

⁴⁰ NTCA/OPASTCO Comments at 4.

recommend applicable proof-of-performance standards, then we will revisit this issue. We note that in the meantime, under our existing rules non-QAM providers must work with LFAs to address any complaints regarding signal quality.⁴¹

11. We will not require non-QAM operators to submit proof-of-performance plans for Commission approval, which is a scheme upon which the Commission sought comment in the *Digital Cable Standards NPRM*.⁴² Cable operators that use technologies other than QAM to deliver video strongly oppose that process as overly burdensome; they argue that non-QAM operators are small and do not have in-house resources to develop signal quality standards and testing regimes in the absence of an industry standard.⁴³ We find commenters' arguments persuasive; this process would put too large a burden on small cable operators, and likely would result in a variety of metrics rather than a standard as Section 624(e) requires.⁴⁴

12. We are not persuaded by NATOA's argument that this case-by-case scheme would "provide regulatory clarity, promote competitive neutrality, and ensure that subscribers to such non-QAM systems enjoy technical and signal quality protections comparable to those enjoyed by subscribers to more traditional QAM-based systems."⁴⁵ To the contrary, such a scheme would provide no regulatory clarity because each operator would need to develop a testing plan without any guidance from the Commission. It would impose heavier burdens on non-QAM providers than their QAM-based competitors that will follow SCTE 40 rather than develop performance standards in-house.

13. We also reject NATOA's proposal that [e]ach channel tested for proof-of-performance should be observed for at least two minutes and the results of this observation recorded" by the cable operator.⁴⁶ A regime that required that proposal would be subjective, non-technical, and would not be standardized. Accordingly, we do not believe that such a proposal is the type of "minimum technical standard" contemplated under Section 624(e).

3. Testing, Certification, and Recordkeeping

14. We conclude that we need not require the testing regime (and attendant certification and recordkeeping requirements) proposed in the *Digital Cable Standards NPRM*.⁴⁷ We come to this conclusion because cable operators have demonstrated that if they design, deploy, and maintain systems that meet or exceed the specifications in SCTE 40, then they are able to deliver good-quality video and audio to their subscribers without testing.⁴⁸ As ACA and NCTA point out, the error correction inherent in QAM service helps ensure consistent quality for subscribers.⁴⁹ In addition, digital signals are less susceptible to errors introduced by noise and the picture degradation that amplifiers add to analog

⁴¹ 47 CFR § 76.1713.

⁴² The Commission asked whether "to establish a case-by-case approach whereby the non-QAM digital cable systems would demonstrate that they are providing a 'good quality signal' to their customers by submitting a plan for Commission approval." *Digital Cable Standards NPRM*, 27 FCC Rcd at 9686, para. 15. The plan, which would have included testing and documentation, "would contain a set of parameters, whether electrical signal characteristics, MPEG stream characteristics or other metrics to demonstrate signal quality." *Id.*

⁴³ See NTCA/OPASTCO Comments at 6.

⁴⁴ 47 U.S.C. § 544(e).

⁴⁵ NATOA Comments at 14-15.

⁴⁶ NATOA Comments at 17.

⁴⁷ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9684-5, 9687-9, paras. 11-12, 16-22.

⁴⁸ NCTA Reply at 3, 9 ("The SCTE 40 parameters are designed to capture any systemic picture quality issue.").

⁴⁹ ACA Reply at 6; NCTA Comments at 5.

signals.⁵⁰ Nonetheless, some LFA commenters reported problems with pixelation, tiling,⁵¹ and loss of audio.⁵² These appear to be isolated incidents, rather than a continuation of a trend of poor signal quality that existed when cable operators delivered analog signals,⁵³ and the Commission has received few complaints about cable operators' signal quality. Even if there were a trend of poor quality, the record does not reflect that testing would yield any additional information necessary to ensure quality signals.

15. Moreover, according to the record, the costs associated with testing are high and outweigh the benefits that a federal testing mandate would provide. NCTA states that due to equipment and personnel costs,⁵⁴ testing for compliance with SCTE 40 can cost "just under a million dollars to multiple millions of dollars simply to conduct a one-time test" of all of a large cable operator's systems, and that testing can be disruptive to subscribers.⁵⁵ NATOA argues that "periodic test reports generate data that assist local authorities with complaint resolution, monitoring performance, and other regulatory responsibilities."⁵⁶ A rigid testing mandate is not necessary to achieve these benefits. Section 76.1713 of our rules requires cable operators to "establish a process for resolving complaints from subscribers about the quality of the television signal delivered," and maintain aggregate data about those complaints for purposes of Commission and LFA review.⁵⁷ This rule section already delivers the benefits that NATOA enumerates without a costly, rigid testing requirement.⁵⁸

⁵⁰ ACA Reply at 6.

⁵¹ Pixelation and tiling refer to when an image appears blocky because "pixels in the same area take the same value of color, forming a block of pixels . . . which is very noticeable to the human eye." Juan Pedro López et al, *Tiling Effect in Quality Assessment for High Definition Digital Television*, IEEE International Symposium on Consumer Electronics, available at <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=4559465>. We believe that commenters may also use this term to refer to "tearing" glitches where a signal does not deliver all of the information necessary to render the picture and as a result the television displays several blocks of the picture in black or in the incorrect color. See *Digital Cable Standards NPRM*, 27 FCC Rcd at 9686, n.47; Definition of Pixelated, PCMag, <http://www.pcmag.com/encyclopedia/term/49324/pixelated> (last visited Feb. 8, 2017).

⁵² See Arlington County, VA Reply at 2; Montgomery County, MD Reply at 2; Mt. Hood Cable Regulatory Commission Reply at 1; NATOA Comments at 5; NATOA Reply at 3-4.

⁵³ NCTA Reply at 3 ("The cable industry collectively serves more than 56 million customers, and a relative handful of complaints provides no justification for a twice-yearly prophylactic testing requirement by every cable operator in the United States. Operators will still be required to respond to a particular picture quality complaint. Operators will still test for digital signal quality at every new installation. And operators will still be required to show compliance with the technical standards upon request by the FCC or a local franchising authority.") (citing 47 CFR §§ 76.1713, 76.1717).

⁵⁴ Letter from Diane B. Burstein, Vice President and Deputy General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, MB Docket. No. 12-217 (filed June 27, 2017).

⁵⁵ Letter from Diane B. Burstein, Vice President and Deputy General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, MB Docket. No. 12-217 (filed May 25, 2017).

⁵⁶ NATOA Reply at 7.

⁵⁷ 47 CFR § 76.1713.

⁵⁸ Although we decline to adopt a federal testing mandate, nothing in this Order prevents local franchising authorities from including testing regimes in their franchising agreements. In this regard, we note that Section 626(c)(1)(B) requires LFAs to consider whether "the quality of the operator's service, including signal quality . . . has been reasonable *in light of community needs*." 47 U.S.C. § 546(c)(1)(B) (emphasis added). Thus, although we are not persuaded that testing for compliance with SCTE 40 is necessary to determine whether service quality is reasonable in *all* communities, we recognize that each community's needs vary and cable operators and LFAs may tailor their local franchising agreements to include testing regimes that will allow LFAs "to evaluat[e] franchisee compliance with Section 626(c)(1)(B) at the time of renewal." See NATOA Reply at 9. Any such local testing requirements must use SCTE 40 parameters. See *Cable Television Technical and Operational Requirements Review of the Technical and Operational Requirements Of Part 76, Cable Television*, 7 FCC Rcd. 2021, 2033 (1992)

(continued....)

16. Nor does the statute require a testing regime. Rather, the statute directs us to establish “minimum technical standards,”⁵⁹ and neither the Act nor the legislative history indicates that Congress wanted the Commission to require tests in the absence of service problems.⁶⁰ When a consumer complains about signal quality, the cable operator and the local franchisor are better suited than the Commission to work to resolve the problem using industry-standard methods and recommended practices.⁶¹ We invite LFAs and others to keep us informed about the complaints that they receive from their residents; we will consider adopting more rigorous requirements if systemic signal quality problems are demonstrated.

17. Finally, with respect to analog testing, we adopt the Commission’s proposal to “simplify the formula by which . . . operators determine how many channels must be tested to ensure compliance with the proof-of-performance rules.”⁶² Specifically, the Commission proposed to require cable operators to test five channels on systems with a channel capacity of less than 550 MHz, and to require cable operators to test ten channels on systems with a channel capacity of 550 MHz or more. NCTA is the only commenter to address this proposal and “agree[s] with the effort to reduce the number of channels that must be tested to demonstrate compliance with the technical standards.” We adopt this rule for the same reasons the Commission proposed it: the rule change “simplifies compliance for all operators and will continue to ensure that a sufficient representative sample of channels is tested to accurately reflect the experience consumers receive.”⁶³

4. Subjective Tests and Set-Top Boxes

18. We also decline to adopt subjective picture quality and set-top box quality rules. In the *Digital Cable Standards NPRM*, the Commission noted that cable operators could reduce a channel’s visual quality via compression even if the signal itself remains strong and error free.⁶⁴ To address this concern, the Commission sought comment on whether to adopt a subjective visual picture quality and auditory sound quality test to ensure that digital cable subscribers receive high quality television images and sound. The Commission also sought comment on whether set-top boxes should play a role in how we assess picture quality of digital cable signals, because set-top boxes can affect the quality of the picture that the viewer sees.⁶⁵ We find that the record is insufficient to take any action on these two items, producing neither standards for perceived video quality nor the output of set-top boxes. As some parties

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(“preclud[ing] local [technical] standards different from those established [by the Commission], whether more strict or more lenient” and explaining that the Commission’s “long standing policy of preempting technical standards other than our own has proven to be effective in ensuring that interstate communications, technical innovation, and service to the public are not hindered by conflicting regulations set at the local level...”); *see also City of New York v. FCC*, 486 U.S. 57 (1988) (upholding Commission decision to pre-empt state and local cable technical standards).

⁵⁹ 47 U.S.C. § 544(e).

⁶⁰ H.R. REP. 102-628, at 37-38 (1992).

⁶¹ *See* Montgomery County, MD Reply at 5; NATOA Comments at 8 (“Without current documentation provided by a regular testing regimen prescribed by the Commission, local authorities will not have readily available data to determine whether or not an operator is maintaining compliance with the Commission’s performance standards.”). We disagree with these commenters. We believe that the first line of readily available data will come from consumer complaints. If consumers do not complain about performance, then the presumption should be that the system’s performance is adequate. If there are consumer complaints, then the operator will remedy the problems per the process it has established under our rules. 47 CFR § 76.1713.

⁶² *Digital Cable Standards NPRM*, 27 FCC Rcd at 9687, para. 17.

⁶³ *Id.*

⁶⁴ *Id.* at 9683, para. 9.

⁶⁵ *Id.* at 9690, para. 23.

point out, subjective tests are, by their nature, difficult to administer.⁶⁶ Moreover, the record has not demonstrated that there is a serious problem regarding picture quality that we need to address. Therefore, we decline to extend proof-of-performance beyond the signal quality provided to the consumer's home by the MVPD.⁶⁷ We also reject the suggestion that we require proof-of-performance tests for CableCARDs⁶⁸ because, as NCTA points out, CableCARDs are responsible solely for decryption of cable programming and do not affect signal quality or display.⁶⁹

5. New Technologies and Requests for Exemption

19. Six cable operators have filed requests for exemption from our proof-of-performance rules because those operators cannot apply the analog standards to their digital systems.⁷⁰ To the extent these operators utilize QAM-based technologies,⁷¹ as discussed above, we conclude that their adherence to SCTE 40 ensures good signal quality. Accordingly, we dismiss as moot those requests for exemption from the proof-of-performance rules consistent with this order and instruct these cable operators and the rest of the cable industry deploying QAM-based technologies to adhere to SCTE 40 2016, as required by our new proof of performance rule.

20. For the request pertaining to a non-QAM-based system,⁷² and for other operators who use non-QAM and non-analog technologies, such as those based on Internet Protocol video over fiber-optics, we will simply retain the duty of those operators to establish and use a process to resolve customer complaints for now and will not require them to adhere to SCTE 40, which does not align technically with the design of their systems.⁷³ As we explain above, we believe it would be better to allow industry more time to reach consensus on a non-QAM-specific proof-of-performance standard before adopting a standard for regulatory purposes since the record before us does not include any minimum technical standards that could apply to non-QAM signals. If the Commission establishes metrics-based or testing-based rules in the future to cover those non-QAM technologies, those operators will be subject to those rules. As a result, we dismiss as moot the petition for exemption filed by a non-QAM system operator.

B. Digital Cable Signal Leakage

21. In this Section, we adopt the signal leakage rules for digital cable systems proposed in the

⁶⁶ See, e.g., NCTA Comments at 11 (“Our review of existing technical resources has located no reliable and consistent way to take all these variables into account... [a]ny testing that has been developed to date is expensive and not amenable to unambiguous test results”).

⁶⁷ While the quality of the picture might vary depending on the quality of the set-top box, a set-top box does not affect the quality of the cable operator's signal. In any event, we note that there are currently no industry performance standards regarding digital set-top boxes or their outputs and that there is little if any evidence that set-top boxes are a meaningful cause of poor video quality..

⁶⁸ NYCDoITT Comments at 4-5.

⁶⁹ NCTA Reply at 11.

⁷⁰ *RCN Corporation Petition for Special Relief*, CSR-8166 and CSR-8301-Z (2010), *Bend Cable Communications, LLC, Petition for Special Relief*, CSR-8294-Z (2010), *Petition of the City of Burlington, VT, D/B/A Burlington Telecom, for Relief from Proof of Performance Testing*, CSR-8273-Z (2009), *Massillon Cable TV, Inc. and Clear Picture, Inc., Petition for Special Relief*, CSR-8274-Z (2010), *Jackson Energy Authority Petition for Special Relief*, CSR-6936-Z (2005); *Service Electric Cablevision, Inc. Petition for Waiver of Sections 76.601, 76.605(a), and 76.1704 of the Commission's Rules* (2013).

⁷¹ RCN, Bend Cable Communications, Massillon Cable TV, Jackson Energy Authority, and Service Electric Cablevision operate QAM-based systems.

⁷² The City of Burlington operates a non-QAM system.

⁷³ See 47 CFR § 76.1713.

Digital Cable Standards NPRM with minor modifications.⁷⁴ In the *NPRM*, the Commission explained the purpose of our cable signal leakage rules:

MVPDs that operate coaxial cable plants (“coaxial cable systems”) use frequencies allocated for myriad over-the-air services within their system. Under ideal circumstances, those signals are confined within the cable system and do not cause interference with the over-the-air users of those frequencies. However, under certain circumstances, a coaxial cable plant can “leak” and interfere with over-the-air users of spectrum.⁷⁵

To prevent this interference, the Commission’s rules impose four major requirements. First, MVPDs that operate coaxial cable plants (referred to as simply “MVPDs” below) must notify the Commission and provide geographic information about their systems before they use frequencies in the aeronautical radio frequency bands above an average power level equal to or greater than 10^{-4} watts across a 25 kHz bandwidth in any 160 microsecond time period.⁷⁶ The Commission refers to this requirement as the Aeronautical Frequency Notification (“AFN”) requirement.⁷⁷ Second, MVPDs must offset their channels to minimize interference from analog coaxial cable systems to aircraft communication and aircraft navigation services, such as the Instrument Landing System and VHF Omnidirectional Range service.⁷⁸ Third, MVPDs⁷⁹ must ensure that their system design, installation and operation comply with the rules and conduct compliance testing four times per year.⁸⁰ Finally, MVPDs must calculate their cumulative signal leakage and report their results to the Commission once per year.⁸¹

22. These requirements protect against interference from analog signals, but have not been updated to protect against interference from digital signals. Therefore, in the *Digital Cable Standards NPRM*, the Commission proposed to update the signal leakage rules to apply to digital operations. First, the Commission proposed a trigger of 10^{-5} watts average power over a 30 kHz bandwidth in any 2.5 millisecond time period for the AFN requirement with respect to digital signals.⁸² The Commission explained that this proposed trigger would impose only limited burdens on cable operators because it would affect a small number of systems and was vital to prevent interference to aeronautical users and international satellite search and rescue services.⁸³ Second, the Commission proposed not to apply the

⁷⁴ These rules apply to all digital systems that use coaxial cable in their systems.

⁷⁵ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9691, para. 26.

⁷⁶ 47 CFR § 76.1804.

⁷⁷ See Aeronautical Frequency Notification Q and A, <https://www.fcc.gov/media/engineering/aeronautical-frequency-notification-q-and-a>.

⁷⁸ 47 CFR § 76.612.

⁷⁹ In addition to traditional cable operators, the term “MVPD” includes private cable operators who provide service without using public rights of way via coaxial cable plants (for example, those that serve hotels, motels, hospitals, apartment buildings, private settlements, and university campuses). These MVPDs must comply with the signal leakage rules. MVPDs with fewer than 1000 subscribers are exempt from the recordkeeping requirements. See 47 CFR § 76.1700(a).

⁸⁰ 47 CFR § 76.614.

⁸¹ See 47 CFR § 76.611(a)(1) (operators must conduct a complete cumulative leakage index (“CLI”) calculation every 12 months), and 47 CFR § 76.1803 (operators must report the results of their CLI testing to the Commission).

⁸² *Digital Cable Standards NPRM*, 27 FCC Rcd at 9693, para. 30 (citing *Amendment of Part 76 of the Commission’s Rules to Extend Interference Protection to the Marine and Aeronautical Distress and Safety Frequency 406.25 MHz*, MB Docket No. 03-05, Report and Order, 19 FCC Rcd 7244, 7248 (2004)).

⁸³ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9694-5, para. 31.

channel frequency offset requirement to digital signals.⁸⁴ The Commission reasoned that the analog channel frequency offset does not make sense to apply to digital signals because the offset is meant to offset the peak power of a signal from interfering with aeronautical frequencies, but digital signals, unlike analog signals, distribute their power evenly throughout the 6 MHz channel.⁸⁵ Third, because the Commission proposed not to adopt a digital signal offset, the Commission proposed to correlate the maximum leakage level for digital signals to that of analog signals, and to require digital leakage in excess of this threshold to be noted and repaired within a reasonable time.⁸⁶ The Commission reasoned that this change would help prevent harmful interference due to cable signal leakage.⁸⁷ As discussed below, we adopt slightly revised versions of each of these proposals.

23. Finally, the Commission sought comment on miscellaneous issues, each of which is discussed below, including whether to change the signal leakage testing methodology,⁸⁸ whether and how to test for leakage in bands above 400 MHz,⁸⁹ and a proposal to modify the formula for calculating the cumulative leakage index (“CLI”).⁹⁰

1. Aeronautical Frequency Notifications

24. We adopt the digital AFN filing trigger proposed in the *Digital Cable Standards NPRM* (10⁻⁵ watts over a 30 kHz bandwidth in any 2.5 millisecond time period),⁹¹ and clarify that this filing trigger will apply to digital signals only; the analog trigger will not change. The Commission tentatively concluded in the *NPRM* that the power threshold should remain unchanged when considering interference from digital, rather than analog, coaxial cable systems, but that the measurement window needed to be adapted. The Commission based its proposal on the fact that unlike analog signals, digital signals distribute power relatively evenly throughout the channel and, therefore, throughout the bandwidth of the devices receiving the interference.

25. NCTA suggests two revisions to the Commission’s proposal. First, NCTA argues that the Commission’s proposed rule would require cable systems that “operate aural subcarriers of analog television channels at levels that fall between 10⁻⁴ watts and 10⁻⁵ watts” to file AFNs.⁹² NCTA asserts that requiring operators that carry analog signals at those levels to file AFNs would have no effect on public safety, and would burden cable operators.⁹³ Instead NCTA suggests that the new power level trigger should apply to digital signals only, and the analog level should remain unchanged. NCTA’s recommendation is consistent with the intent of the Commission’s proposal in the *Digital Cable Standards NPRM*, which was to trigger the AFN filing requirement only for systems that had withdrawn their AFNs because they operate at a power level lower than the analog threshold, but operate at a power higher than the digital threshold that we adopt here.⁹⁴ Therefore, we adopt NCTA’s recommendation.

⁸⁴ *Id.* at 9695, para. 32.

⁸⁵ *Id.*

⁸⁶ *Id.* at 9695-6, paras. 33-35.

⁸⁷ *Id.*

⁸⁸ *Id.* at 9696, para. 36.

⁸⁹ *Id.* at 9697, para. 38.

⁹⁰ *Id.* at 9697-8, para. 39.

⁹¹ See *id.* at 9693-4, paras. 29-31. (citing *Amendment of Part 76 of the Commission’s Rules to Extend Interference Protection to the Marine and Aeronautical Distress and Safety Frequency 406.25 MHz*, MB Docket No. 03-05, Report and Order, 19 FCC Rcd 7244, 7248 (2004)).

⁹² NCTA Comments at 19.

⁹³ NCTA Comments at 19.

⁹⁴ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9694, para. 31.

26. NCTA also suggests that the Commission align the power threshold for digital signal notifications with the power thresholds discussed in Section III.B.3 below by lowering the AFN threshold by a commensurate amount.⁹⁵ We decline to adopt this recommendation. We believe that the threshold for giving the Commission notice of a system's operation, location, and reach should be keyed to the protection of the Marine and Aeronautical Distress and Safety frequency.⁹⁶ The burden of filing a one-time notification is low, and the benefit to public health and safety of being able to identify potential sources of interference is significant.

27. We exempt all-fiber-optic cable systems from the AFN filing trigger and instead allow cable operators with such systems to notify the Commission that the system operates below the relevant power level. Verizon asserts that the signal leakage rules should not apply to operators that, like Verizon, rely primarily on fiber optic systems that are less likely to leak electromagnetic signals.⁹⁷ Verizon explains that its cable service is "delivered over a fiber optic network that delivers signals to customer premises over fiber optic cables using optical wavelengths," and that "[s]uch a network would not represent any threat of interference, because fiber optic cables do not use RF frequencies."⁹⁸ It further explains that its optical network terminal "has been designed and built in a manner that operates at a low power level – below the thresholds that would trigger testing under current signal leakage testing standards."⁹⁹ We agree that all-fiber-optic systems pose less interference risk than other systems and should be subject to less burdensome signal leakage requirements. Specifically, because fiber optic systems with optical network terminals at the customer premises pose minimal risk of signal leakage, such systems need only report in the existing Form 321, Aeronautical Frequency Notification, that their power level is sufficiently low to qualify for a filing exemption.¹⁰⁰ Such cable operators may choose this option instead of complying with the digital AFN filing trigger. Cable operators that do not have optical network terminals at the customer premises or are unable to certify that they operate below a digital threshold of 37.55 dBmV must comply with the digital AFN filing trigger.¹⁰¹ We find that this approach will appropriately enable cable operators that are unlikely to cause harmful interference to continue their current practice with regard to signal leakage reporting, while still ensuring that the Commission is informed of potential interference risks.¹⁰²

⁹⁵ NCTA Comments at 19-20 ("While the Notice proposes to reduce the power threshold for digital signals in the aeronautical band by 1.2 dB, it proposes to require AFN notification for operation in the band at a much lower threshold – a 10 dB reduction . . . the two signal leakage rules should marry up so that the threshold for digital signal notifications should also be changed to 75.85 microwatts across a 25 kHz bandwidth in any 160 microsecond period.").

⁹⁶ See 47 CFR § 76.616.

⁹⁷ Verizon Comments at 14-16. ITTA supports Verizon's position, and no party disagrees with it. ITTA-The Voice of America's Broadband Providers (ITTA) Reply at 11. ("At a minimum, the Commission should clarify that all-fiber networks are not subject to signal leakage testing requirements"). See NATOA Comments at 9-10 (arguing that all-fiber systems should have performance testing requirements, but remaining silent with regard to signal leakage requirements).

⁹⁸ *Id.* at 15.

⁹⁹ *Id.* at 16. Verizon could seek waiver of our rules if it could demonstrate that its systems pose no threat of signal leakage. See 47 CFR §§ 1.3, 76.7.

¹⁰⁰ See <https://www.fcc.gov/media/engineering/aeronautical-frequency-notification>.

¹⁰¹ See 47 CFR § 76.610.

¹⁰² While we understand that the fiber optic portions of a cable system do not carry RF signals and therefore cannot introduce harmful interference, we note that it is possible that the optical network terminals a cable operator installs at its subscribers' residences and the inside wiring in its subscribers' homes could leak, which theoretically could cause interference to aeronautical frequencies. Any cable operator that is made aware of such interference, via complaints or otherwise, must immediately attempt to resolve the issue and report it to the Commission.

2. Channel Frequency Offsets

28. As proposed in the *Digital Cable Standards NPRM*,¹⁰³ we decline to apply the channel frequency offset requirements that apply to analog signals to digital signals. Analog television channel power levels are significantly higher at the center frequencies of the subcarriers contained within the channel. Digital television channel power levels do not share this characteristic because a digital signal does not concentrate all of its power in a narrow carrier.¹⁰⁴ For this reason, the Commission's rules require cable operators to offset their subcarriers from lining up directly with Instrument Landing System (ILS), VHF Omnidirectional Range service (VOR), or communications carriers.¹⁰⁵ With the offset, when a signal leaks it will not align with those important carriers and it will not impact the protected signal as severely as it would without an offset. In the *Digital Cable Standards NPRM*, the Commission proposed not to apply the channel frequency offset requirement to digital signals because digital signals do not have analog signals' peak power characteristic.¹⁰⁶ Commenters agreed with this reasoning.¹⁰⁷ For the same reasons that the Commission offered in the *NPRM*, we conclude that the frequency offset requirement would be useless with respect to digital signals.

3. Analog to Digital Interference Equivalency

29. We adopt rules for general signal leakage limits and for the cumulative leakage index (CLI) that were proposed in the *NPRM*, with some modifications to provide cable operators with flexibility in the ways they test to demonstrate compliance. Because we cannot use the offset requirement to ensure that the strongest part of the signal does not interfere with ILS, VOR, or communications carriers, the Commission proposed to correlate the signal leakage limits for digital channels to those for analog channels. Specifically, it proposed to adjust the signal leakage threshold for digital signals to 1.2 dB less than the analog threshold. The Commission reasoned that because a digital signal does not concentrate all of its power in a narrow carrier like an analog signal does and because an aircraft receiver's bandwidth should be no wider than 25 kHz, the resulting increase in potential interference is 1.2 dB.¹⁰⁸ The Commission proposed to amend the general signal leakage rule¹⁰⁹ (including the signal leakage monitoring, logging, and repair rule)¹¹⁰ and the CLI rules¹¹¹ accordingly.

30. *General Signal Leakage.* We adopt the proposed general signal leakage limit that the Commission proposed for digital signals. NATOA and NCTA were the only commenters that addressed

¹⁰³ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9694-5, para. 32

¹⁰⁴ *Id.* at 9694, para. 32.

¹⁰⁵ 47 CFR § 76.612.

¹⁰⁶ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9694, para. 32.

¹⁰⁷ NCTA Comments at 20; Verizon Comments at 14.

¹⁰⁸ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9695, para. 33 (“Comparing the average power level of a digital cable signal to the peak power level of an analog signal, the digital signal creates substantially less interference. Specifically, the peak power of the analog visual carrier is narrowly constrained, delivering essentially all of its power directly into the 25 kHz receiver front-end. A digital signal operating at a particular average power over 6 MHz delivers only a small subset of its power into any particular 25 kHz bandwidth. This results in a digital signal operating at a particular average power level across a 6 MHz channel delivering 23.8 dB less power into a receiver having a 25 kHz bandwidth than an analog television signal operating at the same peak power. While the lack of frequency offsets increases the potential for signal interference to aviation receivers by 25 dB, the use of digital modulation decreases . . . the level of potential interference by 23.8 dB, resulting in a net increase in interference potential of 1.2 dB for a receiver having a 25 kHz bandwidth.”).

¹⁰⁹ 47 CFR § 76.605(a)(12).

¹¹⁰ 47 CFR § 76.614. *See also* 47 CFR § 76.1706.

¹¹¹ 47 CFR §§ 76.610; 76.611(a)(1), (2).

the Commission's proposal to make the general signal leakage threshold for digital signals 1.2 dB lower than the analog threshold, and both supported the proposal.¹¹² For the reasons the Commission provided in the *Digital Cable Standards NPRM*,¹¹³ we conclude that the 1.2 dB reduction for digital signals is a technically sound proposal, and therefore we adopt it.

31. The Commission noted that this change could require cable operators that carry digital signals to obtain more sensitive leakage detection equipment because our rules require regular monitoring of systems that operate in the designated aeronautical communications bands.¹¹⁴ The Commission sought comment on the burdens that this would impose on cable operators and the extent to which they outweigh the benefits of signal leakage detection and prevention. In response, Arcom Digital, LLC described its low-cost QAM Snare system, which is sensitive enough to detect "QAM channel leakage signals that are as low as 0.13 μ V/m at 100 MHz and as low as 0.89 μ V/m at 700 MHz."¹¹⁵ NCTA described an alternative test methodology "that would allow cable operators to continue to use existing signal leakage detection equipment with the same sensitivity, measurement procedures, calculations and reporting."¹¹⁶ Under NCTA's proposal (the "David Large Methodology"), the cable operator simply carries a test signal that has an average power level equal to the power level of the strongest analog cable television carrier on the cable system.¹¹⁷ To ensure that digital signal leakage is at least 1.2 dB lower than analog signals, the cable operator keeps all digital signal power levels at least 1.2 dB lower than the test signal.¹¹⁸ Because Arcom Digital, LLC and NCTA have demonstrated multiple ways to achieve our intended result, we grant NCTA's request that the Commission not impose any specific test methodology, but rather adopt a flexible rule that would allow a cable operator to "demonstrate compliance using a different methodology."¹¹⁹ Our results-oriented regulation will ensure that cable operators monitor digital cable signal leakage in a less burdensome manner than the one we proposed.¹²⁰

32. *CLI*. We adopt the level that the Commission proposed to trigger the signal leakage rules, and clarify that proposal as NCTA requests. The Commission proposed to modify the level "at which the [signal leakage] rules become applicable, the threshold at which leaks must be included in the [CLI] calculation, and the maximum leakage and CLI permissible,"¹²¹ for digital signals consistent with

¹¹² NATOA Comments at 19; NCTA Comments at 20-21.

¹¹³ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9695-6, paras. 33-34.

¹¹⁴ *Id.* at 9695-6, para. 34 ("[T]he requirement for regular signal leakage monitoring requires the use of a detector capable of detecting a leak in excess of 20 μ V/m at 3 meters. Following our reasoning above, we propose to permit the use of analog detectors with this sensitivity when measuring analog signals in a system which operates no digital signals in the aeronautical bands, but to require analog and digital detectors to have sufficient sensitivity to detect the 1.2 dB decrease in the maximum signal leakage level we propose above, or 17.4 μ V/m, in those systems which operate digital signals in the aeronautical bands.").

¹¹⁵ Arcom Comments at 7.

¹¹⁶ NCTA Comments at 22.

¹¹⁷ *Id.* at 21-22.

¹¹⁸ NCTA Comments at 21-22 & Appendix B at 5. As NCTA explains, as long as the cable operator monitors this test signal, our rules require them to "log and promptly correct any problems." *Id.* at 23.

¹¹⁹ *Id.* at 22-23.

¹²⁰ This regulation also addresses the issue that the Commission raised in paragraph 37 of the *Digital Cable Standards NPRM*: "we propose to allow operators to choose to test either an analog carrier using either their existing analog signal leakage test equipment and an offset analog signal, or a digital carrier using new digital signal leakage test equipment" because, as the Commission stated, "[e]ither method should yield the same peak signal leakage from the coaxial cable plant." 27 FCC Rcd at 9697, para. 37.

¹²¹ *Id.* at 9696, para. 35.

the 1.2 dB reduction from the analog signal levels.¹²² NCTA states that under the David Large Methodology, “no additional change would be required to [the] CLI calculations since digital power levels would be required to be below the level of the leakage test signal.”¹²³ We find that NCTA’s proposal is consistent with the Commission’s reasoning in the *Digital Cable Standards NPRM*. Therefore, in a scenario where a cable operator maintains digital signals at least 1.2 dB below the analog leakage test signal, the operator may perform an “analog” test on the analog test signal and will be restricted to the maximum CLI for analog signals (64 for I_{∞}). However, we do not require operators to do this, and should they elect to carry digital signals at the same power levels as the analog test signal, or to test the digital signals directly, the reduced “digital” CLI applies.

4. Miscellaneous Issues

33. *Protecting Frequency Bands Above 400 MHz.* We decline to adjust our signal leakage rules at this time to reflect recent increases in the bandwidth that cable systems use. As the Commission noted in the *Digital Cable Standards NPRM*, the last time the Commission updated the signal leakage rules, “400 MHz was near the upper limit of the bandwidth of coaxial cable systems deployed,” but today “coaxial cable systems routinely deploy in excess of 750 MHz, and deployments of up to 1 GHz exist.”¹²⁴ Therefore, the Commission sought comment on potential and actual interference from coaxial cable systems to bands above 400 MHz.¹²⁵ While such interference may exist (particularly in the 700 MHz band),¹²⁶ there is insufficient evidence on the record to take action at this time.¹²⁷ We invite the public to file petitions for rulemaking with specific proposals on how to prevent interference in bands above 400 MHz.

34. *CLI Calculations.* We eliminate the I_{3000} method of calculating CLI as the Commission proposed because cable operators have abandoned it in favor of the more effective I_{∞} method.¹²⁸ The I_{∞} method of calculating CLI requires cable operators to treat all leaks equally, rather than discounting leaks the further they are from the geographic center of the cable system. In the *Digital Cable Standards NPRM*, the Commission reasoned that cable systems now cover much larger geographical areas than they did when the Commission first adopted the rules, which can make the I_{3000} formula an inadequate way to

¹²² *Id.* (“[This would result] in a threshold power level of 75.85 microwatts or 37.55 dBmV. Once an operator is subject to CLI, the operators may demonstrate compliance based either upon a Section 76.611(a)(1) ground-based measurement or by a Section 76.611(a)(2) airspace measurement. For ground-based measurements, operators must include analog leaks in excess of 50 μ V/m in the signal leakage index calculation, and an I_{3000} of less than or equal to -7 or I_{∞} of less than or equal to 64 is permissible. Therefore, by subtracting 1.2 dB from each of these components, we propose that digital leaks in excess of 43.6 μ V/m be included in the calculation (and reported to the Commission) and that the maximum acceptable I_{3000} becomes -8.2 and the maximum acceptable I_{∞} becomes 62.8. For airspace measurements, coaxial cable operators may not exceed a field strength of 10 μ V/m RMS at any point 450 meters above the average terrain of the coaxial cable system. Converting for digital leakage, the new maximum field strength becomes 8.7 μ V/m.”).

¹²³ NCTA Comments at 22.

¹²⁴ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9697, para. 38.

¹²⁵ *Id.*

¹²⁶ Letter from Daryl Rosenberger, President, Martech Engineering, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission at 1-2 (March 29, 2013); NATOA Comments at 19-20.

¹²⁷ We note that SCTE has released a technical report, SCTE 209 2015, “UHF Leakage, Ingress, Direct Pickup,” which “provides guidance and recommendations to cable operators on monitoring and measurement practices and procedures for mitigating cable signal leakage, ingress, and direct pickup in the UHF band.” SCTE 209 2015, “UHF Leakage, Ingress, Direct Pickup,” available at <https://www.scte.org/documents/pdf/Standards/SCTE%20209%202015.pdf>.

¹²⁸ *Digital Cable Standards NPRM*, 27 FCC Rcd at 9697-8, para. 39 (citing 47 CFR § 76.611).

detect significant leaks.¹²⁹ Accordingly, the Commission proposed to limit the application of I_{3000} to systems with a total geographic diameter of less than 160 km. We received no comments on this proposal,¹³⁰ and careful analysis of filings from operators over the last 10 years shows that the overwhelming majority of operators utilize the I_{∞} calculation.¹³¹ Therefore, in the interest of simplifying both the submission of information to the Commission, and simplifying the analysis of this data, we instead decide to eliminate the I_{3000} formula. Operators previously using I_{3000} will find that less data collection is necessary to submit an I_{∞} calculation, and so we find no reason to continue accepting and analyzing two separate calculation methods.

C. Part 76 Rules Cleanup and Other Matters

35. In the *Digital Cable Standards NPRM*, the Commission proposed to “remove references to effective dates that have passed, make editorial corrections, delete obsolete rules, update various technical standards that are incorporated by reference into our rules, and clarify language in Part 76 of our rules.”¹³² The proposed changes are non-substantive and were unopposed in the record. Accordingly, we adopt those proposals.¹³³ NATOA recommended several changes to Part 76 of our rules that go beyond

¹²⁹ The Commission provided the following example: “By calculation, we can determine that a single leak of 1340.05 $\mu\text{V}/\text{m}$ located at the center of a coaxial cable system results in that system exceeding the maximum allowable CLI. However, that leak, if located more than 80.32 km from the system center, would appear to be equivalent to a 50 $\mu\text{V}/\text{m}$ leak located at the system center. Such a leak would be potentially strong enough to interfere with aircraft receivers alone, but would not be captured in an I_{3000} measurement.” *Id.* at 9697-8, para. 39.

¹³⁰ We note that NCTA and NATOA did not discuss this issue in their comments, but both included the Commission’s proposed change in their respective mark-ups of the proposed rules that they submitted with their comments, which suggests that they support the change. *See* NCTA Comments at Attachment A at 9, NATOA Comments at Attachment 1 at 10.

¹³¹ Our review of 32,500 CLI reports filed with the Commission shows only 750 (2.3 percent) of the filings relied on an I_{3000} calculation.

¹³² *Digital Cable Standards NPRM*, 27 FCC Rcd at 9698, para. 40.

¹³³ In Appendix B we update Sections 76.55, 76.56, 76.57, 76.64, 76.105, 76.309, 76.606, 76.1508, 76.1509, 76.1510, 76.1601, 76.1602, 76.1610, and 76.1701 as proposed in the *Digital Cable Standards NPRM*. Specifically, as proposed in the NPRM, we (1) remove obsolete references to dates in Sections 76.56(b), 76.57(e), 76.64(a), 76.105(b), 76.309(c), 76.605 n.4, 76.606, 76.1601, and 76.1602; (2) correct citation references in Sections 76.56(a)(1)(i), 76.601, 76.610, 76.1508, 76.1509, 76.1510, and 76.1701(d); (3) eliminate the duplicative reporting requirements found in Section 76.1610(f) and (g); and (4) amend the note to Section 76.55(d). *See Digital Cable Standards NPRM*, 27 FCC Rcd at 9698-99, paras. 40-44. We make a clarification in Section 76.1510 by adding a cross reference to Section 76.610, a rule to which open video systems (OVS), as MVPDs, are subject. Further, we update the incorporation by reference in Section 76.602(c) to refer to the 2013 version of the standard, CTA-542-D, which supersedes the standard that the Commission initially proposed to incorporate in the *Digital Cable Standards NPRM*, CEA-542-C (the 2009 version). *Id.* at 9698-99, para. 43. CTA-542-D was not adopted until after the NPRM was released in 2012. For purposes of the channel allocation plan, the technical requirements of both the 2009 and 2013 versions of the standard are identical. We believe that incorporating by reference the updated standard better achieves marketplace reality *e.g.*, that “participants are adhering to the current versions of these standards, even though they are not required to by our rule,” without placing any additional burdens on regulatees. *Id.* Moreover, it would be impracticable to incorporate the CEA-542-C standard because it is no longer publicly available. *See* Preview and Purchase Consumer Technology Association Standards Documents, https://standards.cta.tech/kwspub/published_docs/. Finally, although we proposed to modify Sections 76.127(f), 76.1204(a), and 76.612(b) of the Commission’s rules in the NPRM, we do not modify those rules in this Order. Section 76.127 (satellite sports blackout) was previously deleted from the CFR. *See Sports Blackout Rules, Report and Order*, 29 FCC Rcd. 12053, App. B (2014)). Section 76.1204(a) (availability of equipment performing conditional access or security functions) contained an obsolete date, which already has been removed from the rule. *Expanding Consumers’ Video Navigation Choices Commercial Availability of Navigation Devices, Notice of Proposed Rulemaking and Memorandum Opinion and Order*, MB Docket No. 16-42, CS Docket No. 97-80, 31 FCC Rcd 1544 (2016). We also do not adopt any changes to Section 76.612(b).

our goal of updating our rules and making them easier to follow.¹³⁴ These proposals are substantive in nature, and are beyond the stated intent of this proceeding. Moreover, because NATOA's proposed rule changes were not raised for comment in the *Digital Cable Standards NPRM*, nor a logical outgrowth of the rule changes proposed in that NPRM, there is insufficient notice and comment under the Administrative Procedure Act for the Commission to adopt such proposals.¹³⁵ NATOA is free to file a petition for rulemaking regarding its proposals so that the public has opportunity to comment on its proposals.

IV. PROCEDURAL MATTERS

A. Regulatory Flexibility Act

36. *Final Regulatory Flexibility Analysis.* As required by the Regulatory Flexibility Act of 1980, as amended ("RFA"),¹³⁶ the Commission has prepared a Final Regulatory Flexibility Analysis ("FRFA") relating to this *Report and Order* in MB Docket No. 12-217. The FRFA is set forth in Appendix C.

B. Paperwork Reduction Act

37. The *Report and Order* contains new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 ("PRA"), Public Law 104-13. The requirements will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA. OMB, the general public, and other Federal agencies will be invited to comment on the information collection requirements contained in this proceeding. In addition, we note that pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. § 3506(c)(4), we previously sought specific comment on how the Commission might further reduce the information collection burden for small business concerns with fewer than 25 employees.

38. We have assessed the effects of the policies adopted in this *Report and Order* with regard to information collection burdens on small business concerns, and find that these policies will benefit many companies with fewer than 25 employees by adopting requirements that do not impose testing and reporting burdens, thereby substantially benefitting smaller businesses..

C. Congressional Review Act

39. The Commission will send a copy of the *Report and Order* in MB Docket No. 12-107 in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

D. Additional Information

40. For additional information on this proceeding, contact Jeffrey Neumann, Jeffrey.Neumann@fcc.gov (202) 418-2046.

V. ORDERING CLAUSES

41. Accordingly, **IT IS ORDERED** that, pursuant to the authority found in Sections 1, 4(i), 4(j), 301, 302a, 303, 307, 308, 624, and 624A of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 301, 302a, 303, 307, 308, 544, and 544a, this *Report and Order* **IS**

¹³⁴ *See* NATOA Comments at 22-24 (recommending changes to closed captioning, CableCARD, and channel deletion notice requirements).

¹³⁵ 5 U.S.C. § 553(b).

¹³⁶ *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et seq.*, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 ("SBREFA"), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996). The SBREFA was enacted as Title II of the Contract with America Advancement Act of 1996 ("CWAAA").

ADOPTED..

42. **IT IS ORDERED** that, pursuant to the authority found in Sections 1, 4(i), 4(j), 301, 302a, 303, 307, 308, 624, and 624A of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 301, 302a, 303, 307, 308, 544, and 544a, the Commission's rules **ARE HEREBY AMENDED** as set forth in Appendix B.

43. **IT IS FURTHER ORDERED** that the rules adopted herein **WILL BECOME EFFECTIVE** thirty (30) days after the date of publication in the *Federal Register*, except for sections 76.105(b), 76.601(b)(1), 76.1610, and 76.1804 which contain new or modified information collection requirements that require approval by the OMB under the PRA and **WILL BECOME EFFECTIVE** after the Commission publishes a notice in the *Federal Register* announcing such approval and the relevant effective date.

44. **IT IS FURTHER ORDERED** that the RCN Corporation Petitions for Special Relief, CSR-8166 and CSR-8301-Z, the City of Burlington, VT, D/B/A Burlington Telecom Petition for Relief from Proof of Performance Testing Obligations, CSR-8273-Z, the Massillon Cable TV, Inc. and Clear Picture, Inc. Petition for Special Relief, CSR-8274-Z, the Bend Cable Communication, LLC Petition for Special Relief, CSR-8294-Z, the Jackson Energy Authority Petition for Special Relief, CSR-6936-Z, and the Service Electric Cablevision, Inc. Petition for Waiver of Sections 76.601, 76.605(a), and 76.1704 of the Commission's Rules are **DISMISSED** as moot.

45. **IT IS FURTHER ORDERED** that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, **SHALL SEND** a copy of this *Report and Order* in MB Docket No. 12-217, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

46. **IT IS FURTHER ORDERED** that the Commission **SHALL SEND** a copy of this *Report and Order* in MB Docket No. 12-217 in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A**List of Commenters****Comments filed in MB Docket No. 12-217**

Arcom Digital, LLC
CenturyLink
National Association of Telecommunications Officers and Advisors
National Cable & Telecommunications Association
NYC Department of Information Technology & Telecommunications
Organization for the Promotion and Advancement of Small Telecommunications Companies & NTCA
Stephen Simonin
Verizon

Reply Comments filed in MB Docket No. 12-217

American Cable Association
Arlington County, VA (Robert Billingsley)
Montgomery County, MD
Mt. Hood Cable Regulatory Commission
National Association of Telecommunications Officers and Advisors
National Cable & Telecommunications Association
Sacramento Metropolitan Cable Television Commission
Mark Sokolow (late filed)
Verizon
Craig S. Wilson

APPENDIX B

Final Rules

The Federal Communications Commission amends Part 79 of Title 47 of the Code of Federal Regulations (CFR) as follows:

Part 76 of the Commission's rules are to be revised as follows:

PART 76 – Multichannel Video and Cable Television Service:

The Authority Citation for Part 76 continues to read as follows:

AUTHORITY: 47 U.S.C. 151, 152, 153, 154, 301, 302, 302a, 303, 303a, 307, 308, 309, 312, 315, 317, 325, 339, 340, 341, 503, 521, 522, 531, 532, 534, 535, 536, 537, 543, 544, 544a, 545, 548, 549, 552, 554, 556, 558, 560, 561, 571, 572, 573.

1. Revise § 76.55 to read as follows

§ 76.55 Definitions applicable to the must-carry rules.

* * * * *

Note to Paragraph (d): For the purposes of this section, **for over-the-air broadcast**, a good quality signal shall mean a signal level of either -45 dBm for analog VHF signals, -49 dBm for analog UHF signals, or -**61 dBm for digital signals (at all channels)** at the input terminals of the signal processing equipment, ~~or a baseband video signal.~~

* * * * *

2. Revise § 76.56 (a)(1)(i) and (b) to read as follows

§ 76.56 Signal carriage obligations.

(a) * * *

(1) * * *

(i) Systems with 12 or fewer usable activated channels, as defined in §76.5(oo) ~~§76.6(oo)~~, shall be required to carry the signal of one such station;

* * * * *

(b) *Carriage of local commercial television stations.* ~~Effective June 2, 1993,~~ A cable television system shall carry local commercial broadcast television stations in accordance with the following provisions:

(1) * * *

* * * * *

3. Revise § 76.57 (e) to read as follows

§ 76.57 Channel positioning.

* * * * *

(e) At the time a local commercial station elects must-carry status pursuant to §76.64, such station shall notify the cable system of its choice of channel position as specified in paragraphs (a), (b), and (d) of this section. A qualified NCE station shall notify the cable system of its choice of channel position when it requests carriage. ~~Channel positioning requests from local commercial stations shall be fulfilled by the cable operator no later than October 6, 1993.~~

* * * * *

4. Revise § 76.64 (a) to read as follows

§76.64 Retransmission consent.

(a) ~~After 12:01 a.m. on October 6, 1993,~~ No multichannel video programming distributor shall retransmit the signal of any commercial broadcasting station without the express authority of the originating station, except as provided in paragraph (b) of this section.

* * * * *

5. Revise § 76.105 (b) to read as follows:

§ 76.105 Notifications.

* * * * *

(b) : Broadcasters entering into contracts ~~on or after August 18, 1988,~~ which contain syndicated exclusivity protection shall notify affected cable systems within sixty calendar days of the signing of such a contract. ~~Broadcasters who have entered into contracts prior to August 18, 1988, and who comply with the requirements specified in §76.109 shall notify affected cable systems on or before June 19, 1989.~~ A broadcaster shall be entitled to exclusivity protection beginning on the later of:

(1) * * *

* * * * *

6. Revise § 76.309 (c) to read as follows:

§ 76.309 Customer service obligations.

* * * * *

(c) ~~Effective July 1, 1993,~~ Cable operators are subject to the following customer service standards:

(1) * * *

* * * * *

7. Revise § 76.601(b) to read as follows

§ 76.601 Performance tests.

(a) * * *

(b) The operator of each cable television system **that operates NTSC or similar channels** shall conduct ~~complete~~ performance tests of ~~that~~ **the analog channels on that** system at least twice each calendar year (at intervals not to exceed seven months), unless otherwise noted below. The performance tests shall be directed at determining the extent to which the system complies with all the technical standards set forth in § 76.605~~(a)~~ and shall be as follows:

(1) For cable television systems with 1000 or more subscribers but with 12,500 or fewer subscribers, proof-of-performance tests conducted pursuant to this section shall include measurements taken at six (6) widely separated points. However, within each cable system, one additional test point shall be added for every additional 12,500 subscribers or fraction thereof (e.g., 7 test points if 12,501 to 25,000 subscribers; 8 test points if 25,001 to 37,500 subscribers, etc.). In addition, for technically integrated portions of cable systems that are not mechanically continuous (~~i.e.~~ **e.g.**, employing microwave connections), at least one test point will be required for each portion of the cable system served by a technically integrated ~~microwave~~ hub. The proof-of-performance test points chosen shall be balanced to represent all geographic areas served by the cable system. At least one-third of the test points shall be representative of subscriber terminals most distant from the system input and from each microwave receiver (if microwave transmissions are employed), in terms of cable length. The measurements may be taken at convenient monitoring points in the cable network; ~~Provided that~~ data shall be included to relate the measured performance of the system as would be viewed from a nearby subscriber terminal. An identification of the instruments, including the makes, model numbers, and the most recent date of calibration, a description of the procedures utilized, and a statement of the qualifications of the person performing the tests shall also be included.

(2) Proof-of-performance tests to determine the extent to which a cable television system complies with the standards set forth in § 76.605~~(a)~~**(b)** (3), (4), and (5) shall be made on each of the NTSC or similar video channels of that system. Unless otherwise as noted, proof-of-performance tests for all other standards in § 76.605~~(a)~~**(b)** shall be made on a minimum of ~~four (4) channels plus one additional channel for every 100 MHz, or fraction thereof, of cable distribution system upper frequency limit (e.g., 5 channels for cable television systems with a cable distribution system upper frequency limit of 101 to 216 MHz; 6 channels for cable television systems with a cable distribution system upper frequency limit of 217–300 MHz; 7 channels for cable television systems with a cable distribution upper frequency limit to 300 to 400 MHz, etc.)~~ **five (5) channels for systems operating a total activated channel capacity of less than 550 MHz, and ten (10) channels for systems operating a total activated channel capacity of 550 MHz or greater.** The channels selected for testing must be representative of all the channels within the cable television system.

(i) The operator of each cable television system **that operates NTSC or similar channels** shall conduct semi-annual proof-of-performance tests of that system, to determine the extent to which the system complies with the technical standards set forth in § 76.605~~(a)~~**(b)**(4) as follows. The visual signal level on each channel shall be measured and recorded, along with the date and time of the measurement, once every six hours (at intervals of not less than five hours or no more than seven hours after the previous measurement), to include the warmest and the coldest times, during a 24-hour period in January or February and in July or August.

(ii) The operator of each cable television system **that operates NTSC or similar channels** shall conduct triennial proof-of-performance tests of its system to determine the extent to which the system complies with the technical standards set forth in § 76.605~~(a)~~**(b)**(11).

(c) * * *

* * * * *

8. Revise § 76.602(b)(7) to read as follows:

§ 76.602 Incorporation by Reference.

* * * * *

(c) The following materials are available from **the Consumer Technology Association, 1919 S. Eads St., Arlington, VA 22202; phone: 703-907-7600; or online at <https://www.cta.tech/Research-Standards/Standards-Listing.aspx>.**

(1) CTA-542-~~BD~~, “Cable Television Channel Identification Plan,” June ~~2003~~**2013**, IBR approved for §76.605

* * *

(d) * * *

(3) **ANSI/SCTE 40 2003**~~2016~~, “Digital Cable Network Interface Standard,” ~~2003~~**2016**, IBR approved for §§ **76.605**, 76.640.

* * * * *

9. Revise § 76.605 to read as follows

§ 76.605 Technical standards.

(a) The following requirements apply to the performance of a cable television system as measured at **the input to any subscriber terminal device** with a matched impedance at the termination point or at the output of the modulating or processing equipment (generally the headend) of the cable television system or otherwise **noted here or in ANSI/SCTE 40 2016. The requirements of subsection (b) of this section are applicable to each NTSC or similar video downstream cable television channel in the system. Each cable system that uses QAM modulation to transport video programming shall adhere to ANSI/SCTE 40 2016, “Digital Cable Network Interface Standard” (incorporated by reference, see § 76.602). Cable television systems utilizing other technologies to distribute programming must respond to consumer complaints under subsection (c).**

(b) For each NTSC or similar video downstream cable television channel in the system: ~~The requirements are applicable to each NTSC or similar video downstream cable television channel in the system.~~

(1)(i) The cable television channels delivered to the subscriber's terminal shall be capable of being received and displayed by TV broadcast receivers used for off-the-air reception of TV broadcast signals, as authorized under part 73 of this chapter; and

(ii) Cable television systems shall transmit signals to subscriber premises equipment on frequencies in accordance with the channel allocation plan set forth in ~~CEA-542-B~~**CTA-542-D**: “Standard: Cable Television Channel Identification Plan,” (Incorporated by reference, see § 76.602).

(2) The aural center frequency of the aural carrier must be 4.5 MHz \pm 5 kHz above the frequency of the visual carrier at the output of the modulating or processing equipment of a cable television system, and at the subscriber terminal.

(3) The visual signal level, across a terminating impedance which correctly matches the internal impedance of the cable system as viewed from the subscriber terminal, shall not be less than 1 millivolt across an internal impedance of 75 ohms (0 dBmV). Additionally, as measured at the end of a 30 meter (100 foot) cable drop that is connected to the subscriber tap, it shall not be less than 1.41 millivolts across an internal impedance of 75 ohms (+3 dBmV). (At other impedance values, the minimum visual signal level, as viewed from the subscriber terminal, shall be the square root of 0.0133 (Z) millivolts and, as measured at the end of a 30 meter (100 foot) cable drop that is connected to the subscriber tap, shall be 2 times the square root of 0.00662(Z) millivolts, where Z is the appropriate impedance value.)

(4) The visual signal level on each channel, as measured at the end of a 30 meter cable drop that is connected to the subscriber tap, shall not vary more than 8 decibels within any six-month interval, which must include four tests performed in six-hour increments during a 24-hour period in July or August and during a 24-hour period in January or February, and shall be maintained within:

(i) 3 decibels (dB) of the visual signal level of any visual carrier within a 6 MHz nominal frequency separation;

(ii) 10 dB of the visual signal level on any other channel on a cable television system of up to 300 MHz of cable distribution system upper frequency limit, with a 1 dB increase for each additional 100 MHz of cable distribution system upper frequency limit (e.g., 11 dB for a system at 301-400 MHz; 12 dB for a system at 401-500 MHz, etc.); and

(iii) A maximum level such that signal degradation due to overload in the subscriber's receiver or terminal does not occur.

(5) The rms voltage of the aural signal shall be maintained between 10 and 17 decibels below the associated visual signal level. This requirement must be met both at the subscriber terminal and at the output of the modulating and processing equipment (generally the headend). For subscriber terminals that use equipment which modulate and remodulate the signal (e.g., baseband converters), the rms voltage of the aural signal shall be maintained between 6.5 and 17 decibels below the associated visual signal level at the subscriber terminal.

(6) The amplitude characteristic shall be within a range of \pm 2 decibels from 0.75 MHz to 5.0 MHz above the lower boundary frequency of the cable television channel, referenced to the average of the highest and lowest amplitudes within these frequency boundaries. The amplitude characteristic shall be measured at the subscriber terminal.

(7) The ratio of RF visual signal level to system noise shall not be less than 43 decibels. For class I cable television channels, the requirements of this section are applicable only to:

(i) Each signal which is delivered by a cable television system to subscribers within the predicted Grade B **or noise-limited service** contour, **as appropriate**, for that signal;

(ii) Each signal which is first picked up within its predicted Grade B **or noise-limited service** contour, **as appropriate**;

(iii) Each signal that is first received by the cable television system by direct video feed from a TV broadcast station, a low power TV station, or a TV translator station.

(8) The ratio of visual signal level to the rms amplitude of any coherent disturbances such as intermodulation products, second and third order distortions or discrete-frequency interfering signals not operating on proper offset assignments shall be as follows:

(i) The ratio of visual signal level to coherent disturbances shall not be less than 51 decibels for noncoherent channel cable television systems, when measured with modulated carriers and time averaged; and

(ii) The ratio of visual signal level to coherent disturbances which are frequency-coincident with the visual carrier shall not be less than 47 decibels for coherent channel cable systems, when measured with modulated carriers and time averaged.

(9) The terminal isolation provided to each subscriber terminal:

(i) Shall not be less than 18 decibels. In lieu of periodic testing, the cable operator may use specifications provided by the manufacturer for the terminal isolation equipment to meet this standard; and

(ii) Shall be sufficient to prevent reflections caused by open-circuited or short-circuited subscriber terminals from producing visible picture impairments at any other subscriber terminal.

(10) The peak-to-peak variation in visual signal level caused by undesired low frequency disturbances (hum or repetitive transients) generated within the system, or by inadequate low frequency response, shall not exceed 3 percent of the visual signal level. Measurements made on a single channel using a single unmodulated carrier may be used to demonstrate compliance with this parameter at each test location.

(11) The following requirements apply to the performance of the cable television system as measured at the output of the modulating or processing equipment (generally the headend) of the system:

(i) The chrominance-luminance delay inequality (or chroma delay), which is the change in delay time of the chrominance component of the signal relative to the luminance component, shall be within 170 nanoseconds.

(ii) The differential gain for the color subcarrier of the television signal, which is measured as the difference in amplitude between the largest and smallest segments of the chrominance signal (divided by the largest and expressed in percent), shall not exceed $\pm 20\%$.

(iii) The differential phase for the color subcarrier of the television signal which is measured as the largest phase difference in degrees between each segment of the chrominance signal and reference segment (the segment at the blanking level of 0 IRE), shall not exceed ± 10 degrees.

(c) As an exception to the general provision requiring measurements to be made at subscriber terminals, and without regard to the type of signals carried by the cable television system, signal leakage from a cable television system shall be measured in accordance with the procedures outlined in § 76.609(h) and shall be limited as follows:

Frequencies	Signal leakage limit	Distance in meters (m)
Analog signals less than and including 54 MHz, and over 216 MHz	15 $\mu\text{V}/\text{m}$	30
Digital signals less than and including 54 MHz, and over 216 MHz	13.1 $\mu\text{V}/\text{m}$	30
Analog signals over 54 MHz up to and including 216 MHz	20 $\mu\text{V}/\text{m}$	3

Digital signals over 54 MHz up to and including 216 MHz	17.4 μV/m	3
--	---------------------------------	----------

(d) Cable television systems distributing signals by using methods such as ~~nonconventional coaxial cable techniques, noncoaxial copper cable techniques, specialized coaxial cable and fiber optical cable hybridization techniques or specialized compression techniques or specialized receiving devices~~ **other than 6 MHz NTSC or similar analog channels or 6 MHz QAM or similar channels on conventional coaxial or hybrid fiber-coaxial cable systems** and which, because of their basic design, cannot comply with one or more of the technical standards set forth in paragraphs (a) and (b) of this section, ~~may be~~ are permitted to operate: ~~provided, That an adequate showing is made pursuant to §76.7 which establishes that the public interest is benefited. In such instances, the Commission may prescribe special technical requirements to ensure that subscribers to such systems are provided with an equivalent level of good quality service~~ **without Commission approval, provided that the operators of those systems adhere to all other applicable Commission rules and respond to consumer and local franchising authorities regarding industry-standard technical operation as set forth in their local franchise agreements and consistent with § 76.1713.**

NOTE 1: Local franchising authorities of systems serving fewer than 1000 subscribers may adopt standards less stringent than those in § 76.605(a) and (b). Any such agreement shall be reduced to writing and be associated with the system's proof-of-performance records.

NOTE 2: For systems serving rural areas as defined in § 76.5, the system may negotiate with its local franchising authority for standards less stringent than those in §§ 76.605~~(a)~~(b)(3), 76.605~~(a)~~ (b)(7), 76.605~~(a)~~(b)(8), 76.605~~(a)~~(b)(10) and 76.605~~(a)~~(b)(11). Any such agreement shall be reduced to writing and be associated with the system's proof-of-performance records.

NOTE 3: The requirements of this section shall not apply to devices subject to the TV interface device rules under part 15 of this chapter.

~~Note 4: Should subscriber complaints arise from a system failing to meet §76.605(a)(6) prior to December 30, 1999, the cable operator will be required to provide a converter that will allow the system to meet the standard immediately at the complaining subscriber's terminal. Further, should the problem be found to be system-wide, the Commission may order all converters on the system be changed to meet the standard.~~

NOTE 54: Should subscriber complaints arise from a system failing to meet § 76.605~~(a)~~(b)(10), the cable operator will be required to remedy the complaint and perform test measurements on § 76.605~~(a)~~(b)(10) containing the full number of channels as indicated in § 76.601(b)(2) at the complaining subscriber's terminal. Further, should the problem be found to be system-wide, the Commission may order that the full number of channels as indicated in § 76.601(b)(2) be tested at all required locations for future proof-of-performance tests.

NOTE 65: No State or franchising authority may prohibit, condition, or restrict a cable system's use of any type of subscriber equipment or any transmission technology.

10. Revise § 76.606 to read as follows:

§ 76.606 Closed captioning.

(a) ~~As of June 30, 1992,~~ The operator of each cable television system shall not take any action to remove or alter closed captioning data contained on line 21 of the vertical blanking interval.

(b) ~~As of July 1, 1993,~~ The operator of each cable television system shall deliver intact closed captioning data contained on line 21 of the vertical blanking interval, as it arrives at the headend or from another origination source, to subscriber terminals and (when so delivered to the cable system) in a format that can be recovered and displayed by decoders meeting ~~§15.119~~ **§79.101** of this chapter.

11. Revise § 76.610 to read as follows:

§ 76.610 Operation in the frequency bands 108–137 MHz and 225–400 MHz – scope of application.

The provisions of ~~§§76.605(a)(12)~~**76.605(d)**, 76.611, 76.612, 76.613, 76.614, 76.616, 76.617, 76.1803 and 76.1804 are applicable to all MVPDs (cable and non-cable) transmitting **analog** carriers or other signal components carried at an average power level equal to or greater than ~~10⁻⁴~~ **100 microwatts** across a 25 kHz bandwidth in any 160 microsecond period **or transmitting digital carriers or other signal components at an average power level of 75.85 microwatts across a 25 kHz bandwidth in any 160 microsecond period** at any point in the cable distribution system in the frequency bands 108–137 and 225–400 MHz for any purpose. Exception: Non-cable MVPDs serving less than 1000 subscribers and less than 1000 units do not have to comply with § 76.1803.

12. Revise § 76.611 to read as follows:

§ 76.611 Cable television basic signal leakage performance criteria.

(a) No cable television system shall commence or provide service in the frequency bands 108-137 and 225-400 MHz unless such systems is in compliance with one of the following cable television basic signal leakage performance criteria:

(1) prior to carriage of signals in the aeronautical radio bands and at least once each calendar year, with no more than 12 months between successive tests thereafter, based on a sampling of at least 75% of the cable strand, and including any portion of the cable system which are known to have or can reasonably be expected to have less leakage integrity than the average of the system, the cable operator demonstrates compliance with a cumulative signal leakage index by showing either that ~~(i) $10 \log I_{3000}$ is equal to or less than -7 or~~ ~~(ii) $10 \log I_{\infty}$ is equal to or less than 64 using one of the following formula:~~

—where:

$$I_{\infty} = \frac{1}{\theta} \sum_{i=1}^n E_i^2,$$

— ~~r_i is the distance (in meters) between the leakage source and the center of the cable television system;~~

θ is the fraction of the system cable length actually examined for leakage sources and is equal to the strand kilometers (strand miles) of plant tested divided by the total strand kilometers (strand miles) in the plant;

— ~~R_i is the slant height distance (in meters) from leakage source i to a point 3000 meters above the center of the cable television system;~~

E_i is the electric field strength in microvolts per meter ($\mu\text{V}/\text{m}$) measured 3 meters from the leak i ; and

n is the number of leaks found of field strength equal to or greater than 50 $\mu\text{V/m}$ measured pursuant to §76.609(h).

The sum is carried over all leaks i detected in the cable examined; or

(2) prior to carriage of signals in the aeronautical radio bands and at least once each calendar year, with no more than 12 months between successive tests thereafter, the cable operator demonstrates by measurement in the airspace that at no point does the field strength generated by the cable system exceed 10 microvolts per meter ($\mu\text{V/m}$) RMS at an altitude of 450 meters above the average terrain of the cable system. The measurement system (including the receiving antenna) shall be calibrated against a known field of 10 $\mu\text{V/m}$ RMS produced by a well characterized antenna consisting of orthogonal resonant dipoles, both parallel to and one quarter wavelength above the ground plane of a diameter of two meters or more at ground level. The dipoles shall have centers collocated and be excited 90 degrees apart. The half-power bandwidth of the detector shall be 25 kHz. If an aeronautical receiver is used for this purpose it shall meet the standards of the Radio Technical Commission for Aeronautics (RCTA) for aeronautical communications receivers. The aircraft antenna shall be horizontally polarized. Calibration shall be made in the community unit or, if more than one, in any of the community units of the physical system within a reasonable time period to performing the measurements. If data is recorded digitally the 90th percentile level of points recorded over the cable system shall not exceed 10 $\mu\text{V/m}$ RMS as indicated above; if analog recordings is used the peak values of the curves, when smoothed according to good engineering practices, shall not exceed 10 $\mu\text{V/m}$ RMS.

(b) In paragraphs (a)(1) and (a)(2) of this section the unmodulated test signal used for analog leakage measurements on the cable plant shall: (1) be within the VHF aeronautical band 108-137 MHz or any other frequency ~~in~~ for which the results can be correlated to the VHF aeronautical band and (2) have an average power level equal to the **greater of (a) the peak envelope average** power level of the strongest **NTSC or similar analog** cable television ~~signal carrier~~ on the system, **or (b) 1.2 dB greater than the average power level of the strongest QAM or similar digital cable television signal on the system.**

(c) In paragraph (a)(1) and (2) of this section, if a modulated test signal is used for analog leakage measurements, the test signal and detector technique must, when considered together, yield the same result as though an unmodulated test signal were used in conjunction with a detection technique which would yield the RMS value of said unmodulated carrier.

(d) If a sampling of at least 75% of the cable strand (and including any portions of the cable system which are known to have or can reasonably be expected to have less leakage integrity than the average of the system) as described in paragraph (a)(1) cannot be obtained by the cable operator or is otherwise not reasonably feasible, the cable operator shall perform the airspace measurements described in paragraph (a)(2).

(e) Prior to providing service to any subscriber on a new section of cable plant, the operator shall show compliance with either: (1) The basic signal leakage criteria in accordance with paragraph (a)(1) or (a)(2) of this section for the entire plant in operation or (2) a showing shall be made indicating that no individual leak in the new section of the plant exceeds 20 $\mu\text{V/m}$ at 3 meters in accordance with § 76.609 ~~of the Rules for analog signals systems~~ **or 17.4 $\mu\text{V/m}$ at 3 meters for digital signals systems.**

(f) Notwithstanding paragraph (a) of this section, a cable operator shall be permitted to operate on any frequency which is offset pursuant to §76.612 in the frequency band 108–137 MHz for the purpose of demonstrating compliance with the cable television basic signal leakage performance criteria.

13. Revise § 76.612 to read as follows:

§ 76.612 Cable television frequency separation standards.

All cable television systems which operate **analog NTSC or similar channels** in the frequency bands 108-137 MHz and 225-400 MHz shall comply with the following frequency separation standards **for each NTSC or similar channel**:

(a) * * *

* * * * *

14. Amend § 76.1508(a) to read as follows:

§76.1508 Network non-duplication.

(a) Sections 76.92 through ~~76.97~~ **76.95** shall apply to open video systems in accordance with the provisions contained in this section.

* * * * *

15. Amend § 76.1509 to read as follows:

§76.1509 Syndicated program exclusivity.

(a) Sections ~~76.151~~ **76.101** through ~~76.163~~ **76.110** shall apply to open video systems in accordance with the provisions contained in this section.

(b) Any provision of ~~§76.151~~ **§76.101** that refers to a “cable community unit” shall apply to an open video system.

(c) Any provision of ~~§76.155~~ **§76.105** that refers to a “cable system operator” or “cable television system operator” shall apply to an open video system operator. Any provision of ~~§76.155~~ **§76.105** that refers to a “cable system” or “cable television system” shall apply to an open video system except ~~§76.155(e)~~ **§76.105(c)** which shall apply to an open video system operator. Open video system operators shall make all notifications and information regarding exercise of syndicated program exclusivity rights immediately available to all appropriate video programming provider on the system. An open video system operator shall not be subject to sanctions for any violation of these rules by an unaffiliated program supplier if the operator provided proper notices to the program supplier and subsequently took prompt steps to stop the distribution of the infringing program once it was notified of a violation.

(d) Any provision of ~~§76.156~~ **§76.106** that refers to a “cable community” shall apply to an open video system community. Any provision of ~~§76.156~~ **§76.106** that refers to a “cable community unit” or “community unit” shall apply to an open video system or that portion of an open video system that operates or will operate within a separate and distinct community or municipal entity (including unincorporated communities within unincorporated areas and including single, discrete unincorporated areas). Any provision of ~~§§76.156 through 76.158, and 76.163~~ **§§76.106 through 76.108** that refers to a “cable system” shall apply to an open video system.

(e) Any provision of ~~§76.159~~ **§76.109** that refers to “cable television” or a “cable system” shall apply to an open video system.

(f) Any provision of ~~§76.161~~ **§76.110** that refers to a “community unit” shall apply to an open video system or that portion of an open video system that is affected by this rule.

16. Revise § 76.1510 to read as follows:

§76.1510 Application of certain Title VI provisions.

The following sections within part 76 shall also apply to open video systems: §§76.71, 76.73, 76.75, 76.77, 76.79, 76.1702, and 76.1802 (Equal Employment Opportunity Requirements); §§76.503 and 76.504 (ownership restrictions); §76.981 (negative option billing); and §§76.1300, 76.1301 and 76.1302 (regulation of carriage agreements); ~~§76.614~~ **§76.610 (operation in the frequency bands 108-137 and 225-400 MHz—scope of applications)** ~~signal leakage restrictions~~; ~~§76.1803 and 76.1804 (signal leakage monitoring and aeronautical frequency notifications)~~; provided, however, that these sections shall apply to open video systems only to the extent that they do not conflict with this subpart S. Section 631 of the Communications Act (subscriber privacy) shall also apply to open video systems.

17. Revise § 76.1601 to read as follows:

§76.1601 Deletion or repositioning of broadcast signals.

~~Effective April 2, 1993,~~ A cable operator shall provide written notice to any broadcast television station at least 30 days prior to either deleting from carriage or repositioning that station. Such notification shall also be provided to subscribers of the cable system.

Note 1 to §76.1601: * * *

18. Revise § 76.1602 (b) to read as follows:

§76.1602 Customer service—general information.

* * * * *

(b) ~~Effective July 1, 1993,~~ The cable operator shall provide written information on each of the following areas at the time of installation of service, at least annually to all subscribers, and at any time upon request:

(1) * * *

* * * * *

19. Remove §§ 76.1610(f) and (g).

§76.1610 Change of operational information.

The Operator shall inform the Commission on FCC Form 324 whenever there is a change of cable television system operator; change of legal name, change of the operator's mailing address or FCC Registration Number (FRN); or change in the operational status of a cable television system. Notification must be done within 30 days from the date the change occurs and must include the following information, as appropriate:

(a) * * *

* * * * *

~~(f) The operator's FCC Registration Number (FRN) as required under part 1, subpart W of this chapter.~~

~~(g) The FCC Registration Number (FRN).~~

20. Revise § 76.1701(d) to read as follows:

§76.1701 Political file.

* * * * *

(d) Where origination cablecasting material is a political matter or matter involving the discussion of a controversial issue of public importance and a corporation, committee, association or other unincorporated group, or other entity is paying for or furnishing the matter, the system operator shall, in addition to making the announcement required by ~~§76.1616(a)~~ **§76.1615**, require that a list of the chief executive officers or members of the executive committee or of the board of directors of the corporation, committee, association or other unincorporated group, or other entity shall be made available for public inspection at the local office of the system. Such lists shall be kept and made available for two years.

21. Amend § 76.1804 to read as follows:

§ 76.1804 Aeronautical Frequencies Notification : leakage monitoring (CLI).

An MVPD shall notify the Commission before transmitting any **digital signal with average power exceeding 75.85 microwatts across a 25 kHz bandwidth in 160 microsecond time period, or for other signal types, any** carrier of other signal component with an average power level across a 25 kHz bandwidth in any 160 microsecond time period equal to or greater than 10^{-4} watts at any point in the cable distribution system on any new frequency or frequencies in the aeronautical radio frequency bands (108-137 MHz, 225-400 MHz). The notification shall be made on FCC Form 321. Such notification shall include:

(a) * * *

* * * * *

APPENDIX C

Final Regulatory Flexibility Analysis for the *Report and Order*

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the Notice of Proposed Rule Making (NPRM).² The Commission sought written public comment on the proposals in the NPRM, including comment on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³

A. Need for, and Objectives of, the Report and Order

2. This Report and Order allows the Commission to fulfil its congressional mandate to establish “minimum technical standards relating to cable systems’ technical operation and signal quality” and “update such standards periodically to reflect improvements in technology,” as stated in the Communications Act.⁴ It will reduce malfunctions by setting proof-of-performance rules that require operators to ensure that their systems are consistent with industry standards designed to deliver high quality signals, which means that consumers will receive good quality pictures and sound.⁵ The Report and Order also makes modifications throughout Part 76 of the Commission’s rules to remove outdated language, correct citations, and make other minor or non-substantive updates.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

3. Commenters raised concerns that the proposed reporting requirements, which would have required them to develop a signal quality test and file the results of that test with the Commission, would impose an undue burden on small businesses. After analyzing the responses of commenters, the Commission concludes that cable operators who design, deploy, and maintain a system which meets or exceeds the specifications in SCTE 40 will consistently provide a service producing suitable picture and audio quality to subscribers. Rather than imposing testing on cable operators to ensure that they deliver quality service, we instead require that cable operators adhere to the specifications in the widely followed SCTE 40 standard.

4. As many commenters highlighted, Quadrature Amplitude Modulated (“QAM”) services are designed with error correction ability which helps to ensure consistent quality for subscribers.⁶ Additionally, as opposed to analog, digital signals are far less susceptible to errors introduced by noise and the picture degradation amplifiers add.

C. Response to Comments by the Chief Counsel for Advocacy of the Small Business Administration

¹ See 5 U.S.C. § 603. The RFA, see 5 U.S.C. § 601 – 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

² See *Cable Television Technical and Operational Requirements*, Notice of Proposed Rulemaking, 27 FCC Rcd 9678 (2012).

³ See 5 U.S.C. § 604.

⁴ 47 U.S.C. § 544(e).

⁵ NCTA Comments at 8; NATOA Comments at 12.

⁶ QAM is the modulation standard that traditional cable operators use to deliver digital cable service.

5. Pursuant to the Small Business Jobs Act of 2010, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA), and to provide a detailed statement of any change made to the proposed rules as a result of those comments. The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

D. Description and Estimate of the Number of Small Entities to Which the Rules Will Apply

6. The RFA directs agencies to provide a description of, and where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁷ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁸ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.⁹ A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).¹⁰

7. *Cable and Other Program Distribution.* Since 2007, these services have been defined within the broad economic census category of Wired Telecommunications Carriers; that category is defined as follows: “This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies.”¹¹ The SBA has developed a small business size standard for this category, which is: all such firms having 1,500 or fewer employees.¹² According to Census Bureau data for 2007, there were a total of 955 firms in the subcategory of Cable and Other Program Distribution that operated for the entire year.¹³ Of this total, 939 firms had employment of 999 or fewer employees, and 16 firms had employment of 1000 employees or more.¹⁴ Thus, under this size standard, the Commission believes that a majority of firms operating in this industry can be considered small.

8. *Cable Companies and Systems (Rate Regulation Standard).* The Commission has also developed its own small business size standards, for the purpose of cable rate regulation. Under the

⁷ See 5 U.S.C. § 603(b)(3).

⁸ See 5 U.S.C. § 601(6).

⁹ See 5 U.S.C. § 601(3) (incorporating by reference the definition of “small-business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

¹⁰ See 15 U.S.C. § 632.

¹¹ U.S. Census Bureau, 2007 NAICS Definitions, “517110 Wired Telecommunications Carriers” (partial definition), <http://www.census.gov/naics/2007/def/ND517110.HTM#N517110>.

¹² 13 CFR § 121.201, NAICS code 517110 (2007).

¹³ U.S. Census Bureau, 2007 Economic Census, Subject Series: Information, Table 5, Employment Size of Firms for the United States: 2007, NAICS code 5171102 (located at http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=600&-ds_name=EC0751SSSZ5&-_lang=en).

¹⁴ See *id.*

Commission's rules, a "small cable company" is one serving 400,000 or fewer subscribers, nationwide.¹⁵ Industry data indicate that, of 1,076 cable operators nationwide, all but 11 are small under this size standard.¹⁶ In addition, under the Commission's rules, a "small system" is a cable system serving 15,000 or fewer subscribers.¹⁷ Industry data indicate that, of 6,635 systems nationwide, 5,802 systems have under 10,000 subscribers, and an additional 302 systems have 10,000-19,999 subscribers.¹⁸ Thus, under this second size standard, the Commission believes that most cable systems are small.

9. *Cable System Operators.* The Act also contains a size standard for small cable system operators, which is "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than 1 percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed \$250,000,000."¹⁹ The Commission has determined that an operator serving fewer than 677,000 subscribers shall be deemed a small operator, if its annual revenues, when combined with the total annual revenues of all its affiliates, do not exceed \$250 million in the aggregate.²⁰ Industry data indicate that, of 1,076 cable operators nationwide, all but 10 are small under this size standard.²¹ We note that the Commission neither requests nor collects information on whether cable system operators are affiliated with entities whose gross annual revenues exceed \$250 million,²² and therefore we are unable to estimate more accurately the number of cable system operators that would qualify as small under this size standard.

10. *Open Video Services.* Open Video Service (OVS) systems provide subscription services.²³ The open video system ("OVS") framework was established in 1996, and is one of four statutorily recognized options for the provision of video programming services by local exchange carriers.²⁴ The OVS framework provides opportunities for the distribution of video programming other than through cable systems. Because OVS operators provide subscription services,²⁵ OVS falls within the SBA small

¹⁵ 47 CFR § 76.901(e). The Commission determined that this size standard equates approximately to a size standard of \$100 million or less in annual revenues. *Implementation of Sections of the 1992 Cable Act: Rate Regulation*, Sixth Report and Order and Eleventh Order on Reconsideration, 10 FCC Rcd 7393, 7408 (1995).

¹⁶ These data are derived from: R.R. Bowker, *Broadcasting & Cable Yearbook 2006*, "Top 25 Cable/Satellite Operators," pages A-8 & C-2 (data current as of June 30, 2005); Warren Communications News, *Television & Cable Factbook 2006*, "Ownership of Cable Systems in the United States," pages D-1805 to D-1857.

¹⁷ 47 CFR § 76.901(c).

¹⁸ Warren Communications News, *Television & Cable Factbook 2008*, "U.S. Cable Systems by Subscriber Size," page F-2 (data current as of Oct. 2007). The data do not include 851 systems for which classifying data were not available.

¹⁹ 47 U.S.C. § 543(m)(2); *see also* 47 CFR § 76.901(f) & nn.1-3.

²⁰ 47 CFR § 76.901(f); *see FCC Announces New Subscriber Count for the Definition of Small Cable Operator*, Public Notice, 16 FCC Rcd 2225 (Cable Services Bureau 2001).

²¹ These data are derived from R.R. BOWKER, *BROADCASTING & CABLE YEARBOOK 2006*, "Top 25 Cable/Satellite Operators," pages A-8 & C-2 (data current as of June 30, 2005); WARREN COMMUNICATIONS NEWS, *TELEVISION & CABLE FACTBOOK 2006*, "Ownership of Cable Systems in the United States," pages D-1805 to D-1857.

²² The Commission does receive such information on a case-by-case basis if a cable operator appeals a local franchise authority's finding that the operator does not qualify as a small cable operator pursuant to § 76.901(f) of the Commission's rules.

²³ *See* 47 U.S.C. § 573.

²⁴ 47 U.S.C. § 571(a)(3)-(4). *See 13th Annual Report*, 24 FCC Rcd at 606, para. 135.

²⁵ *See* 47 U.S.C. § 573.

business size standard covering cable services, which is “Wired Telecommunications Carriers.”²⁶ The SBA has developed a small business size standard for this category, which is: all such firms having 1,500 or fewer employees. To gauge small business prevalence for the OVS service, the Commission relies on data currently available from the U.S. Census for the year 2007. According to that source, there were 3,188 firms that in 2007 were Wired Telecommunications Carriers. Of these, 3,144 operated with less than 1,000 employees, and 44 operated with more than 1,000 employees. However, as to the latter 44 there is no data available that shows how many operated with more than 1,500 employees. Based on this data, the majority of these firms can be considered small.²⁷ In addition, we note that the Commission has certified some OVS operators, with some now providing service.²⁸ Broadband service providers (“BSPs”) are currently the only significant holders of OVS certifications or local OVS franchises.²⁹ The Commission does not have financial or employment information regarding the entities authorized to provide OVS, some of which may not yet be operational. Thus, at least some of the OVS operators may qualify as small entities. The Commission further notes that it has certified approximately 45 OVS operators to serve 116 areas, and some of these are currently providing service.³⁰ Affiliates of Residential Communications Network, Inc. (RCN) received approval to operate OVS systems in New York City, Boston, Washington, D.C., and other areas. RCN has sufficient revenues to assure that they do not qualify as a small business entity. Little financial information is available for the other entities that are authorized to provide OVS and are not yet operational. Given that some entities authorized to provide OVS service have not yet begun to generate revenues, the Commission concludes that up to 44 OVS operators (those remaining) might qualify as small businesses that may be affected by the rules and policies adopted herein.

11. *Satellite Master Antenna Television (SMATV) Systems, also known as Private Cable Operators (PCOs).* SMATV systems or PCOs are video distribution facilities that use closed transmission paths without using any public right-of-way. They acquire video programming and distribute it via terrestrial wiring in urban and suburban multiple dwelling units such as apartments and condominiums, and commercial multiple tenant units such as hotels and office buildings. SMATV systems or PCOs are now included in the SBA’s broad economic census category, “Wired Telecommunications Carriers,”³¹ which was developed for small wireline firms.³² Under this category, the SBA deems a wireline business to be small if it has 1,500 or fewer employees.³³ Census data for 2007 indicate that in that year there were 1,906 firms operating businesses as wired telecommunications carriers. Of that 1,906, 1,880 operated with 999 or fewer employees, and 26 operated with 1,000

²⁶ U.S. Census Bureau, 2007 NAICS Definitions, 517110 Wired Telecommunications Carriers, <http://www.census.gov/naics/2007/def/ND517110.HTM#N517110>.

²⁷ See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-fds_name=EC0700A1&-geo_id=&-_skip=600&-ds_name=EC0751SSSZ5&-_lang=en.

²⁸ A list of OVS certifications may be found at <http://www.fcc.gov/mb/ovs/csovsr.html>.

²⁹ See *13th Annual Report*, 24 FCC Rcd at 606-07 para. 135. BSPs are newer firms that are building state-of-the-art, facilities-based networks to provide video, voice, and data services over a single network.

³⁰ See <http://www.fcc.gov/encyclopedia/current-filings-certification-open-video-systems> (current as of July 2012).

³¹ See 13 CFR § 121.201, NAICS code 517110 (2007).

³² Although SMATV systems often use DBS video programming as part of their service package to subscribers, they are not included in Section 340’s definition of “satellite carrier.” See 47 U.S.C. §§ 340(i)(1) and 338(k)(3); 17 U.S.C. § 119(d)(6).

³³ 13 CFR § 121.201, NAICS code 517110 (2007).

employees or more. Based on this data, we estimate that a majority of operators of SMATV/PCO companies were small under the applicable SBA size standard.³⁴

E. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

12. Under these new rules, cable operators that use QAM to modulate their signals need only comply with the SCTE 40 standard in lieu of testing digital signals. Cable operators will also be required to file Aeronautical Frequency Notifications with the Commission if they operate at a certain power level. These notifications are necessary to ensure that cable operators' signals do not interfere with aeronautical frequencies that are vital to airplane safety and navigation.

F. Steps Taken to Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

13. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.”³⁵

14. The *Digital Cable Standards NPRM* proposed to adopt rules analogous to the Commission's analog proof-of-performance rules which include a testing requirement,³⁶ technical standards,³⁷ testing methods,³⁸ recordkeeping requirements,³⁹ and procedures to resolve complaints about signal quality.⁴⁰ The changes adopted in this Report and Order instead do not impose testing and reporting burdens for digital signals, substantially benefiting smaller businesses, and directly addressing the concerns raised by the comments filed in response to the IRFA. As noted above, because digital signals do not share in the pattern of technical problems which plagued analog services, a rigid periodic testing requirement is not necessary. This item will not impose a significant burden on small cable operators. All QAM-based cable operators already comply with the SCTE 40 standard for signal quality pursuant to the Commission's existing set-top box requirements,⁴¹ and absent complaints from subscribers about signal quality, under the Report and Order cable operators may rely on the standard to ensure proof-of-performance.

³⁴

http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5&prodType=table

³⁵ See 5 U.S.C. § 603(c)(1) – (c)(4).

³⁶ 47 CFR § 76.601.

³⁷ 47 CFR § 76.605.

³⁸ 47 CFR § 76.609.

³⁹ 47 CFR §§ 76.1704, 76.1706.

⁴⁰ 47 CFR § 76.1713.

⁴¹ 47 CFR §§ 76.1204, 76.640.

15. **Report to Congress:** The Commission will send a copy of the Report and Order, including this FRFA, in a report to Congress pursuant to the Congressional Review Act.⁴² In addition, the Commission will send a copy of the Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Report and Order and FRFA (or summaries thereof) will also be published in the Federal Register.⁴³

⁴² See 5 U.S.C. § 801(a)(1)(A).

⁴³ See 5 U.S.C. § 604(b).