nielsen

Engineering

Encoding Installation and Configuration Policy

Revision G

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Nielsen Encoder Support

800-537-4872 option 2

Encoders@Nielsen.com

Detailed Revision History

Revision	Date	Changes
A	2008-10-10	Initial document
B	2008-11-13	Changed title. Replaced “Nielsen Media Research” with “The Nielsen Company” or “Nielsen.” Changed “station, “network,” and cable” to “distributor,” where appropriate. In Statement of Policy, added “service” to “per service agreements.” In Related Documents, removed Encoding and Station Lineup Requirements. Updated Nielsen email. Reworded alert regarding changes to the plant configuration. Corrected simulcast scenario and reworded statement regarding overwrite. Removed “1” from “MPEG2 audio (layers 2 & 3).” Removed second paragraph from Audio Processing section because it duplicated the Statement of Policy.
C	2009-11-18	Updated simulcast section to reflect current policy on overwrite. Added sections on audio processing, studio equipment, and EAS audio processing and new checklist items for audio processing and EAS audio processing, and for optimizing and proofing an OTA transmitter on a regular schedule. Added a glossary.
D	2010-04-28	Revised dialnorm and dialog loudness values in Audio Processing section. Added new Transmission Considerations section with policy information on reduction in power levels. Removed "amol" email address from contacts. Added reference to the Nielsen Encoder Forum. Added new items to the checklist for reduction in power levels and “All mandatory encoder configuration settings have been confirmed.”
E	2011-01-20	Added section on noise gates

Revision	Date	Changes
F	2012-02-24	Replaced “The Nielsen Company” with “Nielsen” except in the copyright and trademark statements. Reworded introduction. Extracted encoder comparison and selection charts to a separate document, Encoder Selection Chart. Removed Installation Scenarios and Noncompliant Encoder Setups sections, encoder placement in different facilities sections, NAVE II- and NAVE IIc-specific sections. Extracted information specific to the NAVE II and created the document, Supplement to the Encoding and Configuration Policy—NAVE II. Substituted “Nielsen encoding technology (or solutions) for NAVE,” as appropriate. Created “Basic Diagrams” section. Added “Cascaded Nielsen Encoding” to “Non-Compliant Installations” section. Added link to new documentation section on Encoder Forum. Moved remaining installation considerations and Reduction of Station Power Levels to the new Compliant Installations section. Rewrote summary of steps for installing an encoder. Removed all but the introductory paragraphs from the Monitoring of Encoded Data and Alarms section, checklist items that referred to deleted sections, and contact information for third-party vendors. Per input from the Legal Department, updated the paragraph on confidentiality of information during support conversations. Added the supplement, Internet Distribution Policy.
	2012-03-09	Replaced incorrect figure with correct figure for Neural MultiMerge
G	2013-12-17	Expanded caution regarding “failure to comply with” this policy; expanded section on Nielsen Watermarks to include NAES II information and added slot designs for both code types; added section on clients (providers such as MeTV) providing both content and direct distribution encoding; added SDI/HDSDI Installation (NAVE II or NWE-3G) figure; updated figure of compliant content distribution to multiple affiliates; added alternate feeds information; updated section on MSO-provided direct feeds with unique commercial content plus moved it from section on non-compliant scenarios to section on compliant scenarios; added DVS to section on encoding SAP and AAP
G2	2018-05-07	Updated links to Engineering Portal

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1. Introduction

1.1. Preface

This document provides an overview of Nielsen encoding solutions and a policy for installing and configuring encoders.

This document supersedes all previous versions of the Nielsen Encoding Installation and Configuration Policy.

1.2. Statement of Policy

This document establishes the policy by which Nielsen encoding and monitoring equipment will be installed and configured to ensure proper operation and performance for the Active/Passive (A/P) In-Home Metering System to accurately detect and report household viewing. Media distributors are required to actively encode using the Nielsen encoding methodology per their service agreements with Nielsen.

Caution Failure to comply with the Encoding Installation and Configuration Policy can result in incorrect data and loss of correct crediting. As a result, Nielsen may need to take actions to protect the integrity of Nielsen Ratings.

1.3. Audience

This document is intended for station managers, station engineers, and others who are responsible for overseeing the execution of this encoder policy. It is also for those who implement the policy. The latter should have a thorough knowledge of broadcast engineering equipment, the functions of each piece within the broadcast air chain, and the inter-relationships between and among the different pieces in the air chain.

1.4. Related Documentation

The following documentation contains important information about encoders and encoding.

- Client agreement
- User documentation for the encoder
- Supplements to the Encoding Installation and Configuration Policy:
  - Internet Distribution Policy
  - Nielsen Encoder Selection Chart
- “ATSC Recommended Practice: Techniques for Establishing and Maintaining Audio Loudness for Digital Television (A/85:2013).” Advanced Television Systems Committee.

2013-03-12. This document is available at http://www.atsc.org/cms/standards/A_85-2013.pdf.

2. Compliant Installations

Note Exact configurations for your application are available from Nielsen Encoder Support and are included with all requests for source identifiers (SIDs). See “Contact Information” on page 34.

2.1. Overview of Encoder Installation

Nielsen encoding technologies are critical to the Nielsen metering solution for accurately measuring viewing behaviors. Encoders use patented, perceptual-masking technology to embed watermarks (codes) in the content’s audio.

1. Select an encoder that is appropriate for your particular plant configuration. See the “Encoder Selection Chart” linked in the section 1.4, Related Documentation.”
2. Select a location in the air chain for the encoder. The facility design is an important factor. The most convenient location may not be the optimal location. See section 2.2.2, “Basic Installation Diagrams.” If you have questions or your particular installation is not addressed, contact Nielsen Encoder Support at 800-537-4872 option 2.

   Caution Any changes to the plant configuration that can affect or influence the performance of Nielsen encoding must be communicated to Nielsen Encoder Support for performance re-qualification. Nielsen cannot guarantee the delivery of accurate data and will not be responsible for reprocessing data stemming from changes that have not been re-qualified.
3. Never install two encoders in series with the same SID and SID type.
4. Install the encoder per the instructions in this document, the encoder-specific user manual, and, if any, online help.
5. Install a second encoder in the backup path.
6. Each backup distribution path must contain an encoder to ensure codes continue to be inserted when the primary feed is interrupted due to faults or maintenance. For details, see section 2.9.11, "Secondary or Backup Feeds."
7. Verify encoder operation offline in the primary and backup paths to confirm compatibility with other equipment in the distribution change.
8. If performance issues arise during offline verification, contact Nielsen Encoder Support at 800-537-4872 option 2.
9. Send an electronic copy of the system configuration to Nielsen Encoder Support at Encoders@Nielsen.com.

2.2. Placement

2.2.1. Encoder Placement Relative to Final Output

For all facilities, the Nielsen encoder must be installed after all program switching or routing and prior to all distribution from the plant, including the transmitter, cable MSO, DirecTV, and EchoStar distribution paths. Refer to the diagrams in the next section, “Basic Installation Diagrams.” All signals leaving the plant must be encoded.

2.2.2. Basic Installation Diagrams

Basic Signal Path

Figure 1 shows the basic signal path. Note the location of the encoder, which could be a Norpak™ encoder or a Ross Video NAVE II or NWE-3G encoder. These units can be configured for SMPTE 259 or SMPTE 292 video with SDI embedded audio or AES discreet audio.

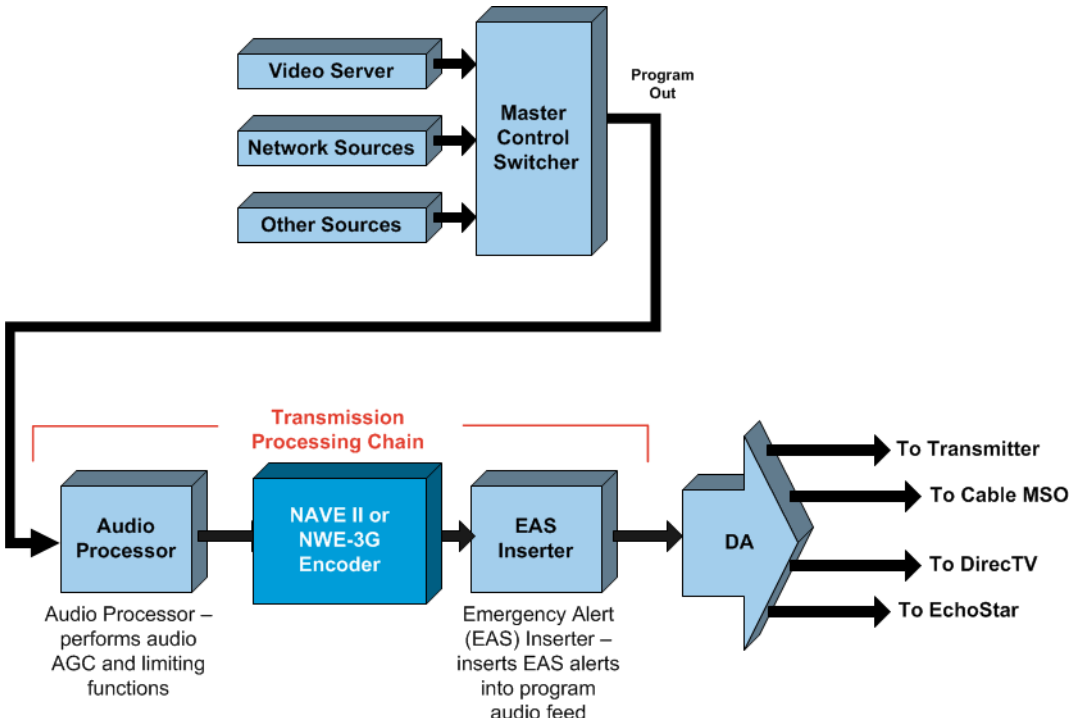

Figure 1 – SMPTE 259 or SMPTE 292 Installations (NAVE II or NWE-3G)

Compressed ATSC Encoders

DTV facilities that partially or entirely operate in the Dolby AC-3/MPEG-2 compressed domain use a compressed ATSC encoder. The compressed ATSC encoder requires a compressed ATSC transport stream (DVB-ASI only for NWE-TS) input. It encodes up to eight programs (minor channels) with Dolby AC-3 audio.

The compressed ATSC encoder is not designed to operate in an analog video plant. The three figures below show examples of compressed ATSC encoder installations in digital facilities. Figure 2 and Figure 3 show examples of compressed-ATSC encoder installations. Figure 4 shows an example of an installation with a compressed and uncompressed encoded signal path.

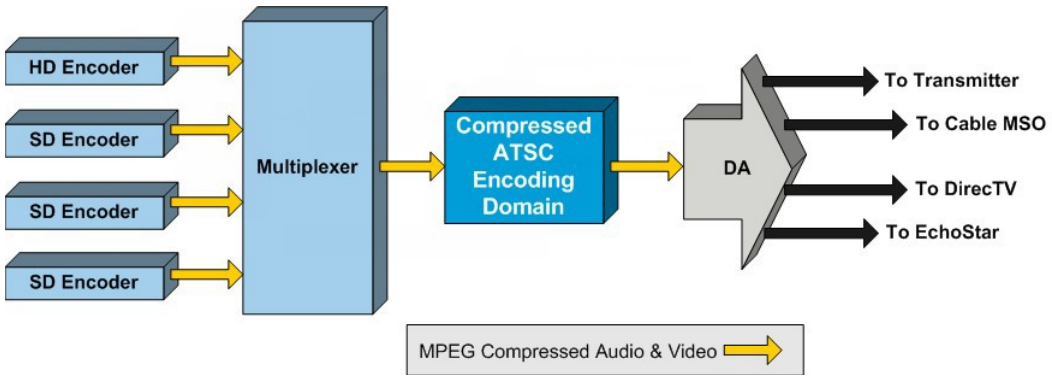

Figure 2 – Compressed ATSC Encoder – Example 1

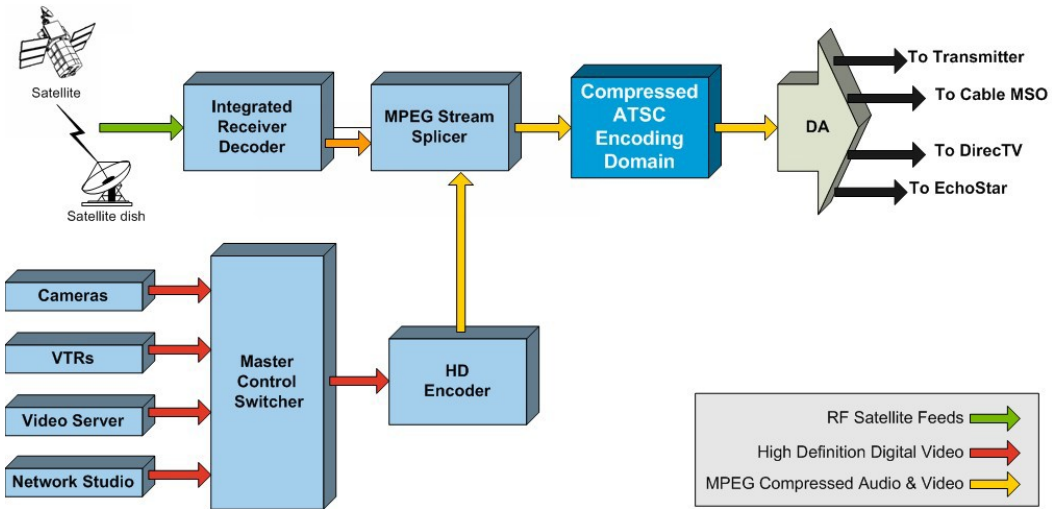

Figure 3 – Compressed ATSC Encoder – Example 2

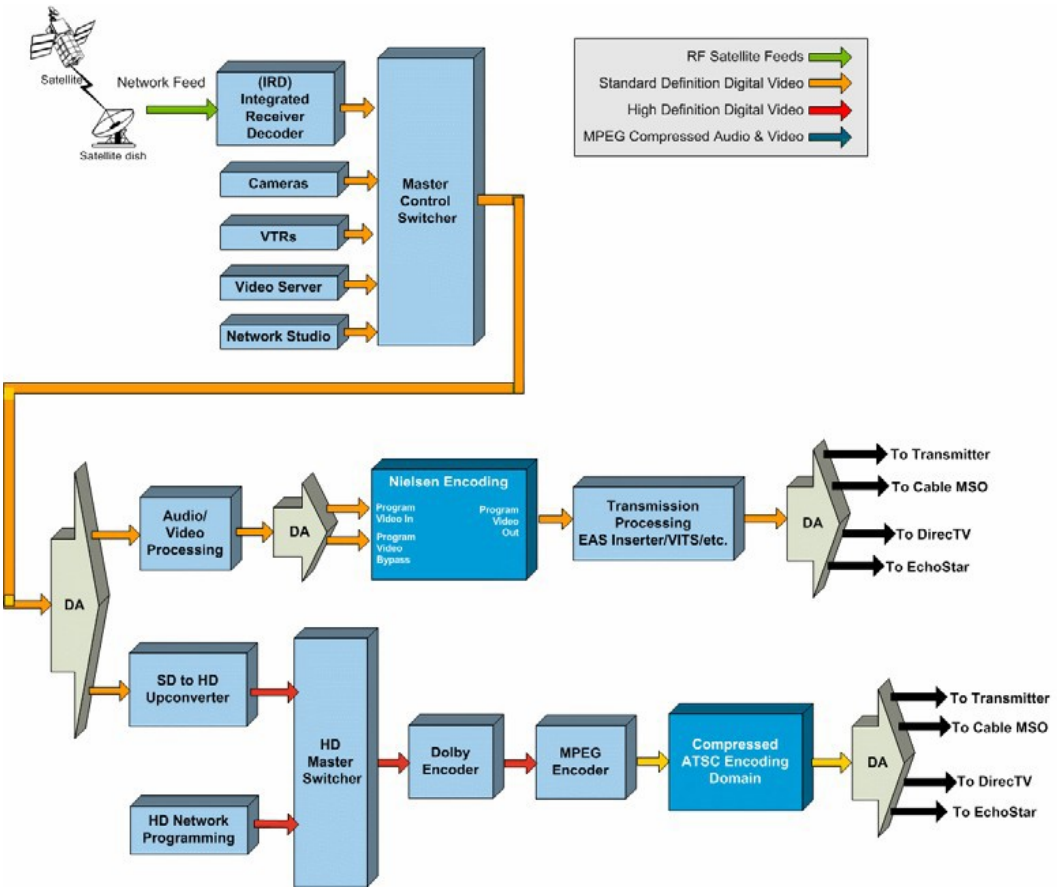

Figure 4 – Combination Uncompressed SD Digital Encoder & Compressed ATSC Encoder (HD Digital)

2.3. NAES II and Nielsen Watermarks Audio Codes

Caution You must notify Nielsen Encoder Support when activating or deactivating any Nielsen watermarking. See section 5, “Contact Information.”

Critical alerts for missing code and for incorrect time for Final Distribution Sources are in place for NAES II and Nielsen Watermarks audio codes.

NAES II and Nielsen Watermarks audio codes contain the same SID. Both types of audio code include date and time stamps. Since the insertion rate for each differs, the date and time stamp of the NAES II audio codes are slightly different from those of the Nielsen Watermarks audio codes.

At this time, Nielsen policy is for both NAES II and Nielsen Watermarks encoding to be enabled on the encoder. Note that Bypass mode disables both NAES II and Nielsen Watermarks encoding.

2.3.1. NAES II Audio Codes

Figure 5 shows a block diagram representing the design of NAES II audio codes.

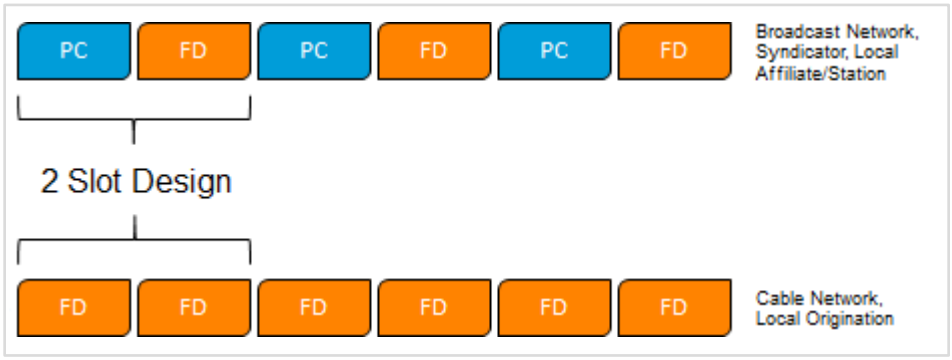

Figure 5 – NAES II Audio Code 2-Slot Design

NAES II audio codes have these characteristics:

- Time-division multiplexing using 2 timeslots or “slots”
- Insertion rate is 2 seconds per slot
- NAES II codes can be overwritten

2.3.2. Nielsen Watermarks Audio Codes

Important Nielsen Watermarks codes *cannot* be overwritten.

Nielsen Watermarks encoding places an audio watermark in a lower-frequency portion of the active program audio than the current NAES II technology does. Its lower-frequency position enables Nielsen Watermarks encoding to be more robust and much less likely to be "compressed out" of the program audio by television distribution providers without interfering with the viewer's listening experience.

The trade-off is that, unlike NAES II audio code, Nielsen Watermarks audio code cannot be overwritten by successive program distributors. Accordingly, Nielsen Watermarks audio code has been engineered with three "slots" to allow for as many as three "hand-offs" between different broadcast stations or cable networks on its way to the viewer. See Figure 6. This enables Nielsen to continue to detect that a viewer was watching, for example, a football highlight during the local sportscast on local station X, even though the same footage was originally telecast on a cable sports network and was subsequently included on highlight compilation previously aired by a local, sister station Y.

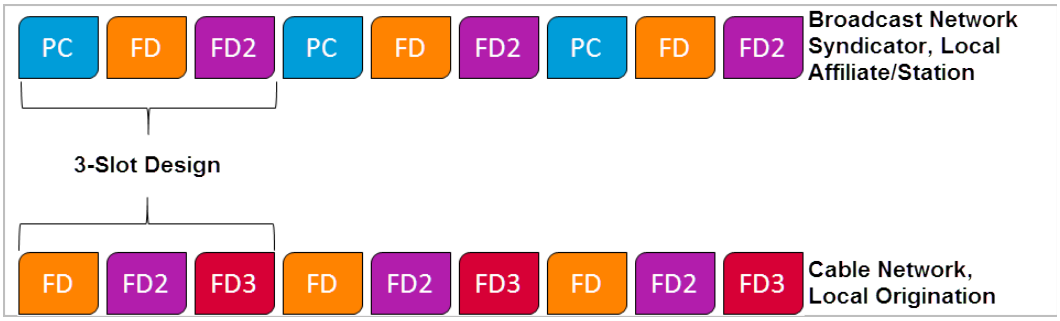

Figure 6 – Nielsen Watermarks 3-Slot Design

Nielsen Watermarks audio codes have these characteristics:

- Time-division multiplexing using 3 timeslots or "slots"
- Insertion rate is 1.6 seconds per slot; 4.8 seconds per encoding entity
- Microphone detectible
- Nielsen Watermarks codes cannot be overwritten. If the 3 slots are full, the encoder refrains. Nielsen Encoder Support sees this as a missing FD code so existing alerting rules and timing apply.

2.4. Simulcasting and Redistribution

In the absence of encoding, the A/P meter uses its passive metering engine to detect what the household is viewing. Although the passive metering technology provides a reliable metering mechanism in the absence of code detection, under certain circumstances a possibility exists that the distribution source for simulcast or previously distributed cable network content cannot be properly credited.

Before simulcasting or redistributing cable network programming content through a station, local cable-origination channel, or regional cable network, do the following:

- Negotiate with the network to get a separate feed or alternate audio channel.
- Request a feed that,
  - Contains a Nielsen-encoded program content (PC) code (syndicator code)
  - Does not contain an FD code. After these conditions are met, the station can airthe content.

Audio code overwrite is not 100%. Crediting rules now favor the simulcasting station when the cable network and station FD codes are simultaneously detected in a signal. However, if the cable network code somehow survives alone for some minutes, however, the cable network receives credit for those minutes. Take precautions to avoid this situation.

Figure **7** depicts the proper conditions under which Nielsen-encoded simulcast program content is distributed and received at the local broadcast facility for final distribution. Both stations insert their respective codes and the content is distributed for viewing. The Nielsen A/P meter monitors and detects the codes in the content viewed by the household and credits accordingly.

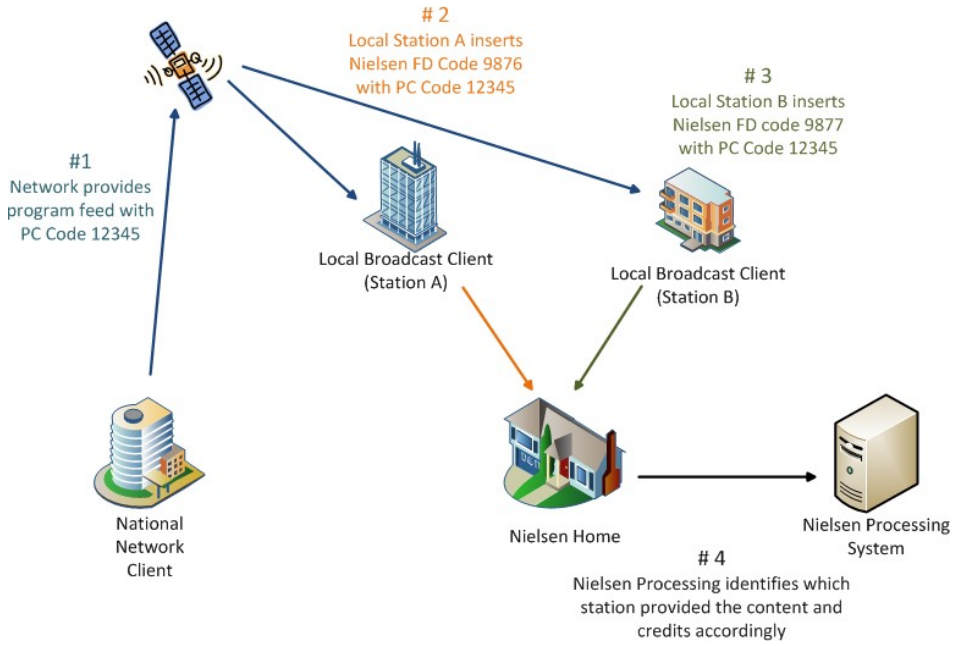

Figure 7 **– Compliant Scenario: Distribution of Content to Multiple Affiliates**

2.5. Nielsen Encoding on Alternate Feeds

2.5.1. Overview

Some facilities provide *alternate feeds*, for programming such as some sports events. To be considered as an alternate feed, the feed must have:

- Unique audio and FD code not used on any other feed
- Content for only a portion of a day and, in fact, might not have content again for one or more of the following days

When there is no feed, the content provider displays a network logo or color bars and accompanies the graphic with a tone. The feed has no FD code at that point and the cable provider does not provide the feed to customers. When an alternate feed is in its “no content” state, Nielsen does the following:

- Disables alerts for loss of audio code
- Disables alerts regarding clock synchronization issues

2.5.2. Options

Clients who use alternate feed encoding, therefore, should discuss options with Nielsen and confirm performance upon installation with Nielsen Encoder Support.

Nielsen recommends that these Clients provide unique audio when not in programming, allowing the Nielsen encoder to generate audio code, and the Nielsen Media Monitoring Site (MMS) to alert on Nielsen code issues. Note that this audio must be unique, and not used for any other TV programming distributed to homes. An example of such audio is a network audio jingle. Nielsen can discuss options and then confirm code performance upon installation

2.5.3. Risks

Since audio codes would not be on the feed 24/7, Nielsen has to disable code alerts; therefore, none of the following are alerted:

- Code loss
- Nielsen encoder clock issue
- Loss of audio and video.

2.6. Clients Providing Both Content and Direct Distribution Encoding

For a Client providing distribution of programming for both local affiliates and direct-to-home providers such as Cable MSOs and DBS, it is mandatory that unique distribution of each type of feed be provided and that a separate Nielsen encoder be present on each of those feeds.

The local affiliates that receive this content need a Nielsen Program Content (PC) code to be present for Nielsen to provide credit to the content provider, as well as provide a location for the local station to add Nielsen Final Distributor (FD) code to be inserted in the local market.

The feed that cable MSOs and DBS directly provide to homes needs a unique Nielsen FD code inserted prior to distribution, which enables Nielsen to credit the Client for the programming viewed in the homes.

Figure 8 shows the station signal flow for a compliant scenario. This layout provides two separate program streams and the Client incorporates two audio packet ID (PID) numbers. The Client installs two Nielsen encoders, one configured with a PC SID and one with a FD SID, so both levels of code are present. The recipient of this content tunes to the correct audio PID and distributes the correct Nielsen code for crediting. Figure 9 shows the overview of distribution through the different facilities.

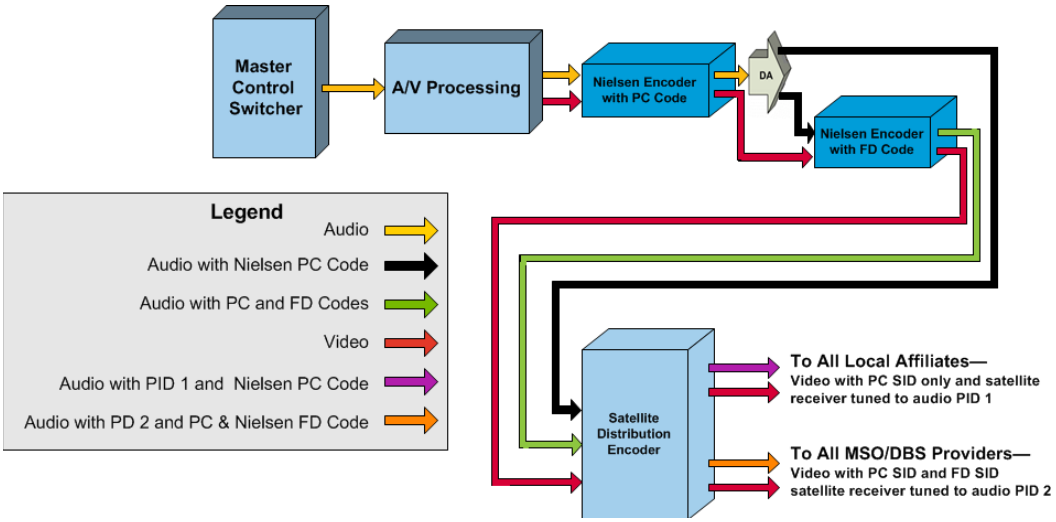

Figure 8 – Compliant Scenario: Content and Distribution of the Same Programming

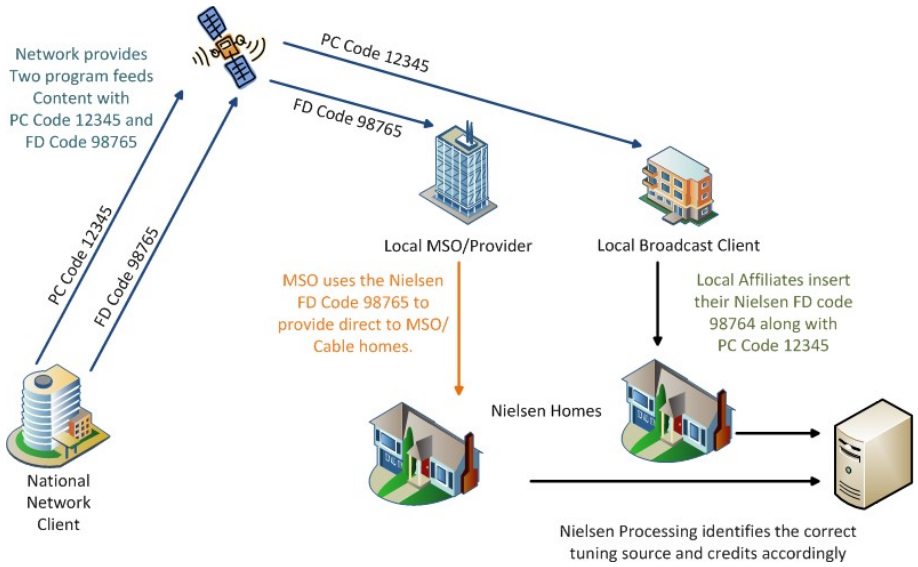

Figure 9 – Compliant Scenario: Content and Distribution of the Same Programming to Nielsen Homes

2.7. MSO Provided Direct Feeds with unique Commercial Content

Local stations are starting to provide cable systems owned by select Multiple System Operators (MSOs) with occasional, unique, 30-second-ad creatives. Such creatives are specifically designed for distribution to local subscribers of the cable system, while non-subscribers in the market receive a different targeted commercial creative for that cable system. There are two options for encoding these unique, cable-system, commercial creatives to ensure they are properly being credited.

Figure 10 shows the first option. This scenario ensures that Nielsen is able to identify and credit tuning to these occasional, 30-second spots and to actively encode them with a separate SID. Nielsen assigns a specific SID to the station for this purpose and separately monitors this unique code from its MMS (Media Monitoring System) site in that market. This option requires a separate encoder and separate monitoring by Nielsen with associated costs.

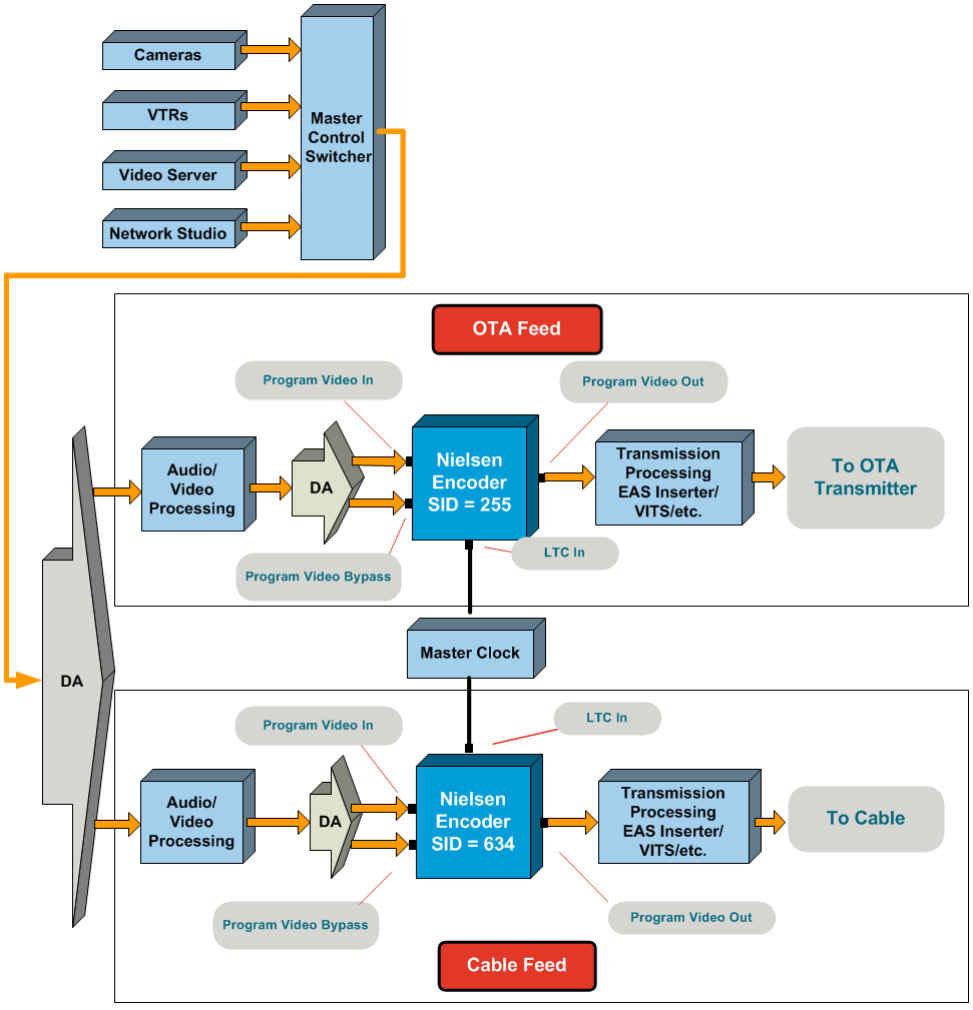

Figure 10 – Compliant Scenario: MSO Direct Feed Nielsen Encoder

Figure 11 shows another option for inserting these unique, 30-second spots into a feed previously encoded with one of the station's assigned SIDs. The existing Nielsen "smoothing" or "bridging" rules often credit these unencoded spots when the station's SID is detected in the home immediately preceding and following the spots. In other words, if a market's sample home, subscribing to the particular cable system's services, views the station immediately before, during, and after these spots, and the station's SID is detected in the programming before and after this spot, Nielsen credits the station for all the tuning. If the same sample home tunes the station's programming immediately preceding the unencoded spot and during the vast majority of the spot itself but then changes the channel to another station or network, the system's "smoothing" or "bridging" rules are not triggered and the station does not always receive full credit for this tuning.

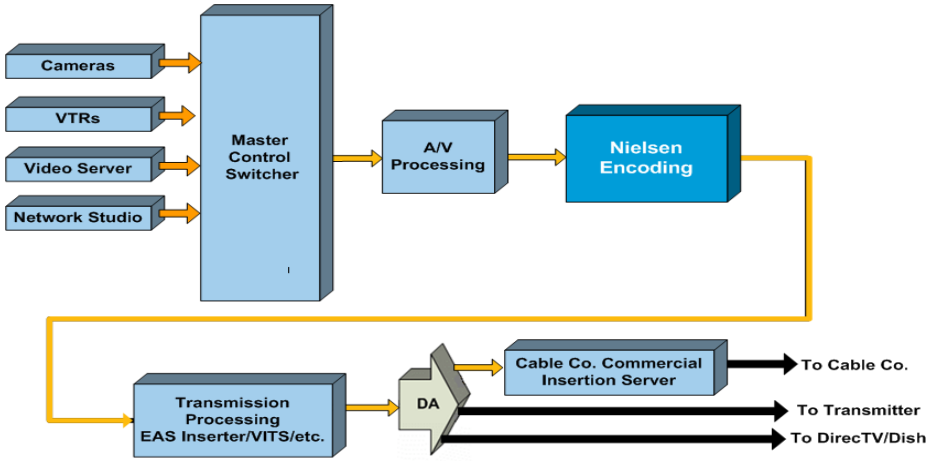

Figure 11 – Compliant Scenario: MSO Direct Single Encoder Solution

Figure 12 shows that the SID for the MSO output cannot be the same as the SID for the Over the Air (OTA) output. For multiple encoders with the same SID, the only exception is for redundant feeds (X/Y or A/B output chains, for example.), where only a single encoder is online at any one time.

To achieve compliance and eliminate this risk, the station's Research Director must contact their Nielsen Client Service Representative for complete details regarding MSO commercial insertion direct feeds, as additional costs are involved. The Nielsen Client Service Representative submits a Change Request with the station call letters, Nielsen encoder serial numbers, feed information, and Chief Engineer or equivalent for each encoder. Nielsen then provides a new SID and assistance in configuring the encoder.

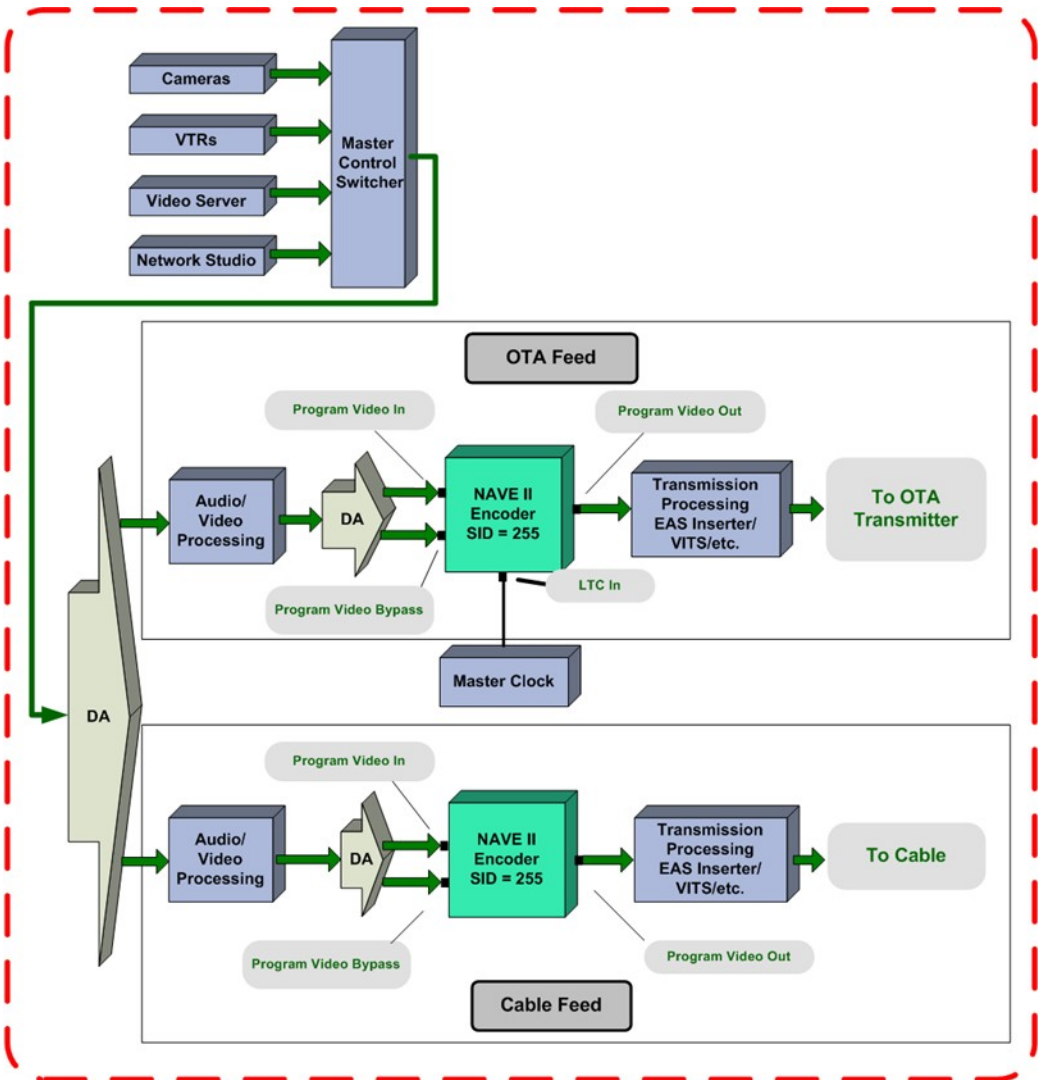

Figure 12 – Non Compliant Scenario: MSO Direct Feed

2.8. Solution for MSO Delayed Feeds

Delayed distribution of a channel provides a new, alternate tuning source that allows any home to view programming at a later time, adding to the Live + Same Day ratings and affecting the C3 ratings. For this programming to be Nielsen-compliant, the viewing must be credited to the National Client, not to the Local Affiliate. To accomplish this, the delayed feed to the MSO must meet the following criteria (Figure 13):

- The Station MUST provide a unique Nielsen Final Distributor (FD) encoded feed and not a feed with the same FD SID as is sent to the Local Affiliate.
- The encoder clock must be offset to match the delayed feed so programming and Nielsen FD code are delayed by the same amount of time.

Nielsen does the following:

- Provides the new Source ID (SID) for proper crediting to the National Client.
- Prior to launch of the feed, installs a MMS reference site for the MSO, unique channel.
- Processes clock and encoder alerts as is done with the primary feed and in agreement with our service-level agreement.

To implement the necessary procedures, ask your Nielsen Client Service Executive to submit a Change Request from.

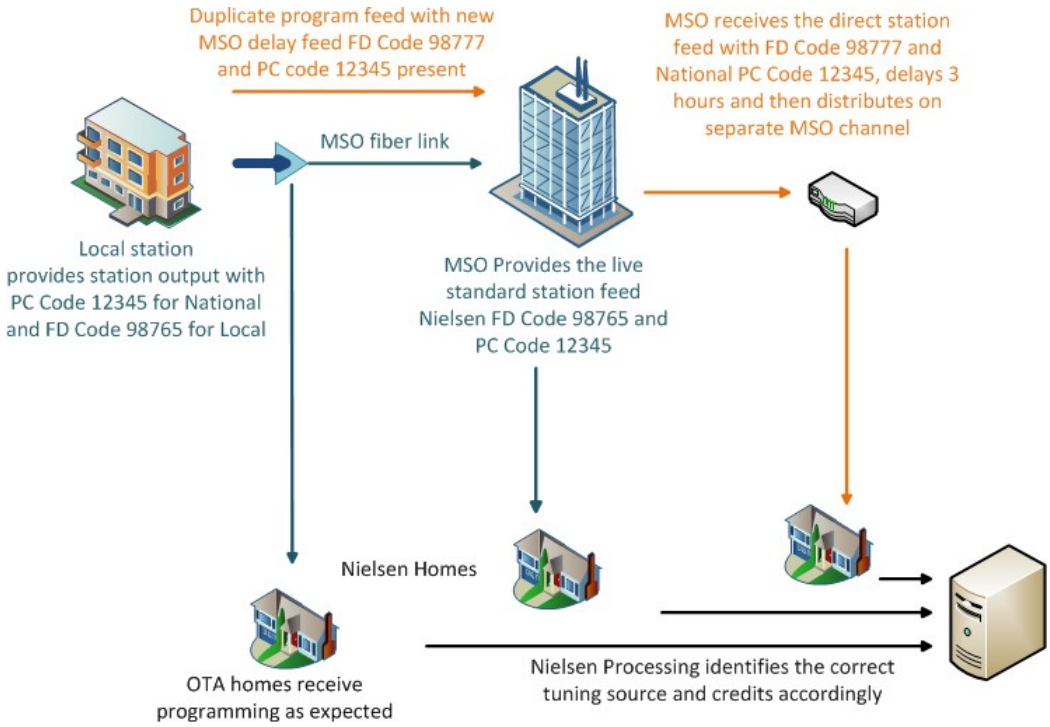

Figure 13 – Compliant Scenario: MSO Delayed Feed

2.9. Environmental Factors

This section describes how to manage a variety of environmental factors that exist in various facilities. Review those that apply to your plant.

- Audio code survival with compression
- Audio processing
- Noise gates and multi-band processing
- Dolby Digital dialnorm settings
- Studio equipment
- EAS audio processing
- Time synchronization
- Daylight Saving Time
- Encoding SAP, AAP, and DVS
- Reduction of station power levels
- Secondary or backup feeds

2.9.1. Audio Code Survival with Compression

Nielsen encoders are designed and tested to optimally insert audio codes that survive industry-standard audio compression. To maintain the best possible performance, the following compression bit rates should be maintained:

Table 1 – Compression Bit Rates

Type	Rate
Dolby AC3 stereo	192 Kbps or higher
Dolby AC3 5.1	384 Kbps or higher
Enhanced Dolby AC3	192 Kbps or higher
MPEG audio (layers 2 and 3)	192 Kbps or higher
MPEG4 AAC audio	192 Kbps or higher

Audio watermarks are inserted in the frequency range 3.0 kHz to 8.2 kHz. Audio processing equipment must pass this frequency range to ensure optimal audio coding.

2.9.2. Audio Processing

To maximize code insertion opportunities, audio processing must occur prior to Nielsen encoding. On the output of a studio feed with a wide dynamic range, install an audio processor with AGC functionality, audio limiting, and dialog loudness control. A good- quality audio processor slightly smoothes large variations in dynamic range, improves the audibility of quieter audio passages, and enhances the ability of the encoder to insert watermarks.

Digital audio facilities typically measure and monitor digital (AES) audio referenced to dBFS. This measure, dBFS, is the audio level in decibels relative to full scale (FS). Full scale is the point in digital audio where the audio signal goes into clipping, and there is no additional headroom to use for encoding the audio feed.

The audio coding algorithm used by the encoder only inserts an audio watermark if enough energy is present in the audio feed to mask the additional Nielsen audio bits being inserted into the program feed. Because of this, it is important to ensure that the digital audio going to the encoder is at the correct level. Audio that is considered hot causes severe and audible audio clip conditions

Audio that is too low does not have enough masking energy present to mask the Nielsen audio codes being inserted into the audio program feed and reduces the number of opportunities the encoder would have to watermark the program feed. Therefore, it is important to ensure that the audio going to the encoder is in the correct operating range.

If an NTSC encoder is placed in-line with a program stream that is simulcast on a DTV facility, some NTSC SIDs are occasionally seen on the DTV facility program. This bleed-through of SIDs is undesirable and must be avoided.

To avoid bleed-through, you must not install encoders in series in the same physical plant.

Note For more information, see Scenario 1. Non-Compliant Overwrite/Bleed-Through Installation in section 4.

2.9.3. Noise Gates and Multi-band Audio Processing

With the advent of digital audio technology, absence of audio means that the audio energy floor can fall so low that it is no longer possible to insert Nielsen SIDs in the compressed domain during silent periods in a program. Analysis has found that an audio processing device, called an audio noise gate, can cause low FDAC crediting percentages when aggressively used.

The use of a noise gate can push residual background audio energy between spoken words on programming, such as a talk show, below -80 dBFS (decibels below full scale) in the compressed domain—well below typical levels seen in analog studio mixes done in the past.

Nielsen audio watermarking technologies insert audio codes roughly -30 dB down from program audio to prevent audibility. This low, audio-energy level is beyond the usable dynamic range of the Dolby Digital AC3 audio encoding system used in ATSC over-the-air broadcasts. Thus, most Nielsen audio codes inserted during these periods can be lost.

Program creators, who are intent on using an audio noise gate to reduce background audio for live broadcasts, need to ensure enough audio energy remains for Nielsen audio

watermarking to occur. Ensuring the audio energy is sufficient is especially important for program content that must be Nielsen-encoded in the Dolby Digital compressed domain further downstream in the distribution chain.

When using a noise gate or similar audio processing device, Nielsen recommends keeping audio energy during silence periods no lower than -48 to -50 dBFs.

2.9.4. Dolby Digital Dialnorm Settings

Abnormally low audio fed to a Dolby encoder hinders the ability of downstream Nielsen encoding to properly insert codes. To optimize the encoding process, use the following settings and levels on the Dolby AC3 encoder:

- Dialnorm setting is –24.
- Dialog loudness is –24 LKFS (±2 LKFS)

These settings are based on recommendations found in “ATSC A/85 Recommended Practice Techniques for Establishing and Maintaining Audio Loudness for Digital Television.” See section 1.4, Related Documentation,” for a link to this document.

2.9.5. Studio Equipment

Because studio feeds such as news, live, and weather broadcasts, use equipment that offers flexibility in altering audio characteristics, you must ensure the equipment and its settings properly sustain the audio energy in the audio spectrum identified in section 2.9.1.

Caution Failure to ensure the range meets this requirement minimizes the ability to watermark the content with Nielsen audio codes.

For example, a Client notified Nielsen about poor audio code insertion rates during news programming. Further investigation revealed that whenever the local news show for the TV station switched to the weather set, code insertion rates dropped to near zero.

Figure 14 shows severe audio abnormalities in the audio spectral plots for the microphone used at the weather set. These abnormalities are highlighted in the spectral plot at the top of the figure. Under these conditions, the audio energy was insufficient to support optimal Nielsen audio watermarking.

The Client replaced the microphones on the weather set and adjusted equalizers on the soundboard to their default positions. Following these changes, audio energy was restored to the Nielsen audio frequency band and audio code detection rates returned to normal level. See also section 2.9.1 “Audio Code Survival with Compression.”

Figure 14 – Audio Spectrum Before and After Microphone Replacement and Equalizer Adjustments

2.9.6. EAS Audio Processing

Non-time-aligned, AES digital audio signals feeding to a Dolby 569 AC-3 encoder have the potential to degrade watermark performance of Nielsen audio codes. Degradation can occur when an audio feed for a TV station is later down-mixed to stereo through a Dolby Pro Logic® II down-mix process (Figure 15).

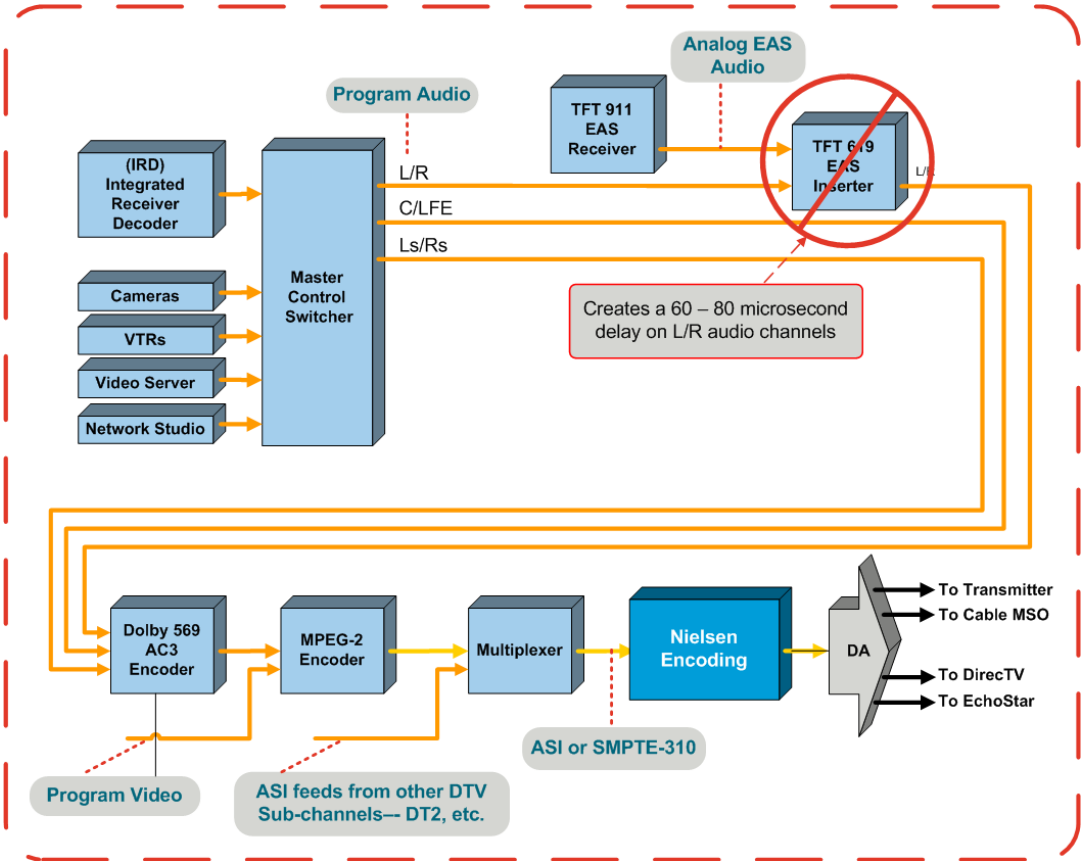

Figure 15 – Non-Compliant Scenario: EAS Causes Delay in Audio

This specific situation occurs when digital over-the-air signals with Dolby Digital 5.1 surround sound audio are down-converted to stereo for use where 5.1 surround audio is not supported. Using a specific EAS (Emergency Alert System) inserter causes a delay in one of the audio signals. This delay negatively results in poor detection of FD codes in Nielsen sample homes. The net effect produces an increase in the dependency on PC codes and audio signatures. In cases where MMS (Media Monitoring System) reference data is not available, this situation has the potential to create crediting issues.

Any delay in an audio channel must be time-aligned across all audio channels as input to the Nielsen encoding equipment. The next three figures show configurations designed to uniformly process all audio signals.

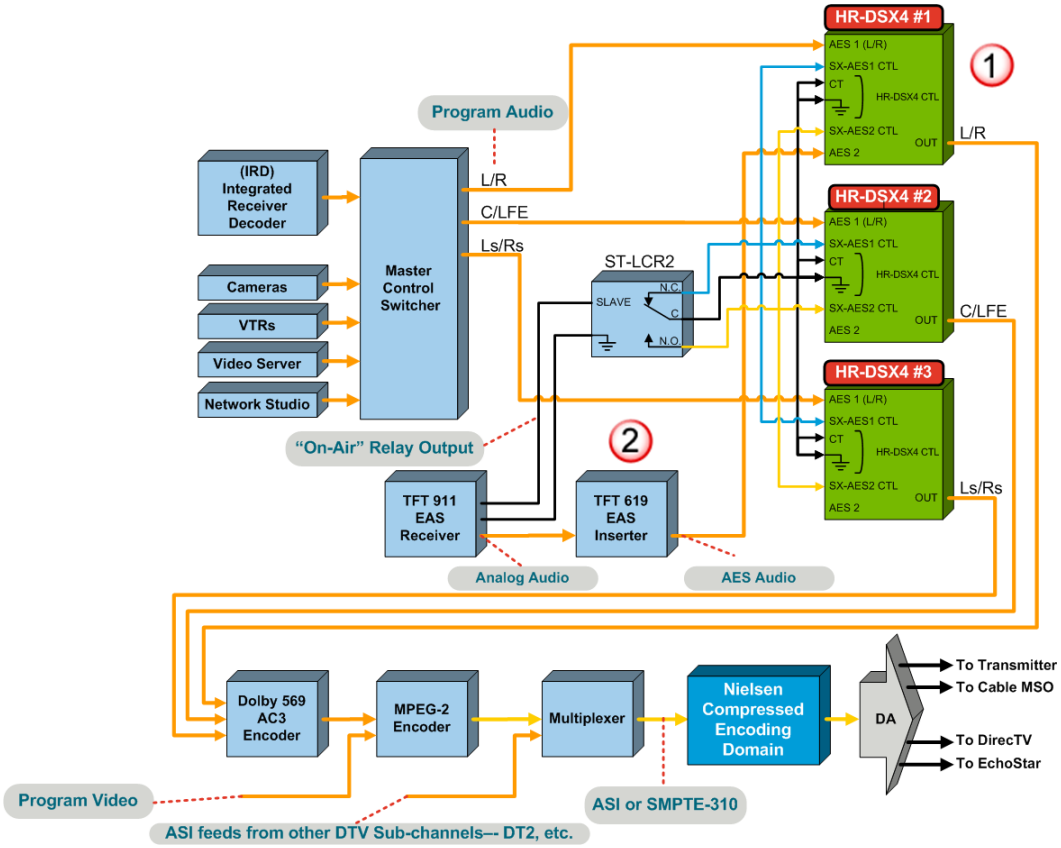

Figure 16 – EAS and Radio Design Labs HR-DSX4

Figure 16 shows a plant using a Radio Design Labs® HR-DSX4 Digital Audio Selector 4x1. Do the following:

1.
   - Set the Mode to AES31D and connect the CT strap to ground.
   - Use RCA-to-BNC adapters on the I/O.
   - On all three switchers, tie the GPI inputs together.
2. To force the EAS 619 to always convert analog audio to AES output, short pins 5 and 6 together on the Control/Status connector

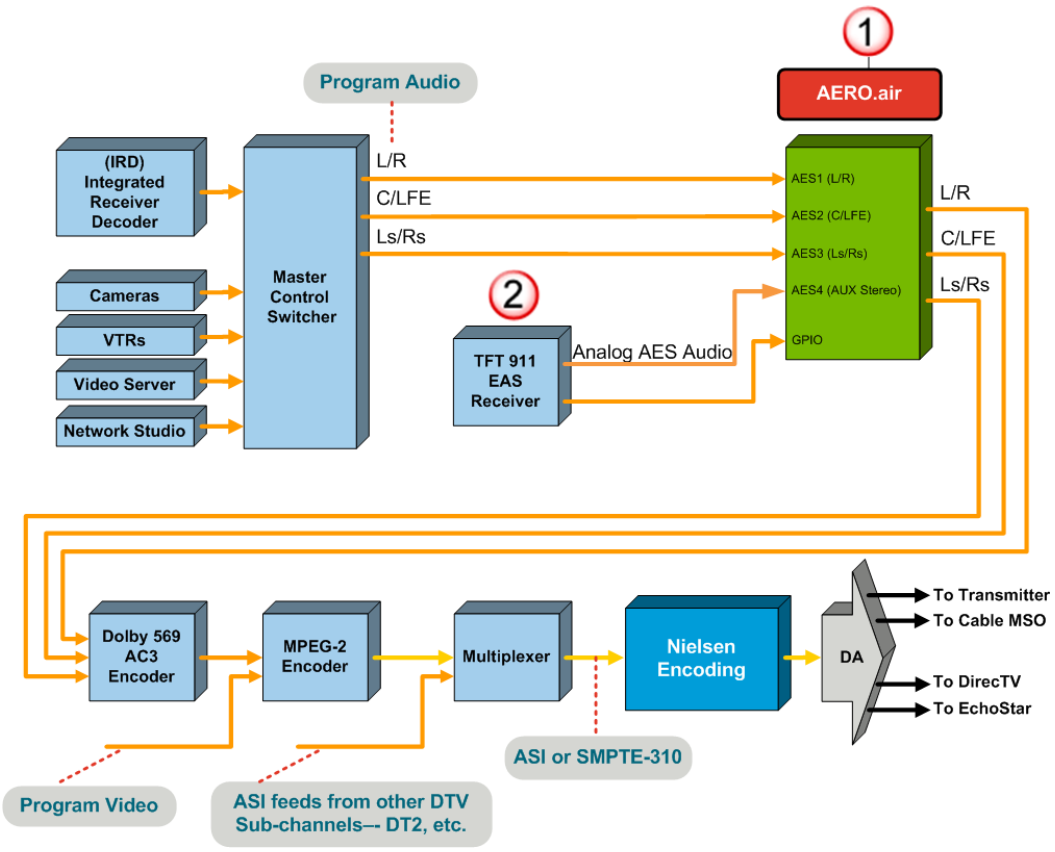

Figure 17 – EAS and AERO.air™

Although the Linear Acoustic AERO.air™ can insert Nielsen audio code, Figure 17 shows a layout in which the Nielsen Watermark engine is not enabled.

1 For the AERO.air™, when +5 VDC is present on GPIO, AERO.air does the following:

- Mutes the.5.1 inputs
- Airs the EAS input
- Bypasses up-mixing

2 On-Air relay output—external current-limited +5 VDC supply is needed for the AERO.air GPI input.

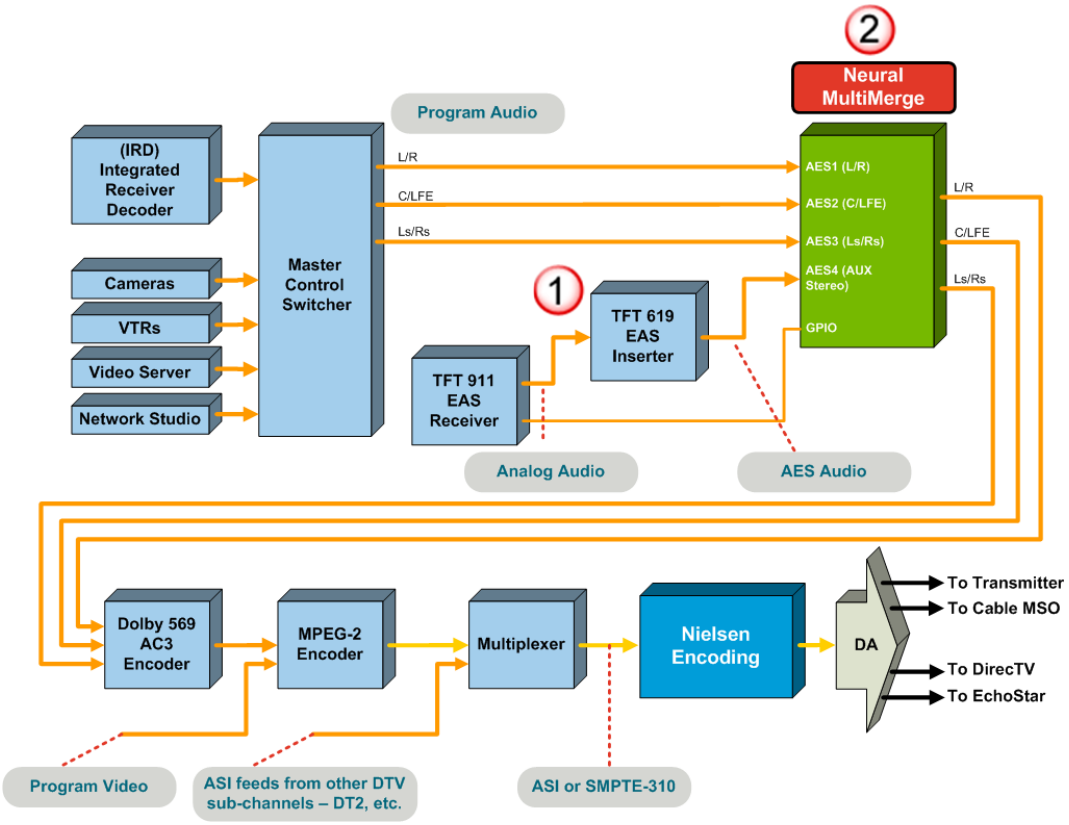

Figure 18 – EAS/Neural Surround™

Figure 18 shows a plant layout that includes a DTS® Neural Surround™ MultiMerge stereo-to-surround up-mixer. For the on-air relay output, use an external, current-limited +5 VDC supply:

1. To force EAS 619 to always convert analog audio to AES output, short pins 5 and 6 together on the Control/Status connector

2. Set the MultiMerge as shown in Table 2. When +5 VDC is present on GPI, MultiMerge does the following:
   - Mutes the.5.1 inputs
   - Airs the EAS input
   - Bypasses up-mixing

Neural MultiMerge	Mode	GPIO
Input	5.1	Aux
MultiMerge	AutoDetect	Pass-through

2.9.7. Time Synchronization

The encoding process inserts two primary pieces of information: the SID and a date and time stamp. The date and time stamp is an important element that supports the ability of Nielsen to track and credit TSV (Time-Shifted Viewing).

Although the encoder clock is accurate, as with any computer-based clock, it is subject to drift over an extended period. For this reason, the accuracy of the internal clock in the encoder must be synchronized to a highly stable reference standard within plus or minus 2 seconds.

Caution Inaccurate time synchronization can result in crediting errors such as miscrediting assigned to AOT (All Other Tuning) or TSV.

All encoder products provide mechanisms for time synchronization that can be installed and configured according to the product's user manual.

Use one or more of the following sources for time synchronization:

- NTP—Network Time Protocol
- LTC—Linear or Longitudinal Time Code
- GPS—Global Positioning System

NTP Requirements

The NTP interface requires a LAN connection to a server that provides accurate time. If the encoder is connected to a LAN, no other hardware connections are necessary. The encoder, however, must be configured for NTP operation and connect to a single NTP server at an IP address that you specify.

LTC Requirements

When using LTC for time synchronization, check the documentation for your encoder to verify whether its LTC input is balanced or unbalanced and that the encoder is correctly configured for LTC. Also, check that the LTC source provides the required input voltage range for the encoder.

If DST (Daylight Saving Time) is observed in the area where the signal is broadcast, the LTC data must reflect this. The time code must advance by one hour at the prescribed date and time in the spring and fall back by one hour at the prescribed date and time in the fall.

Some LTC master clocks automatically adjust for the DST transition while others do not. The "LTC observes DST" configuration in each of the encoders should be enabled or disabled according to the capabilities of the system in the plant.

GPS Requirements

Although it is recommended that encoders use an NTP or LTC time input from a GPS-synchronized master clock, facilities without a master clock can set their encoders to receive time synchronization directly from a GPS receiver using the RS232 connections on the back of the unit.

2.9.8. Daylight Saving Time

DST transitions occur twice each year. Because the time stamp is critical to the encoding process, correct management of DST transitions is extremely important.

All time-related configurations must be verified when the following events occur:

- Encoder software updates that affect time-related functions or features are installed. Such changes may affect the configurations set prior to installation of the update.
- DST transitions are about to occur. Although encoders are designed to automate DST transitions, verification is strongly recommended.

Even if your external time reference source controls the DST transition, the encoder may need to be configured for the correct DST transition days. Refer to the documentation for your encoder and verify that the encoder is correctly configured for DST adjustments. See also section 2.9.7, “Time Synchronization."

If DST transition adjustments are incorrectly handled, proper station, local cable origination channel, and regional cable network viewing credit rely on the Nielsen back-up process using MMS sites. In the event a monitoring site is down, a potential exists for crediting to be assigned to AOT or TSV.

Self-monitoring is required to verify the accuracy of the Nielsen time stamp after each DST transition.

2.9.9. Encoding SAP, AAP and DVS

All encoding media distributors are required to encode their secondary audio program (SAP), alternate audio program SAP, AAP and DVS streams, when they exist, with the same SID as their primary audio streams. This is true for program content providers, when the program contains SAP, AAP, or DVS, and for final distributors when transmitting SAP, AAP, or DVS. Encoding all the audio streams allows Nielsen to accurately credit tuning regardless of the audio selection made in the home. If these audio tracks are not encoded and an A/P home enables SAP, AAP, or DVS on a digital set top box, crediting goes to AOT rather than to the media distributor.

2.9.10. Reduction of Station Power Levels

An emergency may require a Client station to run at reduced power levels. Reduced power is defined as operating at power levels 3 dB or more below the FCC-authorized ERP (effective radiated power) level.

If a Client station must operate at a reduced power level for an extended period, the station must notify Nielsen Encoder Support. Low power levels may impair the ability of Nielsen to collect high-quality reference data for crediting.

Nielsen recognizes that operating at reduced power is rarely planned. Because such operation affects the crediting of data for the Client, however, keeping Nielsen Encoder Support informed of such a condition is a critical factor in reducing that impact.

2.9.11. Secondary or Backup Feeds

Many plants or facilities have secondary or backup distribution feeds to remain on-air during equipment failure, maintenance, or upgrade of the primary feed. Encoders must also be installed in these secondary or backup distribution feeds to ensure continued insertion of Nielsen codes during these outages. Use the same SID for the backup encoder as the SID for the primary path that it bypasses.

3. Monitoring Nielsen-Encoded Feeds

For all facilities, it is imperative that all distribution paths and return paths downstream from the Nielsen encoder be self-monitored to verify the presence of Nielsen codes.

Caution Absence of code on distribution paths may affect crediting.

Monitoring for the presence of Nielsen codes is done on the output side of the encoder and as close to the transmitter as feasibly possible. Monitoring ensures encoding is enabled and working properly and has not been accidentally disabled or bypassed. Monitoring also provides early warning of any faults.

For more information, see the following:

- Client agreement
- User documentation for the encoder
- Nielsen Encoder Technical Bulletin, “Nielsen Encoding of Direct Cable System Feeds.” 2012-01-25.
- Policy supplements and the Encoder Selection Chart on the Encoder Forum at https://engineeringportal.nielsen.com/docs/TV.

4. Non-compliant Installations

Site visits have revealed certain encoder installations that produce issues resulting in faults. The diagrams in this section are examples of some unacceptable installation and configuration scenarios.

Caution **Failure to comply with the Encoding Installation and Configuration Policy can result in incorrect data and loss of correct crediting. As a result, Nielsen may need to take actions to protect the integrity of Nielsen Ratings.**

4.1. Overwrite/Bleed-Through

4.1.1. Encoders Installed in Series

Non-compliant Installation

Never install two encoders in series of the same SID and SID type. In this example, codes on the SD distribution are consistent. Codes on the HD distribution path, however, are a mixture of HD (SID=999) and SD (SID=255) audio codes.

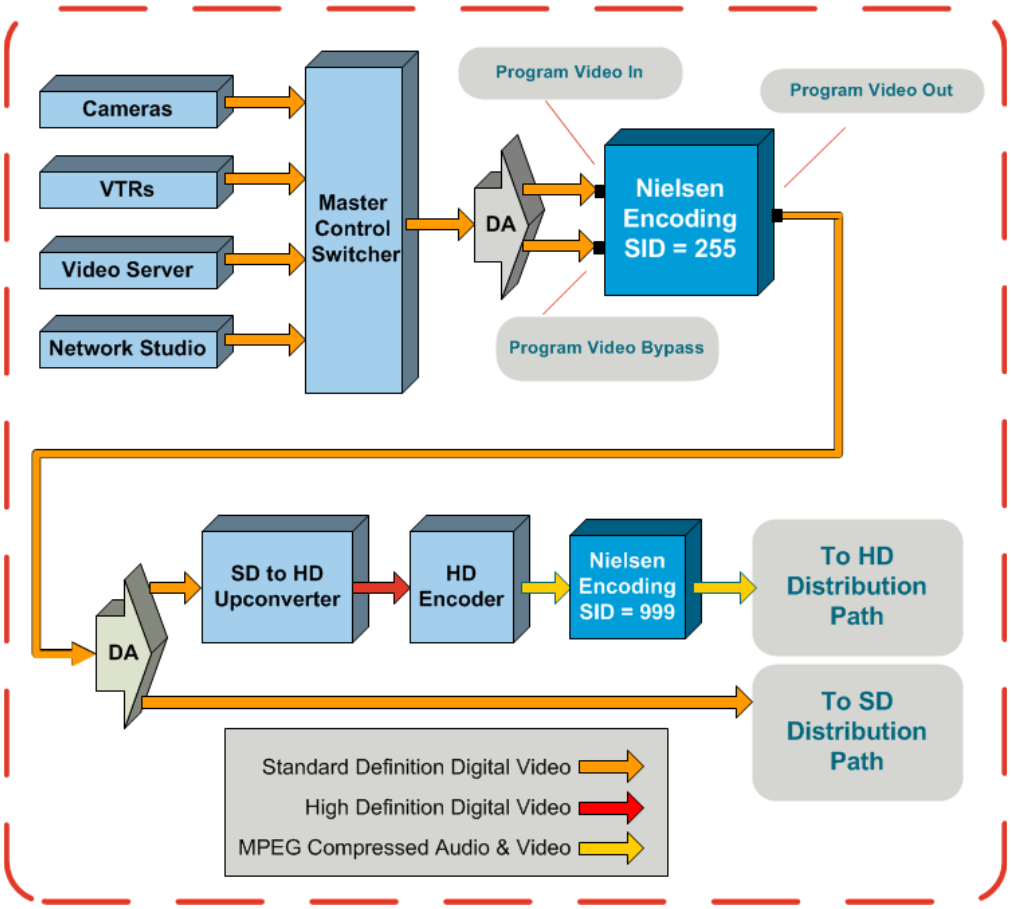

Figure 19 – Non-compliant Scenario: Overwrite/Bleed-Through Installation

Compliant Installation

See Figure 4 – Combination Uncompressed SD Digital Encoder & Compressed ATSC Encoder (HD Digital) on page 7.

4.1.2. Cascaded Nielsen Encoding

As stated previously, each unique signal path must contain a unique SID, which means that two encoders must not be installed in series in the same physical distribution path. Following this rule prevents bleed-through of an upstream SID.

Non-compliant Installation

Figure 19 can also be regarded as an example of cascaded Nielsen encoding. Some other examples of cascaded Nielsen encoding are:

- Up-converting an SD feed that contains Nielsen code to HD and using a second Nielsen encoder with its own unique SID to over-write the SD code
- Up-converting from SD to HD
- Down-converting from HD to SD programming

To provide Nielsen with correct and accurate code, cascaded Nielsen encoding must be avoided.

The following setups do *not* comply with this Nielsen Encoding Installation and Configuration Policy:

- A server delays an East Coast distribution that has Nielsen encoding and then a West Coast Nielsen SID is inserted over the East Coast SID. This applies to SD or HD services.
- A server delays an East Coast distribution that has Nielsen encoding and then a West Coast service distributes it with the East Coast SID present and off by 3 hours. This applies to SD or HD services.
- SAP, AAP or DVS audio is Nielsen encoded in an SD domain and then up-converted and distributed with the HD video service.

Compliant Installation

In each case, the correct solution is to provide a non-Nielsen encoded feed to each Nielsen encoder. In many cases, the correct placement of a single Nielsen encoder corrects any cascaded Nielsen encoding issues and provides a spare unit for disaster recovery.

The optimal solution is to have a single point of encoding or to install encoders as shown in section 2.2.2, “Basic Installation Diagrams.”

4.2. One or More Unencoded Distribution Paths

4.2.1. Non-compliant Installation

In Scenario 2, there is not any Nielsen encoding on the distribution of the station to DBS providers. This could also be a particular MSO Fiber feed. The result is that some station outputs content contains no audio encoding. This situation can produce reduced or no crediting.

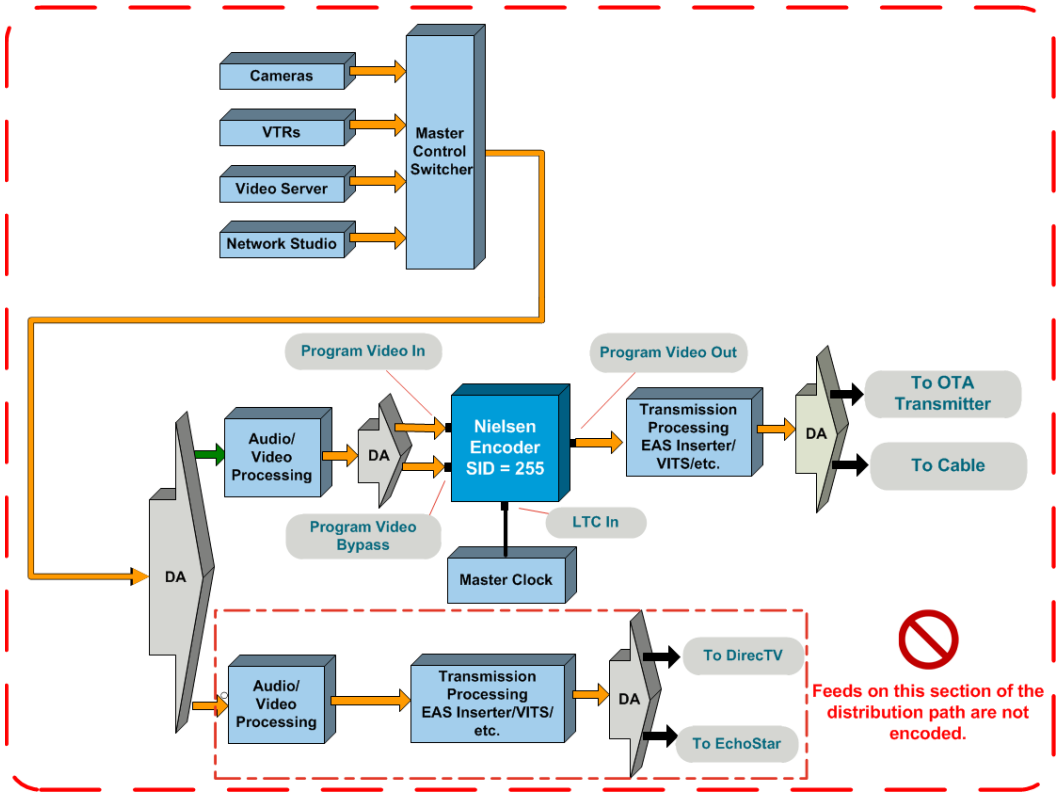

Figure 20 – Non-compliant Scenario: Unencoded Distribution Paths Installation

4.2.2. Solution

In Figure 20, select transmission paths are credited using codes (in this case, OTA and cable). For the satellite feeds, reduced crediting can result.

See section 2.2.2, “Basic Installation Diagrams.”

4.3. No Nielsen Code on the SD Distribution

4.3.1. Non-compliant Installation

Figure 21 shows an installation where no Nielsen encoder is on the SD distribution path of the station. The result is that the content of the SD feeds contains no audio encoding. This situation can produce reduced or no crediting.

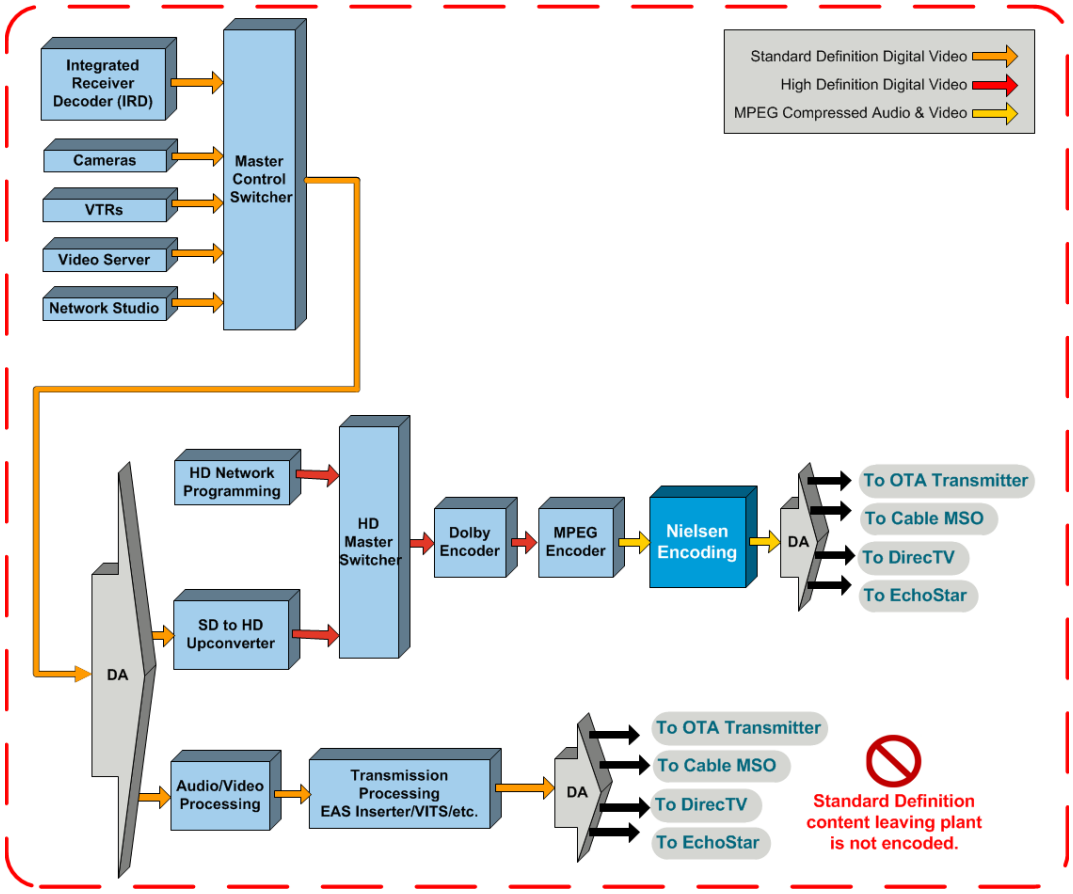

Figure 21 – Non-compliant Scenario: No Nielsen Code on SD Distribution

4.3.2. Solution

Confirm the presence of code on all distribution paths leaving the facility. If code is not present, identify and correct improperly configured equipment.

Refer to Figure 4on page 7 to review compliant installation or contact Nielsen Encoder Support.

4.4. Improperly Configured Equipment

4.4.1. Non-compliant Installation

In Figure 22, a Harris FlexiCoder™ encoding system is not properly configured: It is set to distribute video from Port A and non-encoded audio from Port B out of the plant. The result is that the content contains no audio code. This situation can produce reduced or no crediting.

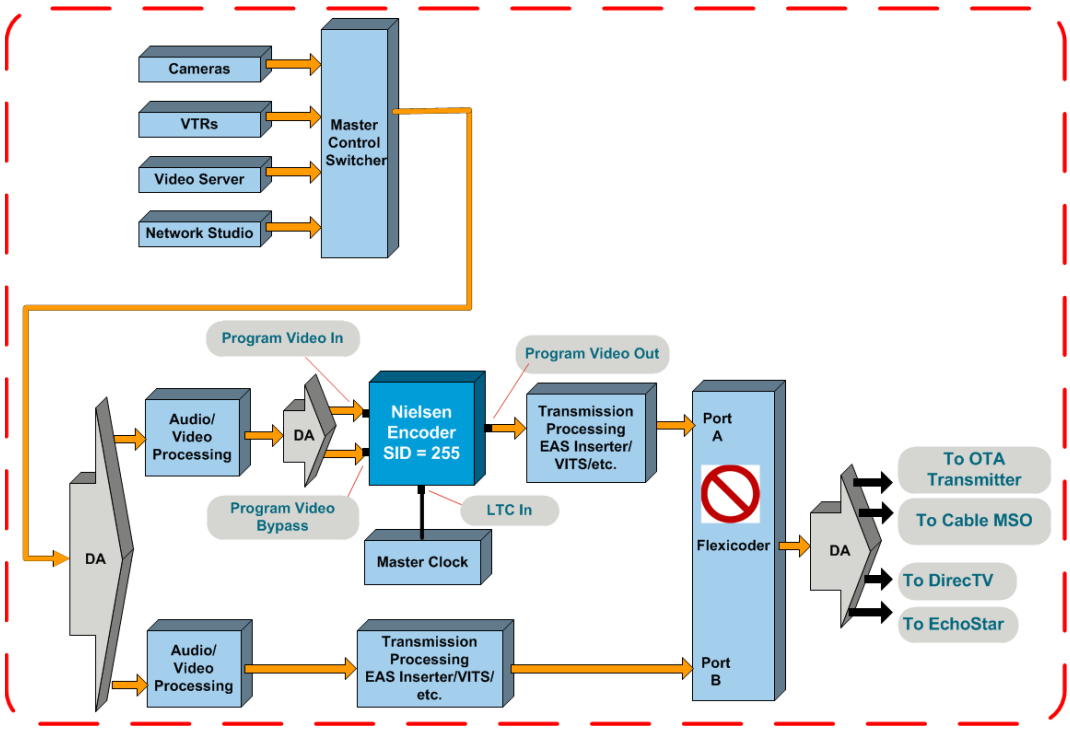

Figure 22 – Non-compliant Scenario: Improperly Configured Equipment

4.4.2. Solution

Confirm the presence of code on all distribution paths leaving the facility (Figure 22). If code is not present, identify and correct improperly configured equipment.

Note item 7 in section 2.1, “Overview of Encoder Installation,” which states the following:

> “Verify encoder operation offline in the primary and backup paths to confirm compatibility with other equipment in the distribution change."

5. Contact Information

Although Nielsen encoding solutions are designed to be reliable and dependable devices with many thousands of operating hours, configuration and installation issues are still possible. In addition, Nielsen or one of the companies below may have worked on or be working on a patch or fix for an issue that has already been reported and logged in our database. Use one of the contact points in Table 2 to reach Nielsen as appropriate.

If you wish to contact Nielsen for support, be aware that you should not provide Nielsen with information that your company considers confidential unless your company's written information is clearly marked "confidential." Verbal information must be reduced to a writing marked "confidential" no more than thirty days later, and/or information disclosed through access to your company's computer systems must be preceded or followed by your company's written notice claiming confidentiality no more than thirty days later.

Subject to the foregoing, Nielsen will only use your company's confidential information to assist in resolving support issues directly connected to this policy, and will obtain your company's permission before any of said company confidential information may be disclosed by Nielsen to any of the third-party encoder partners.

At your company's request, Nielsen will provide its standard non-disclosure agreement to you for signature.

Table 2 – Customer Support Contacts

Nielsen Support	Location
Encoder Support	Nielsen 501 Brooker Creek Blvd Oldsmar, FL 34677 800-537-4872 option 2 www.Nielsen.com Encoders@Nielsen.com
This policy	https://engineeringportal.nielsen.com/w/downloads/tv/Encoding/Encoding_Install_Config_Policy_Rev_G.pdf
Engineering Portal	https://engineeringportal.nielsen.com/docs/TV

Encoding and Monitoring Compliant Checklist

Name Date

Confirmed	Item	
	All encoders are updated with the most recent software and firmware installed.	Section 2.9.8
	All encoders are installed downstream of program switchers, routers, and processing equipment and prior to any compression encoders and all signal distribution from the plant.	Section 2.2.1
	Audio processing is implemented prior to Nielsen encoding equipment.	Section 2.9.2
	The Nielsen encoders are not installed in series in the same physical plant.	Section 4.1.2
	Encoders are installed in all secondary or backup signal processing feeds.	Section 2.9.11
	If the encoder solution supports a bypass video input (such as the NAVE II does), the same video input must be connected to the main and bypass inputs.	User manual for the encoder
	All mandatory encoder configuration settings have been confirmed.	Section 2
	Dolby Digital settings adhere to the settings specified in this document.	Section 2.9.2, “Dolby Digital Dialnorm Settings”
	Dialnorm is set to –24 and dialog loudness is set to –24 LKFS (±2 LKFS). The EAS insertion system uniformly passes all audio channels as outlined in this document.	Section 2.9.2, “Dolby Digital Dialnorm Settings”
	All audio processing conforms to the minimum compression bit rates outlined in this document.	Section 2.9.2
	The audio level on all audio channels being processed is in the correct operating range (not peaking) in accordance with SMPTE specifications.	User manual for the encoder and SMPTE specification
	Unprocessed audio is in the operational dynamic range of the encoder and frequency range is preserved.	Section 2.9.2, “Dolby Digital Dialnorm Settings”
	Each unique signal processing feed (channel) has a dedicated encoder and a unique SID.	Section 2.1
	Encoders are configured with the proper code type: program content (PC) or final distributor (FD).	Section 2.4

Confirmed	Item	
	Program content encoded source feeds are used for distributing cable network simulcast content.	Section 2.4
	All signals leaving the plant are properly encoded per the instructions outlined in this document.	Section 2
	All SAP, AAP feeds, and DVS streams are encoded.	Section 2.9.9
	The clocks in all encoders-both primary and backup-are synchronized to a time standard using one of the time synchronization methods identified in this document.	Section 2.9.7
	DST configuration settings have been properly configured and stored in the encoder.	Section 2.9.8
	Compatibility with other equipment in the plant has been verified by operating the encoder off-line for at least one day (24 hours).	Section 2.1
	No performance issues arose during offline testing OR We notified the Nielsen Encoder Support Group and resolved any performance issues that arose during off-line testing.	Section 2.1
	After installing the encoders, an electronic copy of the system configuration was sent via email to Nielsen Encoder Support.	Section 2.1
	The station will notify Nielsen Encoder Support if the station intends to reduce transmission power levels.	Section 2.9.10

Glossary

A

A/P Meter (Active/Passive Meter)

A Nielsen meter that monitors a television set by examining the content of what is watched, independent of the delivery path or tuning mechanism. The meter reads an active code embedded in a television audio or video signal that uniquely identifies the program content. In the absence of an active code, it develops an event signature through audio pattern definition and recognition that is then matched to a database of signatures taken during the same period at reference sites for every channel for which Nielsen generates ratings. See also MMS.

Active Passive Metering System (A/P)

The Nielsen system that meters analog and digital television, as well as new viewing environments and consumer electronics. It requires complex in-home hardware and software, integrated household and monitored reference data collection, active encoding at the final distributor, and rules-driven processing to ensure proper crediting to program distributors.

AOT (All Other Tuning)

All tuning that fits into the Households Using Television (HUT) category but is not monitored

E

Encoder

A physical device or application that inserts an identifying code or watermark into the audio and/or video content of distributor events to identify those events as a specific program, commercial, or other item. The term "watermark" is a synonym for "encode."

H

HUT (Households Using Television)

The percentage of all television households in a survey area with one or more sets in use during a specific period. The sum of the average ratings for a given time period is sometimes higher than the HUT number because households may view multiple programs at the same time. If a household watches two programs, the household counts toward each program rating but only once toward a HUT number.

M

MMS (Media Monitoring System)

A Nielsen system that collects reference data from analog and DTV signals. It includes an acquisition unit and a collection unit at a remote site and a collection facility at a central Nielsen location. Nielsen matches the reference data in the collection facility against the in-home viewing data collected by the A/P metering system.

N

NACAT—Nielsen Audio Code Analysis Tool

An application that captures audio, decodes, logs, and displays the information to the user. The application is used for monitoring, assisting the user in troubleshooting, and verifying NAES — Nielsen Audio Encoding System — installation.

NAVE—Nielsen Audio Video Encoder

A Nielsen encoder that adds data to audio and/or video to track the distribution of content through a variety of local and national distribution systems

NAES—Nielsen Audio Encoding System

A Nielsen patented encoding technology used to insert audio watermarks with a unique signature at the point of transmission for decoding by Nielsen in-home metering and MMS monitoring equipment. The NAES (Nielsen Audio Encoding System) software watermarking algorithms operate on and in a variety of software and hardware-based encoding platforms.

Nielsen Watermarks

Nielsen Watermarks places an audio watermark in a lower-frequency portion of the active program audio than the current NAES II technology does. Its lower-frequency position enables Nielsen Watermarks to be more robust and much less likely to be “compressed out” of the program audio by television distribution providers without interfering with the viewer’s listening experience. Nielsen Watermarks cannot be overwritten by successive program distributors.

NUR—Nielsen Universal Reader

A data receiver that decodes AMOL (Automated Measurement of Lineups) and NAES data that has been added to the video or audio signals. It enables a Client who is using NAVE I or NAVE II to verify that the AMOL or NAES data is correctly encoded.

S

SID (Source Identifier)

A unique number assigned to each encoder device that is encoded into the audio portion of the signal. The SID identifies a particular encoder and is the link between the source of the encoding on an encoded video (distributor or third-party encoder) and an encoder. SID is part of the watermark code that is encoded on the video and is used in combination with the encoded date/time range to identify a particular event. In summary, the SID identifies the source of the content, points in the distribution chain, and the final distributor.

W

Watermark

The Nielsen process of inserting active NAES or Nielsen Watermarks audio codes into the audio portion of content