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Using SCTE 224 To Increase Advertising Revenue

A Technical Paper prepared for SCTE by

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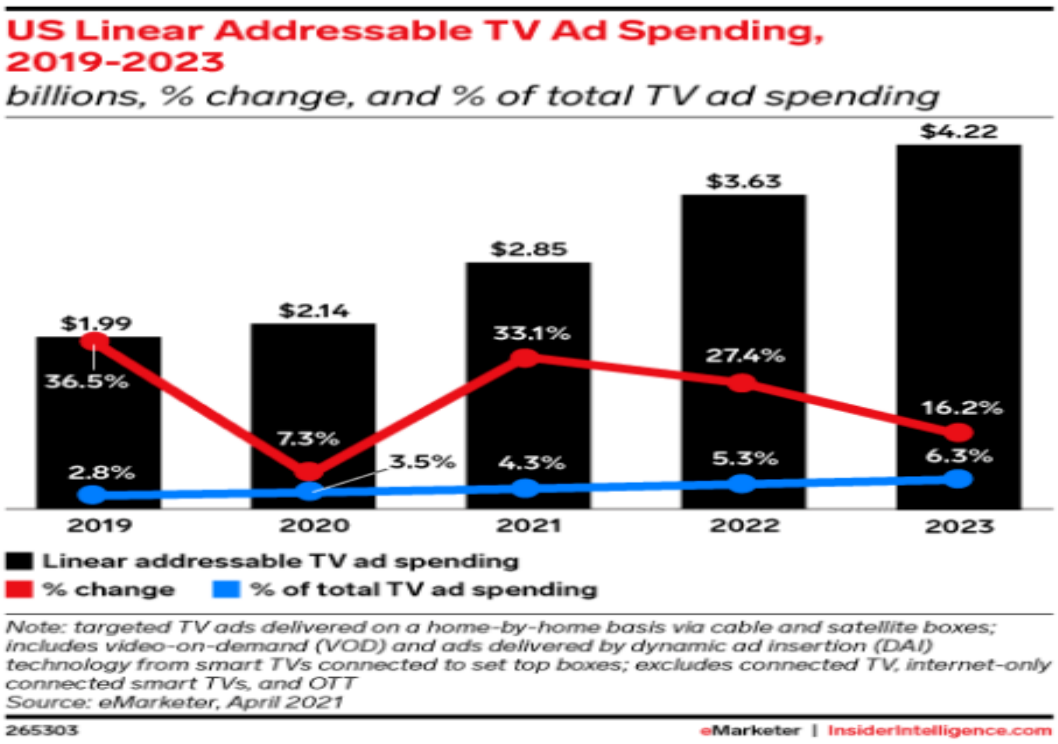
1. Introduction

The popularity and adoption of the SCTE 224, Event Scheduling and Notification Interface (ESNI) is opening new use cases where the protocol is a great fit. One new and exciting use cases is for addressable advertising where content providers and operators can use static, national ad inventory which are more targeted to the viewers and therefore potentially generate higher CPMs. Addressable advertisements, in this context, means replacing advertisements sold on broad age/gender demographics with advertising sold on more specific audience definitions. This evolution in ad avails has both content providers and operators excited for revenue growth potential in this relatively untapped market. According to eMarketer, U.S. addressable TV advertisement spending is expected to grow 33.1%, 27.4%, and 16.2% respectively in 2021, 2022, and 2023 and will eventually represent 6.3% of the total TV ad spending.



SCTE 224 has proven itself as an efficient and effective means for machine-to-machine communication of out-of-band (OOB) linear rights management. Additionally, combining of SCTE 224 with SCTE 35 to trigger the in-band signaling allows precision execution of linear rights for content substitution and addressable advertising management. ESNI is well known as the solution of record for content embargos and alternate content, however, content providers are now using ESNI for addressable advertising,

The ESNI protocol is perfectly well suited to communicate rules and policies at an audience-based level, thereby providing a substrate to implement addressability. Two critical requirements within the addressable advertising workflow are 1) identifying which slots within the content provider's 14-15 minutes per hour are addressable and 2) conveying ad information specific to those slots. ESNI is the key mechanism to communicate slot schedules for addressable slots versus national advertisements. ESNI also communicates specific rules for the addressable inventory on behalf of the content provider to the

distributors' Advertising Decisioning Service (ADS). ESNI therefore facilitates appropriate ad avail decisioning, providing information for ad spot inclusion and exclusion.

ESNI objects are extensible markup language (XML) messages with relevant fields for advertising such as ViewingPolicy actions for ad inclusion, exclusion, and ADS directives. These ESNI messages are managed with a representational state transfer (REST) interface for exchange between the operator and content provider. SCTE 35 markers in the stream trigger these breaks as they have done in the past. The out-of-band ESNI execution components then link these in-band SCTE 35 markers with the ESNI instructions.

2. Addressability Background

Let's start with a high-level description of addressable advertising: Linear-based television advertising (cable or satellite TV ads) has been essentially sold the same way for years. The operator/distributor typically has the ability to sell 2 to 3 minutes of commercials per hour per program – historically called the local avails – and the content provider sells the rest of the ad inventory per program per hour – roughly 14 to 15 minutes of commercials. In this workflow, the local avails inventory has been classified as addressable ads, targeted and sold at a local level vs. ads sold by the content providers which are national ad campaigns that are "locked and loaded" to be seen by everyone watching that particular program.

The buzz around the industry is the transition of taking those 14 to 15 minutes of content provider-owned national inventory and converting it into "addressable" ad inventory. Addressability has both content providers and operators interested because of the potential revenue and growth of this relatively untapped market.

There are also a few industry consortiums focused in this area, such as Go Addressable and Project OAR that are working to tackle both business and technical challenges to grow the space. Additionally, the SCTE Digital Video Subcommittee working group five recently released a best practices document around using SCTE 224 for advertising (SCTE 268, Operational Practice on the Usage of SCTE 224 for Advertising Information).

3. SCTE 224 Context

The SCTE 224 Event Scheduling and Notification Interface (ESNI) is an XML-based standard that provides a defined protocol for carrying machine-to-machine metadata for video. There are five basic constructs within SCTE 224, as shown in Figure 1. Each of these constructs work together to provide a content provider with a means to convey video rights for content replacement as well as advertising instructions on the operator side of the workflow. These five constructs are Media, MediaPoints, Policy, ViewingPolicy, and Audiences. We describe each of these here, and then tie them all together with the underpinning for the advertising use case in the following section.

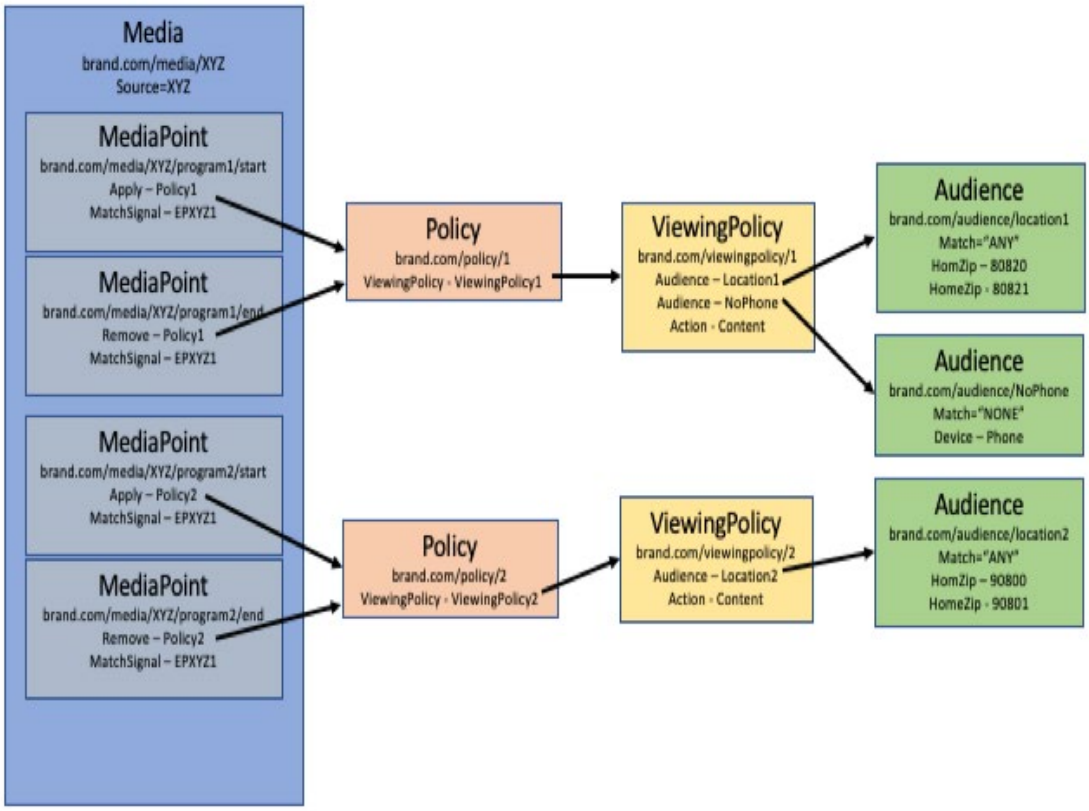


Figure 1 – SCTE 224 Constructs

3.1. SCTE 224 Media

The Media object is a top-level container representing a linear channel whose primary function is to carry all the MediaPoints, so it contains an ordered list of MediaPoint elements as shown in Figure 1. The Media object also contains a few key elements like a description and source for the linear channel it represents.

3.2. SCTE 224 MediaPoint

The MediaPoint object describes a point in the Media when a decision needs to be made or an action needs to be taken. These points in time can either be time-based (i.e., the presence of a @matchTime attribute in the MediaPoint) or SCTE 35 in-band signal based for frame accuracy. The signal-based MediaPoints contain a MatchSignal element with XPath matching logic to link the MediaPoint to the presence of the in-band signal. Signals can be reused, because MediaPoints also have an effective/expires window constraining when the MediaPoint can be evaluated.

When a MediaPoint is triggered, based on time or signal, it can either "Apply" or "Remove" one or more Policy objects which effect the state of the linear playout. See the Policy object description below for more details. MediaPoints that "Apply" a policy do so until another MediaPoint explicitly "Removes" that Policy or they time out based on the duration indicated in the "Apply" statement.

3.3. SCTE 224 Policy

A Policy object is nothing more than a container for defining a set of ViewingPolicy elements to be acted upon based on this Policy being "Apply" or "Removed" from the Policy stack. The "Apply" or application of a Policy means putting that Policy on that Media's stack via first-in-last-out queue. All policies currently on the stack that affect a particular Media are aggregated together, so multiple Policies can be affecting the state at one time. The removal of a Policy then takes it off that stack and out of the state of that Media. SCTE 224 has explicit rules about how to manage the Policy queue in a SCTE 224 execution engine.

3.4. SCTE 224 ViewingPolicy

The ViewingPolicy object is the key SCTE 224 object that associates one or more actions to an audience. These "Actions" can range from directing an audience to alternate content, restricting trick mode, or restricting resolution. For ads specifically, these actions can contain information about the Advertising Decisioning Service (ADS) to use for a particular audience, or various advertisement conflicting rules for a particular audience. The key to a ViewingPolicy is that if the "Audience" criteria is met, then the action must be taken. The SCTE 224 maintains a list of actions, many of which apply to the ad use case such as allocation and break owner, allowed within the ViewingPolicy object, many of which are specific to addressable advertising

3.5. SCTE 224 Audience

The Audience object is a set of characteristics that define a subset of viewers based on certain aspects of their device type (tablet, phone, etc.); device characteristics (local storage, mobile, etc.); or location information (such as zip codes, postal codes, latitude/longitude, market areas); or even receive categories such as Distributor or Virtual Integrated Receiver Decoder (vIRD). Audience objects can contain other Audience objects, making for compound Audiences. Additionally, logic to associate a client with an Audience is based on matches of ANY, ALL, or NONE of the characteristics outlined, for easily including or excluding specific characteristics. For example, you can say Match="ANY" for a list of zip codes to characterize the audience within that area, or Match="NONE" to characterize an audience outside that area.

3.6. SCTE 224 Example Logic

So now let's take those five objects from Figure 1 and run them through a scenario. A video signal acquisition system (SAS) sees an in-band SCTE 35 signal. It calls a signal decisioning system (SDS) to figure out what it should do. When the SAS calls the SDS it tells the SDS which source it was on, what time it saw the signal, the binary signal, and the client characteristics. If it could talk, it would say something like "I just saw the signal 'UhJeasfojoihe23edde' on source XYZ, at 1:00pm and I am encoding for zipcode 80820." The SDS then looks through all the out-of-band SCTE 224 and its Media to find the one for that source (i.e., XYZ). Once it finds the correct Media, it examines its MediaPoints to find those that fall within the designated time window. Once it has the list of MediaPoints, it evaluates each one to see if there is a match with the signal. For a MediaPoint that matches, it either performs an "Apply" or "Remove" of the associated Policy. It then goes from that Policy to the ViewingPolicy, where it determines whether a match exists between the audience and the designated zipcode, based on the Match criteria. If yes, the SDS would return the "Action" of the ViewingPolicy to the SAS for that audience. In the case of alternate content, for instance, it might tell the SAS that it needs to switch over to another source and start encoding the alternate source.

4. Addressable Advertising Specifics

How does SCTE 224 support this new dynamic with addressable ads? The exciting news is that the SCTE 224 standard is set up to communicate rules and policies at an audience-based level, which is exactly what addressable advertising needs to make it work.

Within the addressable advertising workflow, the first critical decisioning point is for the content provider and operator to know which advertisements are addressable, within the content providers' 14-15 minutes of ad avails per hour. To do that, SCTE 224 is used as the communication protocol between the three parties. The content provider's ad schedule is converted into SCTE 224 and then distributed throughout the value chain in SCTE 224 format. Figure 2 shows the video and SCTE 224 information being sent from the content provider to the operator and the Advertising Decisioning Service.

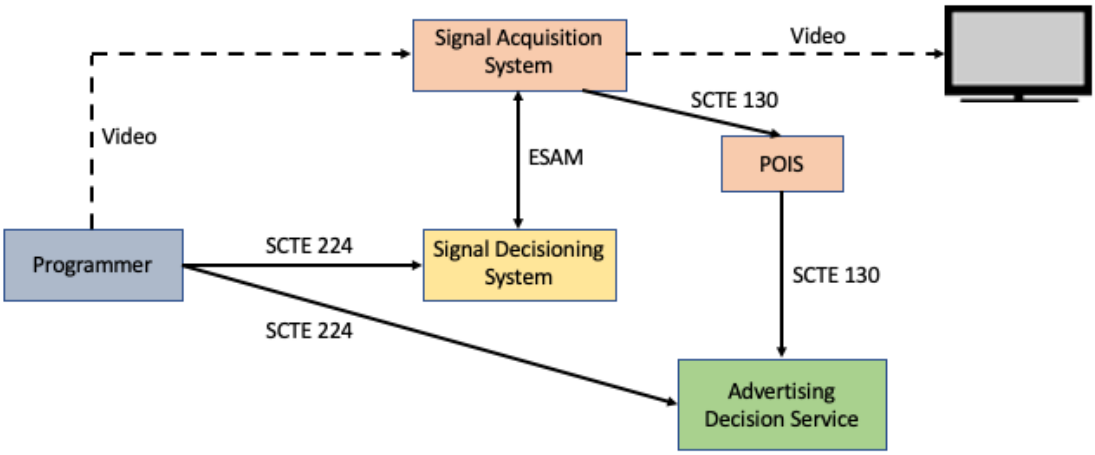


Figure 2 – SCTE 224 Advertising Use Case

4.1. Identifying Addressable Slots

This SCTE 224 message set is sent to the operator's signal decisioning system (SDS) to work with the signal acquisition system (SAS), which is watching for the SCTE 35 in-band signal in the video. When the SAS sees an SCTE 35 marker for the start of an avail break/pod, it calls the SDS to see if that is an addressable ad slot or not. The SDS logic then looks for the corresponding MediaPoint to "Apply" the policy and then validate the operator against the ViewingPolicy Audience and resulting action. For example, if the operator is ABC and the "ABC" is in the content provider's audience, and the action is "LinearDAI (Digital Ad Insertion)", then it is addressable. The SDS then will return the "LinearDAI" back to the SAS as the decision response, which means the SAS now knows that it is an addressable advertising slot, so it then calls the Placement Opportunity Information Service (POIS) to get an advertisement to play. If, on the other hand, the operator is "DEF" and is not in the Audience, the SDS would return a "noop," to mean "no opportunity," which tells the SAS to do nothing and/or keep doing what it was doing, which results in it playing out the baked-in advertisement. It should be noted that there could be other actions like "SignalDeletion".

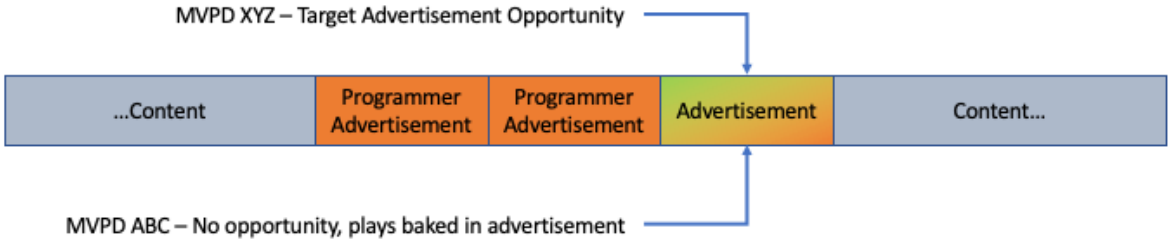


Figure 3 -- Identifying Slots

This might sound like a capability that SCTE 35 has today, but the benefit of out-of-band SCTE 224 is that it is unlimited in capacity and ability to match audience and action pairs. Because the signaling happens out-of-band, it does not impact the frames in the video by trying to cram everything into a SCTE 35 signal, so it greatly reduces the SCTE 35 work required with the video. In fact, it allows a single, simple SCTE 35 marker to be sent to multiple operators and have multiple meanings, which results in individual playout payloads to multiple operator recipients. Because content providers innately serve multiple operators and audiences, this is a highly desirable feature.

4.2. Addressable Advertising Rules

The second major addressability use case for SCTE 224 is providing specific ad rules for the addressable inventory on behalf of the content provider to the operator and its Advertising Decisioning Service (ADS). There are many advertisement rules, but two constitute the main rules conveyed from the content provider to the operator. One involves which ADS to use, whether there are campaign/order codes associated with that slot that the ADS needs to know. The second involves advertisement inclusion and exclusion, or whether there are conflicting rules, based on what advertisements the content provider already has slotted in its linear feed. In this case, a common language like SCTE 224 can facilitate the appropriate advertising placement with correct ad decisioning rules applied. Each of these types of advertisement rules can easily be carried by SCTE 224 and conveyed to an operator by or for the content provider, on a per-operator basis. Below are more details about these rules.

4.2.1. ADS Rules

Because SCTE 224 information is sent out-of-band and can be used differently for each operator, a content provider can set up different Advertisement Decisioning Systems for each operator. The content provider can use a SCTE 224 MediaPoint that has a Policy for audience "Comcast," for instance, and action "use FreeWheel" and another operator with audience "Charter" and action "use Google DFP". The SCTE 224 actions have been expanded in 2020/2021 to handle just this use case. This means that with a single, simple SCTE 35 in the video identifying the ad break, a content provider can tell different operators to use different ADSs.

Additionally, because the content provider now has individual direction capability for different operators, they can direct more than just *which* ADS to use. They can also include varying order numbers or varying campaign attributes that are different for each operator. This can result in a tighter coupling of addressable advertisements and the operator, leading to potentially higher revenue upsells.

4.2.2. Advertisement Conflicting Rules

Again, because the SCTE 224 signal path is out-of-band, it is not limited in size or what it can carry, compared to a SCTE 35 in-band signal. As a result, a content provider can include extensive metadata about an advertisement – or, more importantly, about what targeted advertisement(s) cannot be used, to avoid placing ad within the same ad break that conflict with one another. Because the content provider knows about the baked-in advertisements in the feed, it can provide rules to the operator or the operator's ADS about what advertisements would fit great in the pod -- it can say which advertisements to include. Or, a content provider can say which type or category of advertisements *not* to include (to exclude), because they would counter the previous or consequent advertisement that had been identified as addressable.

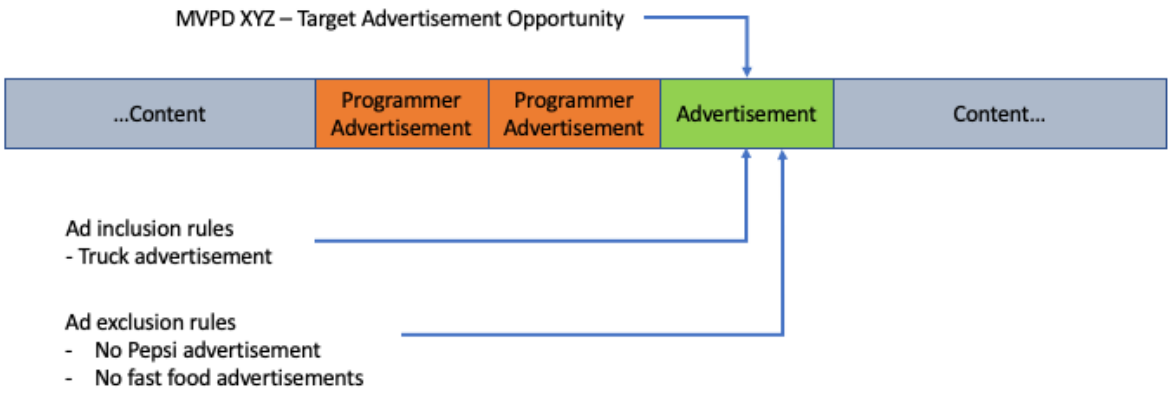


Figure 4 -- Conflicting Rules

Examples of these rules include, but are not limited to, the following:

1. Showing a specific number of advertisements or limiting the number of ad spots for a specific product group
2. Specifying a minimum spacing between advertisements belonging to a specific product group
3. Specifying that an ad spot may only be replaced by campaigns that's a member of a specific product category
4. Excluding particular products or categories that might not align with other advertisements in the advertisement pod.

Some real-world application of these types of rules includes not wanting to have a Brand A, a soda ad, and Brand B, another soda ad, appearing in the same advertisement pod. Or showing a national car advertisement followed by a local car dealer advertisement, or not showing an insurance advertisement in every pod.

4.3. Advertising Metadata Information (Intelligent Ad Insertion)

Because of its aforementioned large capacity and flexibility, SCTE 224 can also carry a great deal of information about the advertisements or the content around the addressable advertisement. Examples of these additional use cases include:

1. Scene information - Often ad campaigns are set up on overarching show genre, category, or age group, but if a content provider could convey more information at the scene level, it could be that

much more valuable for the slot. For example, what was last viewed by the audience in the last scene before the break: Maybe it was a car chase. Tying the next advertisement to that visual context, and scheduling into the next appropriate advertisement break a car dealer advertisement would more maximize effectiveness. This linkage could lead to greater CPM values.

2. Actors or other action-based metadata – Similar to the above example, product placement or metadata derived from action within a show (either live or pre-recorded) could be used to drive more intelligent ads and higher CPMs. Examples of this could include knowing the actor or additional scene information.
3. Ad Creative metadata – Using metadata from the previous ad or other ads from the advertisement pod could lead to a more intelligent ad break and higher CPM.
4. Technical ad metrics – Data such as ad duration could be used to ensure ad breaks are not missed, which could result in loss of revenue for the content providers and operators.

5. Conclusion

Ultimately, the benefits of using SCTE 224 to implement addressable advertising are plentiful and could enrich the ad environment for both content providers and operators/distributors. A short list includes:

- Addressable ad slots can be identified uniquely for different operators
- Different ADS can be supported by different operators
- Inclusion and exclusion rules can be conveyed machine-to-machine
- Different inclusion an exclusion rules can be executed for different operators
- Advertisements can be enriched with scene, actor, or creative metadata in ways that strengthen visual ties and could improve overall effectiveness/CPMs.

All of those benefits come with reduced complexity within SCTE 35, because they all can be done with a single simple SCTE 35 trigger; the rest is carried in the SCTE 224 Audience, ViewingPolicy, and Policy construct. This provides a content provider with control and execution within its linear feed. No more multiple versions of a video, just to carry different SCTE 35 markers to different operators, or multiple complex SCTE 35 markers into the video, leading to confusing and problematic interpretations by operators.

The addressable advertising eco-system is still highly complex. It involves and needs much more than SCTE-224 to solve its many nuances, but hopefully we have provided a glimpse into how much it plays a critical role in enabling addressable advertising — for both content providers and operators.

Abbreviations

ADS	Advertising Decisioning Service
CPM	cost per thousand
DFP	DoubleClick for Publishers
ESNI	Event Scheduling and Notification Interface
IRD	Integrated Receiver Decoder
OOB	out-of-band
POIS	Placement Opportunity Information Service
(Project) OAR	Open Addressable Ready
REST	representational state transfer

SAS	signal acquisition system
SCTE	Society of Cable Telecommunications Engineers
SDS	signal decisioning system
vIRD	virtual integrated receiver decoder
XML	Extensible Markup Language
Linear DAI	linear digital ad insertion

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