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Capturing TV Everywhere Ad Revenue with Local Linear Insertion

A Technical Paper prepared for the Society of Cable Telecommunications Engineers

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Introduction

Subscribers' TV viewing behavior is changing

Due to the proliferation of smartphones and tablets in the home, subscribers have started to consume more and more streaming content on their small screens. In addition to watching TV on smartphones and tablets, subscribers also use these as companion devices for online activities while watching TV on their traditional TV screens. Those online activities are typically correlated to the TV content they choose to watch. For example, certain TV program selections may trigger additional actions, such as online searches for advertised products they just saw on TV; or starting new discussions with friends on Facebook about the programs they are currently watching. These new TV viewing behaviors provide tremendous monetization opportunities that advertisers and operators will clearly want to take advantage of.

Changing relationship of content providers, advertisers and operators

Historically, the TV ad placement business model has involved advertisers or content providers who require operators to carry ads, then negotiate with the content operators for a price reduction for using the content. In other words, operators do not make profits by inserting ads into the content; instead, their business model relies on reduced costs of purchasing content, which they are not entirely satisfied with. Operators want more involvement in this advertising ecosystem process and want to be compensated for ad sales along with the ability to host their own campaigns. If this process were to occur, ad insertion technology will help automate this process more effectively. Operators will then be able to efficiently route their ad calls to several portals, including local fulfillment systems, advertiser or content providers' fulfillment systems, or perhaps route to ad exchanges to auction a particular spot for placement of the ads. Providing rules management tools to advertisers and operators will also be extremely valuable as well. These tools will enable them to acquire valuable data, including subscribers' information (SIS), ad placements' information (POIS), and content information (CIS). These data points will help them to deliver the ads to the right customers, raise the overall CPM, and eventually increase profits by offering TV everywhere.

Seamless merging among VOD, linear and OTT

The variances among linear, VOD, and OTT will diminish over time. These three types of video delivery methods are intersecting almost at the point where subscribers may not even notice the nuances among the different types of TV programming they are watching. Since TV shows and movies can be repurposed into any format to play out on any screen, ads can mirror this flexibility as well.

As operators are increasing their investment in TV everywhere, they are finding new ways to monetize their content to take advantage of the $60 billion local ad insertion business. While there are huge opportunities within local ad insertion, there are also some obstacles too. To assist operators with this process, they require simple and effective ways to monetize the content on new screens. Local dynamic ad insertion is the first large potential ad opportunity in multi-screen video, enabling operators to create ad zones based on targeted criteria.

This paper outlines a technical strategy that identifies the technical and business hurdles as well as solutions for operators so that they can achieve local linear insertion in multi-screen video. In addition, this paper defines the key roles of the core architecture components, including: Ad Decision Manager (ADM)/Ad Decision Router (ADR) and Linear Ad Decision Service (ADS), as well as the important roles POIS, SIS and CIS play in the local ad placement eco-system.

Content

1. Live Local Ad Insertion in Multi-Screen

Currently, operators primarily deploy traditional ad insertion platforms over HFC networks for linear, VOD, and OTT advertising. In those environments, they are not using adaptive bit-rate streaming, relying more on splicers and inserters, which is not as efficient. Increasingly, the splicer and inserter vendors are also catering to this evolving architecture by providing support for various formats, including RTSP, adaptive RTSP, HTTP progressive download & Apple (HLS)/Microsoft (Smooth) and Adobe (HDS) streaming.

Typically, live local ad insertion system workflows utilize the deployment method depicted in Fig. 1.

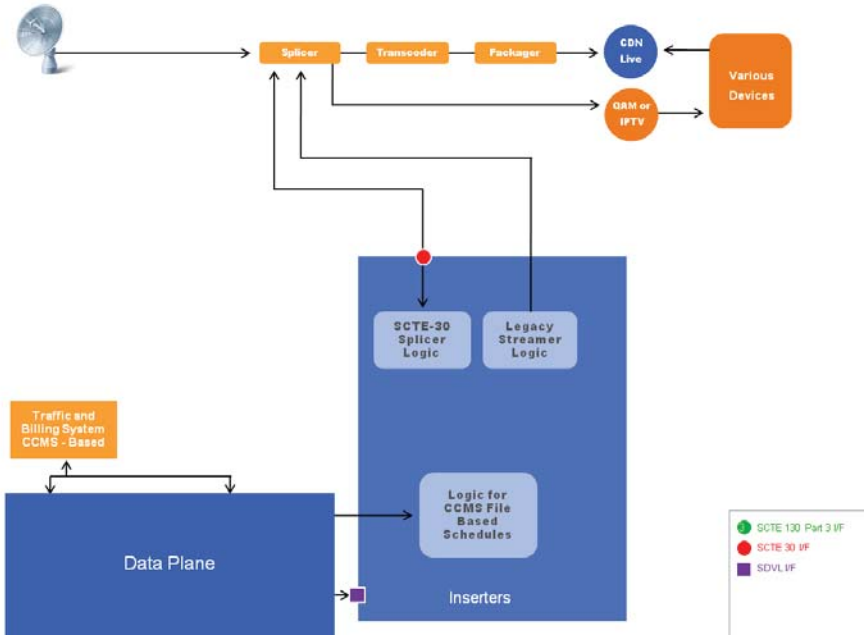

Figure 1. Live Local Ad Insertion Workflow 1

In this diagram, the **data plane** stores all schedule files, ad copy and break information, and then passes along the ad copies to the corresponding control plane. In the **control plane**, which is usually a combination of splicer and inserter, is where the actual ad insertion process occurs, using SCTE 30-based methods to control the splicer/inserter interactions.

During an actual ad insertion, an SCTE 35 cue tone in the network feed is detected by the splicer for an ad insertion event. The splicer then requests the inserter for an appropriate ad for the break. The inserter then in turn dictates the ad spot that needs to be played for that break based on CCMS file information (from traffic and billing) that is stored in the data plane of the architecture.

1.1 Changes in Advanced Ad Insertion System

Now in order to move on to a more efficient delivery methodology for multi-screen video (linear) most operators have been centralizing both the data and control planes. This change is effected by the following steps:

1) Pull SCTE 30 logic from the inserter, transfer into a more scalable, centralized SCTE 130-compliant Ad Decision Manager/Router (ADM/ADR) platform.

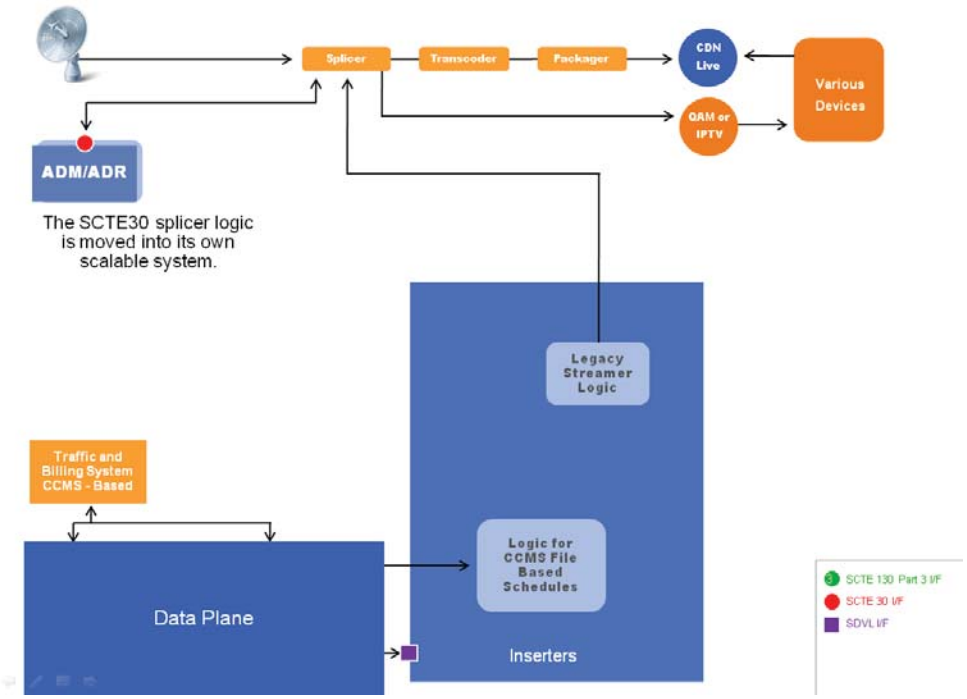

Figure 2. Live Local Ad Insertion Workflow 2

2) The CCMS file-based schedule data is encapsulated into a centralized SCTE 130 compliant ADS, which is the inserter. This is essentially a SCTE 130 wrapper around the CCMS (schedule file) information that is used to drive the current time-based linear ad insertions.

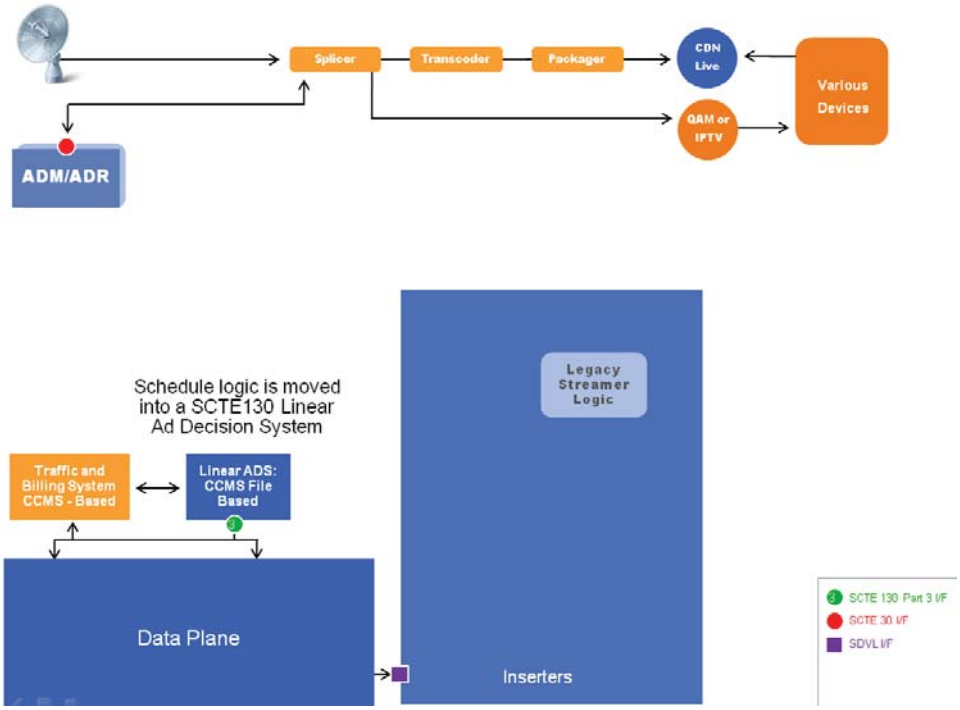

Figure 3. Live Local Ad Insertion Workflow 3

3) To expand the logic further, this will control the splicers as they move into a scalable centralized ADM/ADR component. This produces two benefits – first the inserters (now upgraded to streamers) will have a greater TSI efficiency having been pooled together and, second, the active-active redundancy and n+1 scalability is now achieved.

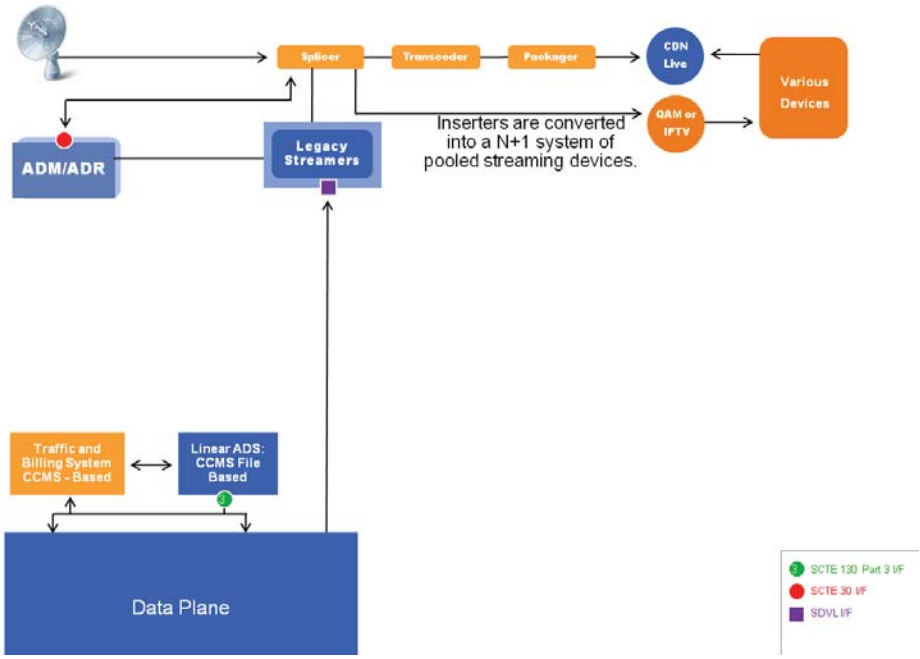

Figure 4. Live Local Ad Insertion Workflow 4

4) To support multi-screen over and beyond traditional linear ad insertion, there is a need to introduce the live encoders that feed off incoming linear streams that are zone-based. These encoders will create manifest files, which can, in turn, be manipulated for ad insertions and corresponding video file (ad copy) that is then loaded onto a CDN.

The net results of the above architecture changes include:

1. Centralization - more efficient and scalable linear ad insertion

2. Introduction of multi-screen video components (minimal increment) are added efficiently to the existing linear ad insertion architecture:

- Qualified encoder for live streams
- ADM/ADR

1.2 System Operations and Benefits

1). Increase bandwidth efficiency

Previously, each channel would require communicating with both splicer and inserters; which unfortunately does not provide efficient utilization of the bandwidth downstream. When using SCTE 30-based ADM/ADR centralized splicer control logic, inserters act as streamers, and are no longer dedicated to each channel, freeing up valuable resources.

This "*pool of streamers*" is managed by the centralized SCTE 130 ADM/ADR for increased overall bandwidth efficiency.

2). Provide redundancy and disaster recovery

Another benefit of using streamers in an ad insertion workflow is that they can provide active-active redundancy. In the current system, all the inserters are operating independently, so if one inserter fails to play the ads for some reason, it can inform the failover inserter to complete the ad insertion. In this workflow, this process is seamless; since it can detect failures and utilize the ADM/ADR to efficiently divert streams to the next available streamer pool. These benefits appeal to operators as this can provide more channels in a central location along with disaster recovery across the sites in a centralized operations workflow.

3). Provide flexibility to split and alter breaks

The CCMS ADS provides support to play a particular ad in a particular break, or shift and split the breaks. These are based on revenue splits for the particular operator measured on revenue weightage between local and interconnects. With this added flexibility, content providers and operators are able to manage content much more efficiently.

4). Enable addressability

There is no addressability (other than time-based) in the current linear spot ad insertion environment. The CCMS or schedule files are received from traffic and billing systems - all placements are time-based and determine which spot to play in which break on a particular channel. Further enhancement targeting is possible by adopting certain client technologies to do household targeting - a function of how to effectively manipulate QAM bandwidth. (This is because traditional linear broadcast is like a "multicast" network.) With the introduction of IP devices, the game plan changes given every one of these devices becomes an effective IP endpoint that can be targeted.

The way to achieving this can be a two-step approach in the better interests of speed to market for the operator to capture the multi-screen linear video efficiencies.

- Step 1: Lowering the Barrier to Entry
  - Very Simple Mechanism
    - URL Tag (SSO Sign-in or MAC ID)
    - CSV with targeted group extract (Export to carve targeted User Base)
      - Geographic
      - Demographic
      - Or ANY OTHER group criteria (Gender, etc)
- Step 2: Improved Targeting Mechanism
  - Work with operators as they refine their strategy
  - Remove immediate dependencies from SIS systems that are still evolving
  - Data acquisition & target refinement from
    - Operator CRM, Subscriber and User Provisioning Systems

2. Advanced Ad Insertion System Captures More Advertising Revenue

2.1 New Business Model

As linear, VOD and OTT are seamlessly merging together, managing linear/VOD/OTT ad placement decisions in a centralized ADM/ADR is an efficient way for operators to monetize different content. In addition, as mentioned before, operators want to participate more in the advertising ecosystem process. Thus the ad placement decisions are no longer coming from one campaign manager. The ad decisions can either come from the internal linear based campaign manager, internal VOD based campaign manager, an OTT-based campaign manager from content providers that is IAB/VAST based, from third-party ad exchanges, or a third-party campaign manager using SAFI-CIP interface . The ADM/ADR works by receiving incoming requests from subscriber devices (in many cases operator have back-office redirect the URL) and redirects the incoming ad requests for placement. The ADM/ADR redirect those ad requests to various Campaign Managers/ADS, then make placements to support the four predominant formats (DASH, Adobe HDS, Apple HLS and Microsoft Silverlight) after receiving the decisions to support the various client devices.

However, before the actual ad insertion occurs, operators will need to verify their rights to make the placement, length of the actual slot (this in many cases received from the encoders during live encoding) and information on which ADS is registered to fulfill this particular ad request.. In many cases, the content providers will provide their own POIS, since content inventory information is required..

Other standard systems for ad insertion operations include the **CIS** (Content Information System) which informs operators where ads exist on the CDN before placement. However, many operators are trying to identify conflicts far in advance before placement during a schedule ingest time. The **SIS** (Subscriber Information System) provides detailed subscriber information that operators require for ad targeting. However, SIS integration is not simple, due to the large costs associated with deployment plus the invasion of privacy issues caused by subscriber ad targeting. As an alternative to an expensive SIS targeting integration, a shorter alternative would be to run queries from operators' provisioning systems (CRM) to access user targeting data, which can be exported as files for targeting in the initial phase.

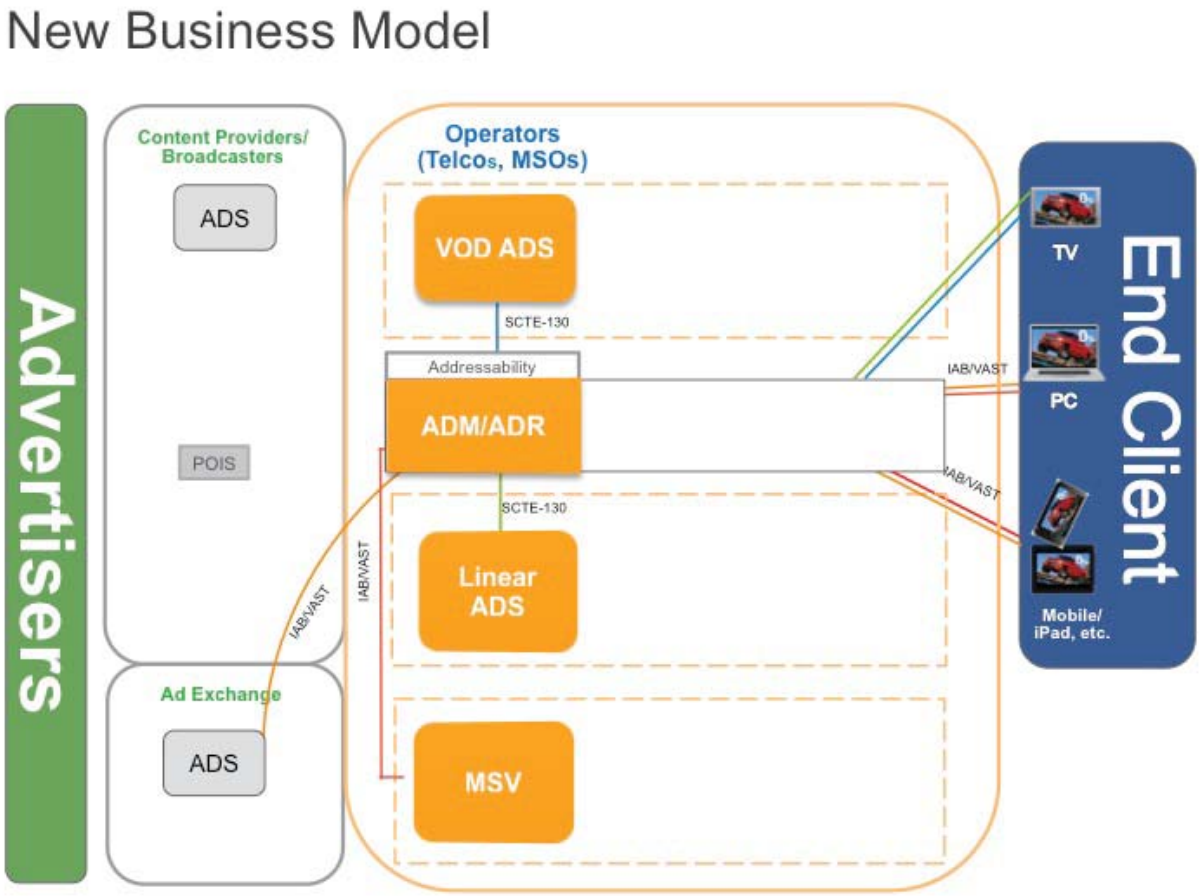

Figure 5. New Business Model

2.2 Seize Monetization Opportunities in MSV

In the advanced ad insertion system environment, ads can be inserted into any streaming format on any device. Thus operators will need to determine how their local ad insertion strategy for multi-screen will maximize the value of each "placement". How to increase the overall CPM becomes a key to maximizing the value of each spot.

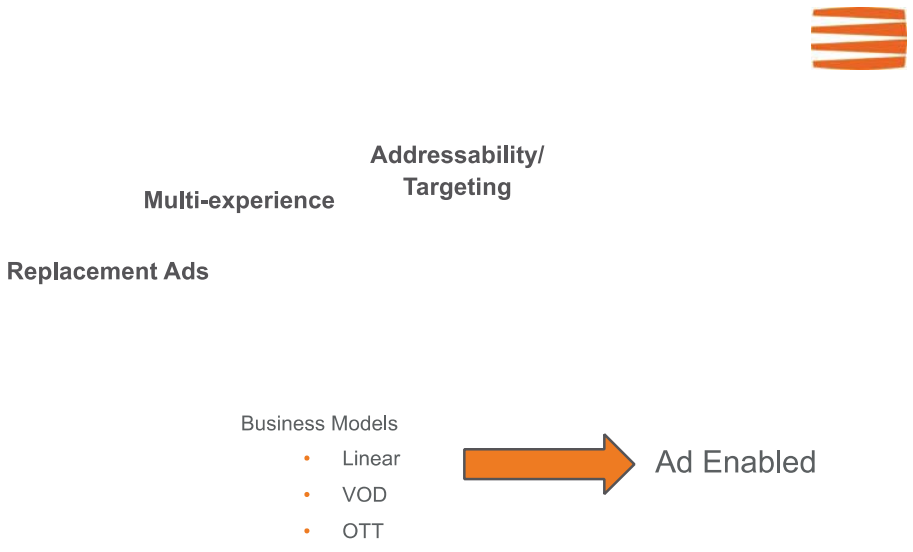

Figure 6. Advertising Evolution Phases

Even though this paper is written focused on linear ad insertion, we anticipate four phases in the advanced advertising market that will emerge. The graph above illustrates the progression of advanced advertising including three primary levers:

1. The changing business relationship between the operators and content providers/advertisers.

2. Increasing value of CPM as we progress due to starting with linear and slowly migrating to multi-screen video with the subsequent merging of linear, VOD and OTT delivery methodologies.

3. The phases in which operators will deploy the advanced advertising components to maximize their investment/minimize risks.

Phase 1:

This is where we stand currently. Many operators have invested in delivering multi-screen video to remain competitive. In this phase, there is no monetization element in the multi-screen environment (other than web-based delivery) to capture the local ad insertion opportunities.

Phase 2:

Though this phase does depend on content rights management, this does present a significant revenue opportunity for the operators for ad insertion on multi-screen devices. The operators will have to do local ad insertion on the multi screen devices, to be able to monetize two minutes worth of local ads across all channels continuously, this process will need to be:

- Easy to do
  - Small, incremental addition to existing spot operations
- Start small and scale incrementally
  - Low investment risk
  - Scale as you go: Start small (a percentage of overall subs) and scale with adoption
- Business/sales and most important operations model same as spot advertising
  - Sales force has to sell a new zone (same as they do today)
  - No change to existing CCMS-based operational workflow

Phase 3: Deals with coordinated campaigns across the screens

Since traditional TV viewing cannot show any banner or overlay ads, one way to increase value is through advanced ad targeting. What operators would need to do in this phase is orchestrate a coordinated campaign across all devices. These would require call-to-action ads such as banners, overlays and click through ads related to the primary video advertising they are seeing on the TV (mostly brand advertising centric). The result of this would typically boost a current $2 CPM banner/overlay on the web to a couple of multiples higher. However, not every smartphone, tablet, or PC is the same, which can bring device qualification challenges to targeting. With recent market data indicating that over 60% of subscribers use companion devices as they watch TV, offering companion ads to associate with video ads becomes another great opportunity operators could use to double the ad CPM.

An SCTE 130-compliant ADS platform should provide operators tools where they can make informed decisions on video, companion and overlay/banner ads in a unified, manageable system.

Phase 4:

Targeted and addressable models are evolving across all operators. Once operators have accomplished local ad insertion on the subsidiary devices, the ability to target based on finer user segmentation criteria becomes key to enhance the CPM value of the ads. Targeting can start as zone-based and can then advance with a repository of provisioning, CRM and other information (SIS) to target geolocation, behavioral and other complex attributes. Effectively, the more precise the criteria, the more it can be delivered to the end user with a likelihood of a 1:1 targeting that will yield precious CPM returns.

3. Advanced Reporting System

A reporting system is a very important component in an advanced ad insertion system. It provides operators billing information, ad insertion system working status, and the campaign running status in real-time. Content providers/advertisers mandate submission of these reports each day - the operators incur penalties on a daily basis for failure to report the information. Reporting usually includes Placement Status Notification (PSN), which is generated by streamers PSN and then captured by the ADM/ADR, and pumped into monitoring system, which creates alerts, reports and alarms for the operations team. These reports can give content providers the information they require per the contract. In addition, operators can use this monitoring system to keep track of the current campaign fulfillment status, and make real-time adjustments if there are unexpected errors.

Reporting is a functionality of:

1. Technology
    - Technology refresh allows more efficient (time and material) development of features and function (e.g., Operational Management modules)
2. Scalability
    - Crossing the chasm by parallel gathering of data (by site) and processing, central processing of data, and per-hour collection of data rather than once per day. Building upon this strong foundation, platforms need to provide the flexibility by leveraging the power of Big Data and its ecosystem of technologies
3. Raw data
    - Inbuilt purge of old data
    - Head of line unblocked: Small jobs squeeze past others

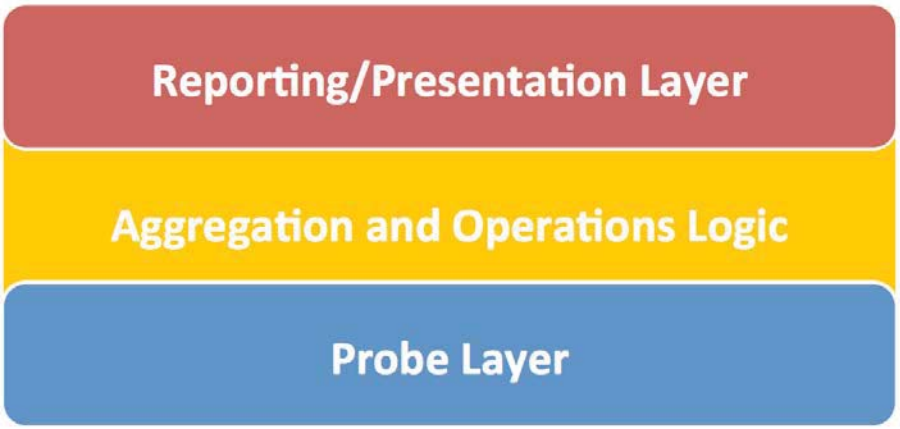

Figure 7. Reporting

A quick overview of reporting technologies:

1. Raw data required to build business reports exists across the streamers, Campaign Manager/ADS, CIS and SIS;
2. Speed up bulk copy of raw data: Exploit parallel execution threads by spawning multiple bulk copy requests;
3. Store this data in a database capable of parallelizing throughput: Cassandra File System maximizes throughput for a given server configuration;
    1. Leverage a database that is cluster friendly: Cassandra FS cluster technology scales data storage: add nodes to cluster or add clusters to increase data capacity
4. Hive breaks down report queries into Hadoop jobs; creates RDBMS-like tables and stores these tables in Cassandra FS. This conversion allows for a streamlined generation of reports;
5. Hive maps dataset in Cassandra FS into report friendly SOLR schema;
6. SOLR builds an index database of all searchable terms in the data;
7. DGW pulls report friendly data for reports from SOLR and converts it to XML format;
8. Report server pulls XML form reports from DGW and converts them to desired format [PDF/XLS];
9. Reports are mailed / posted / archived as required.

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Acronyms

ADM	Ad Management Service
ADR	Ad Decision Router
ADS	Ad Decision Service
CCMS	Cable Computerized Management Systems
CDN	Content Delivery Network
CIS	Content Information Service
CPM	Cost Per Impression
CRM	Customer Relationship Management
DASH	Dynamic Adaptive Streaming over HTTP
DGW	Digi-Watcher
HDS	HTTP Dynamic Streaming
HLS	HTTP Live Streaming
MSF	Microsoft
MSO	Multiple-system Operator
OTT	Over-the-top
POIS	Placement Opportunity Information Service
PSN	Placement Status Notification
RDBMS	Relational Database Management System
SIS	Subscriber Information Service
TSI	Transport Stream Inserter
VOD	Video-On-Demand
XLS	Microsoft Excel
XML	Extensible Markup Language