INDIVUALLY TARGETED ADVERTISING IN A SWITCHED SERVICES ENVIRONMENT

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Abstract

Enhanced network switching technologies are becoming available throughout cable plants and providing operators with an opportunity to dramatically change the way advertisements are delivered and viewed by subscribers. Instead of subscribers being exposed to advertisements chosen on assumed demographics, ads can be forwarded based upon more personally relevant data such as viewing preferences, hobbies, interests, personal demographics and other parameters. Targeted advertising offers marketers greater confidence that the promotional messages they are paying for will result in improved response rates among their intended audiences.

Service providers benefit by having the ability to sell more valuable advertising content to more refined subsets of subscribers. This could also satisfy subscriber demands to receive only relevant content and potentially less cumulative advertising.

Additionally, by moving away from a "push" model that delivers ads of little interest to viewers, to a scenario in which subscribers are more likely to be engaged, opportunities exist for greater interactivity. Within their own streaming experience, subscribers can request additional information or other follow-up from the vendor regarding what's being advertised, possibly going so far as to complete a transaction. For example, after viewing a promotional message about a new sports car, a subscriber can be invited to request a longer form of the advertisement and schedule a test drive.

This paper compares two broadcast architectures, switched and stored. Each can analyze data about what programs are being viewed and deliver ads that have the highest probability of achieving the desired responses, based on subscriber profiles and household classification data. Furthermore, the paper considers multiple models for delivery of targeted advertising in switched environments. Direction of advertising towards its correct destination can be achieved from multiple network locations, ranging from switched digital broadcast techniques based at headend and hub locations to dynamic digital tuning within set-top boxes.

INTRODUCTION

Just as the Internet is driving new consumption patterns of video, it is radically transforming advertising models. Google has strongly established that delivering contextually relevant ads increases the interest of the user and value to the advertiser. Recent studies of TV viewers have confirmed that subscribers are more likely to respond favorably to ads if the topic is of interest to them. So, contrary to concerns that increasing use of personal video recorders and on-demand services will decrease the effectiveness of ads, an opportunity is rapidly emerging for individually targeted advertising to increase the response rates of consumers.

Unlike legacy advertising methodologies that broadcast the same ads to all subscribers, targeted addressable advertising achieves a much closer pairing between the interests of consumers and the promotional messages they receive. Ads can be selected and forwarded to subscribers based on viewing preferences, hobbies, interests, demographic information, and other relevant data.

Targeted advertising works in a switched digital broadcast environment and aptly demonstrates that adoption of a switched services model not only allows cable operators to reclaim bandwidth, but offers a compelling array of additional benefits.

OVERVIEW OF SWITCHED DIGITAL BROADCAST

Switched digital broadcast is a method of delivering selected broadcast programming only within nodes, or service groups, where subscribers actively request that programming. Unlike traditional broadcast service where all programming is delivered to all subscribers all the time, switched digital broadcast delivers programming only when and where requested by subscribers.

When a subscriber in a service group wants to watch a program that is currently being delivered to other subscribers within the same group, the new subscriber simply joins the existing multicast program delivery. As a result, there is no need for additional bandwidth to deliver the same program. Using such a methodology enables the creation of virtual programming capacity without the correlated physical expense of creating and dedicated precious bandwidth resources. Figure 1 shows the bandwidth savings that can be achieved using switched digital broadcast.

Switched unicast is a form of switched digital broadcast in which each subscriber receives a unique program stream. Switched unicast consumes dramatically less bandwidth than traditional broadcast programming, and though it doesn't have the same bandwidth reclamation

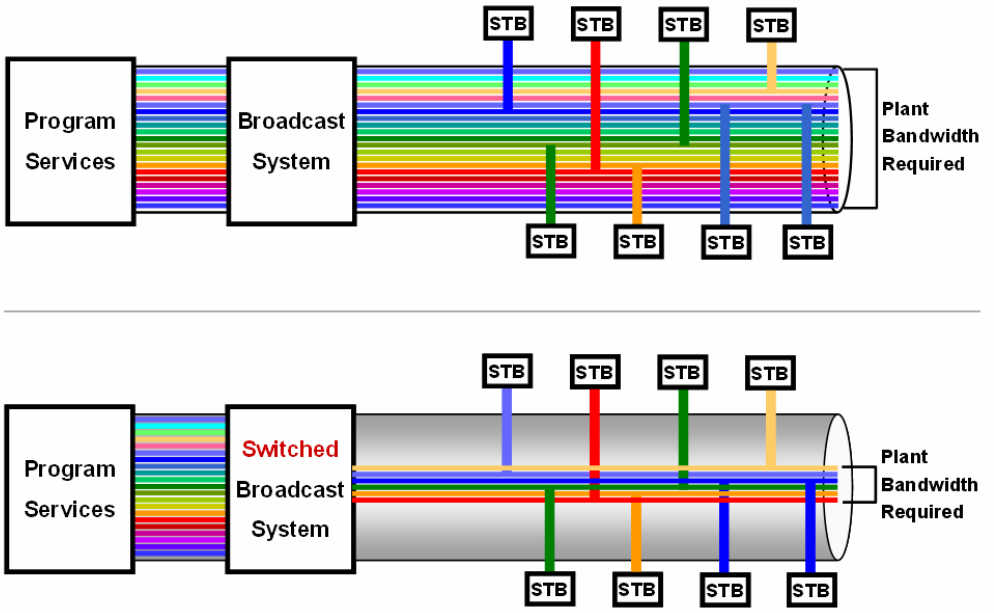

Figure 1. Switched digital broadcast significantly reduces bandwidth consumption

capability as switched multicast, it still enables cable operators to significantly increase the amount of programming offered. The greatest benefit of switched unicast, however, is in enabling operators to individualize programming and establish one-to-one subscriber relationships.

INTRODUCTION TO TARGETED ADVERTISING

Targeted addressable advertising offers cable operators the opportunity to increase advertising revenues by delivering promotional messages that more closely match subscribers' interests: marketers are willing to pay a premium rate if their ads achieve improved response rates among their intended audiences. Several recent research studies indicate that advertisers have a strong willingness to pay twice as much for an advertisement if there is a guarantee that it reaches a targeted audience (source: On Demand report, CTAM, June 2005). It benefits cable operators by allowing them to enhance advertising revenues, especially since marketers may increase the variety and quantity of ads they run. For example, an automobile manufacturer that traditionally provided one or two ads to an operator for broadcast to a large audience may choose to run five or six ads tailored to match the interests of more refined audiences.

An example of targeted addressable advertising is shown in Figure 2. In this example three subscribers, all watching the same program on the switched tier, receive different ads during the commercial breaks. Subscriber #1, an avid snowboarder in his early twenties, receives an ad about low-cost winter cabins in Lake Tahoe. During the same commercial break, subscriber #2, a thirties-something bachelor, views an ad about an upcoming motor show. Subscriber #3, an older couple planning a second honeymoon, receive information about cruises in the Caribbean.

Targeted addressable advertising systems allow subscribers to undertake ad telescoping activity. Telescoping enables a viewer to press a button on the remote control for more information or request a longer form of the ad or a brochure. Interested viewers can schedule an appointment with a retailer, receive a demo

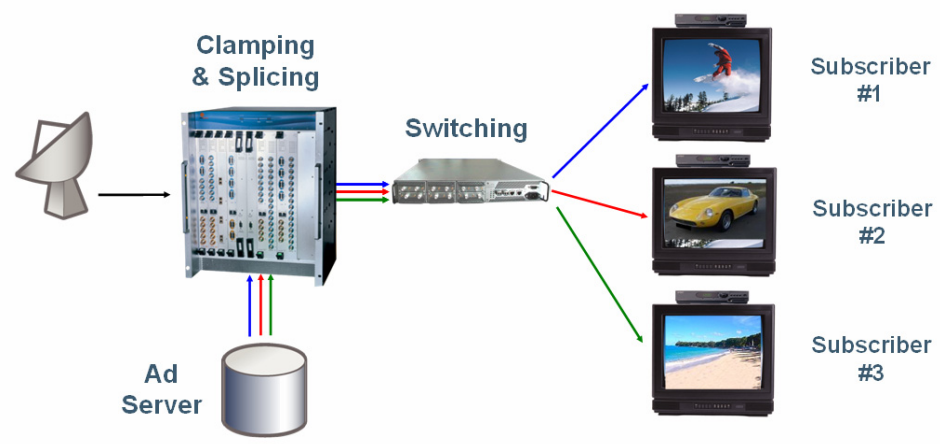

Figure 2. Delivery of targeted advertising, here within a switched digital broadcast architecture, provides ad content of personal relevance even to multiple subscribers watching the same program

in the mail, or take part in a promotional contest.

Advertising can be further enriched using PVRs (personal video recorders), networked or otherwise. These enable subscribers to pause near-live broadcasts while telescoping. Once the ad has been viewed, the viewer can return to programming, at the place where it was paused.

There is also the opportunity to increase the pool of marketers willing to advertise on television if they now are able to reach a very targeted audience independent of the program or geography.

The technical key to targeted advertising is switching. In order for subscribers watching widespread broadcast programming to see specific advertising content, that content must be dynamically directed to, or accessed by, the subscriber through switching at some level. This can occur within the cable network since unicast methods of switched broadcast are able to dynamically deliver separate copies of live digital program streams to each active subscriber, allowing each stream to be spliced with the right advertisement.

Alternatively, all subscribers watching the same content can receive the multiple ads in sync, with precisely timed dynamic digital tuning by each set-top box to reveal the correct ad. There are variations on both these network-based and subscriber-based models of ad targeting.

MATCHING ADVERTISEMENTS AND SUBSCRIBER INTERESTS

Switched digital broadcast systems track which programs subscribers are watching in real-time. This provides cable operators with information that can be used to determine which promotional messages a subscriber is more likely to be interested in. For example, a subscriber watching a sports network has a higher probability of being interested in hearing about an upcoming local sporting event.

Naturally, privacy restrictions surround the gathering of individual subscriber data, limiting cable operators to matching ads to the programs that subscribers are watching in real-time. However, the ability to build profiles about subscribers' interests adds tremendous value to targeted advertisements. Accordingly, the more enterprising cable operators could explicitly ask their subscribers about their ad preferences. In return for providing a cable operator with a list of the subjects and categories they'd be interested in viewing ads on, subscribers could receive a complimentary gift or upgrade to an expanded service package, or some other incentive.

Switched digital broadcast systems can be configured to store information about subscribers' viewing patterns anonymously. This can provide cable operators with precise viewership statistics without relying on third parties. The value of this information is high because it provides insights into the viewing patterns of all subscribers on the switched tier not just the subset of viewers that have been enlisted by audience research firms.

IMPLEMENTING TARGETED ADRESSABLE ADVERTISING

The core components of a switched digital broadcast system are:

- Clamping sub-system;

- Edge sub-system;
- Management server;
- Client software.

The clamping sub-system converts incoming broadcast programs to a predetermined constant bit rate value. Though not absolutely required, the normalization of all programs to a constant bit rate allows a faster and simpler switching mechanism, and paves the way for QAM resource sharing with similar services such as VOD. The bit rate most often chosen is one that resembles the program parameters for VOD streams. The clamped programs are multicast to all hubs using a Gigabit Ethernet transport network.

The edge sub-system replicates program streams and directs them to the appropriate edge QAM, in response to directions from the switched broadcast manager. Edge switching capabilities can be integrated into the QAMs or can be a stand-alone entity upstream of the QAMs.

Client software resides on a subscriber's set-top box. When a program is selected, the client conveys the channel request upstream along with information that uniquely identifies the node-group location of the set-top box. The client functionality can be easily integrated into the tuning firmware of future set-top boxes.

The switched digital broadcast manager uses the received channel number to identify the requested program and, consequently, the input port on the switch where the program is being received. Similarly, the switched broadcast manager uses the set-top box ID and associates the node group information to determine the downstream path that connects to the subscriber.

When an available downstream QAM and program resource are identified, the frequency and program information is returned via the downstream out-of-band channel to the set-top box, which decodes and displays the program using the normal tuning mechanisms. While the specific

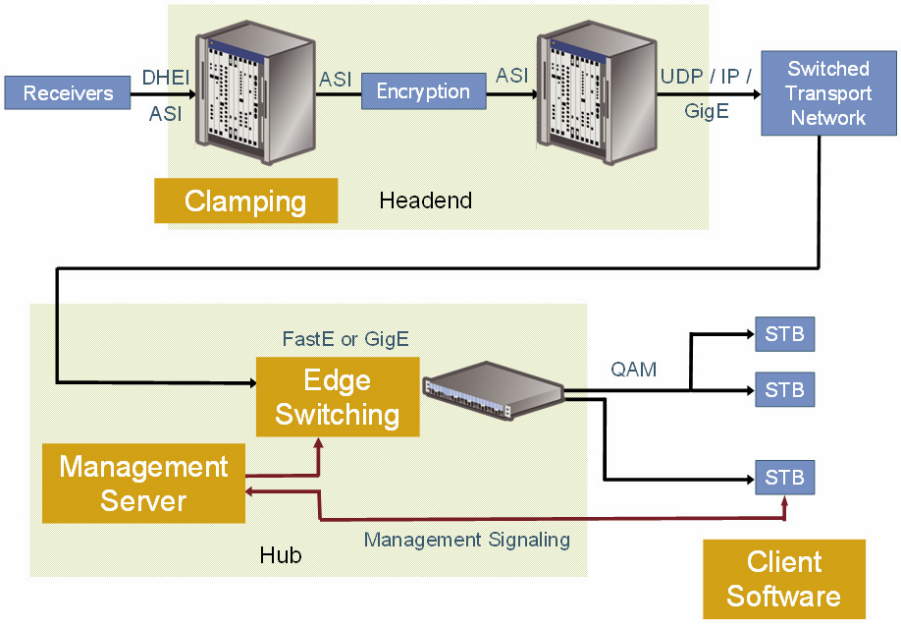

Figure 3. Core components in a switched digital broadcast network

frequency and program number may vary with time, the channel number seen by the subscriber's set-top box is unchanged.

The building blocks of a switched digital broadcast network are shown in figure 3.

When a subscriber changes programs the following sequence occurs:

1. Subscriber's set-top box sends an upstream request to the switched digital broadcast server;
2. Switched digital broadcast server allocates the bandwidth needed for the program and instructs the set-top box where to put the program;
3. Switched digital broadcast server sends a message to the appropriate QAM to join the IP multicast that has the required program;
4. Program appears on subscriber's TV set.

AD INSERTION IN SWITCHED NETWORKS

The process used to insert ads in a switched environment is similar to the process used in legacy broadcast networks except for a few minor differences. The key steps are the following:

1. Ad splicer in the program path detects an embedded SCTE 35 cue packet and sends an SCTE 30 cue request to the ADM (ad decision manager) that an ad avail will appear shortly. The splicer is typically the clamping device in the acquisition sub-system, and may also replicate the input program multiple times for geographic zoning of the advertisements.
2. ADM queries the switched digital broadcast manager to find out how many viewers in each node are watching the network. The ADM also requests the MAC addresses of all viewers in a node, enabling unique subscriber demographics to be identified for each MAC address. The added demographic information, coupled with the active programming information, provides the ADM with important data from which to select the most appropriate advertisement.
3. ADM chooses an appropriate ad selector from a list of pre-registered ADS (ad decision selector) servers. The ADM requests ads to fill the avail from the selected ADS using the DVS/629 API. It's worth noting that ad selection is traditionally based on the owner of the ad avail slot or the particular network.
4. The ADM then triggers splicing of the chosen ads into the program stream. Splicing can be implemented by a currently available splicer, or other devices.
5. After receiving verification that the ad has played and been properly spliced in and out, the ADM notifies the ADS of the success, or failure, of the insertion. The ADM can be configured to record more information about the event in its log files. This information is then recorded and sent to the traffic and billing system for invoicing, or other analysis reporting.

CLIENT-BASED AD INSERTION

There is an emerging method of targeted addressable advertising that includes client-based ad selection. In this form of targeted

advertising the subscriber's set-top box contains an agent that selects the most relevant advertisement from a pool of available ads. This requires that a set-top client be deployed and maintained with relevant subscriber profile data and be capable of dynamically tuning when time for the insertion occurs. This sort of functionality must be programmed for every digital client environment in use, but such functionality is generally achievable on most digital devices. The hypothesis here is that the STB (set-top box) contains household information that is additive to the demographic and geographic information, thereby increasing the potential relevancy of a targeted advertisement. These extra targeted ads can either utilize additional plant bandwidth or can be stored on DVR set-tops.

One approach to client-based targeting, shown in Figure 4, is based on dynamic tuning within a multiplex. In this scenario a digital multiplex does not carry its maximum load of programs, but instead maintains some spare capacity so that whenever time for an advertisement arises for any program, multiple ads are inserted within the multiplex. Each set-top box dynamically accesses the digital ad corresponding to its profile, and after the ad returns to the program that was being watched. This method is relatively easy to implement, as it is not contingent on switched digital broadcast deployment, but it does present bandwidth challenges in reducing the programming load of the multiplex. It also requires detailed synchronization of insert times within a multiplex so that not too many individual ads are required to be carried simultaneously. For similar reasons, the variety of profiles that can be simultaneously supported is limited.

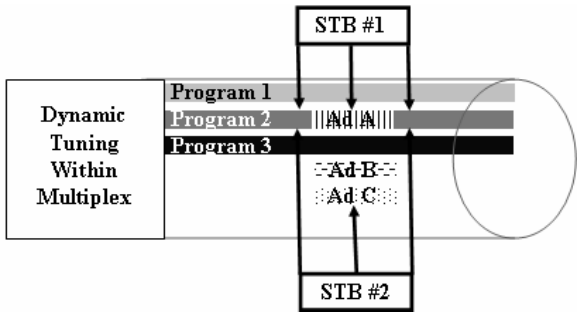

Figure 4. Client-based targeting in which each set-top box dynamically access a digital ad within the same multiplex as the programming

An alternative method of client-based ad insertion, shown in Figure 5, dedicates a complete multiplex to carriage of the advertisements. In this case a carousel methodology can be utilized for a constant rotation of ad content. When time arises for a targeted ad, the subscriber's set-top box re-tunes to the multiplex with advertising and selects the ad best matching the subscriber's profile. This allows for full programming multiplexes, only requiring that a single multiplex, or a few multiplexes, be reserved for ad carriage. It also enables a large number of overall profiles to be maintained, and a large number of programs to simultaneously receive targeted splicing. There is some efficient sharing among these, as is illustrated in the image, by STBs #1 and 2 accessing the same ad stream despite watching different programs. It does increase the burden on the set-top box to seamlessly tune to the multiplex with advertising and re-tune to the original programming. And ultimately there is some limitation on the advertising that can be delivered.

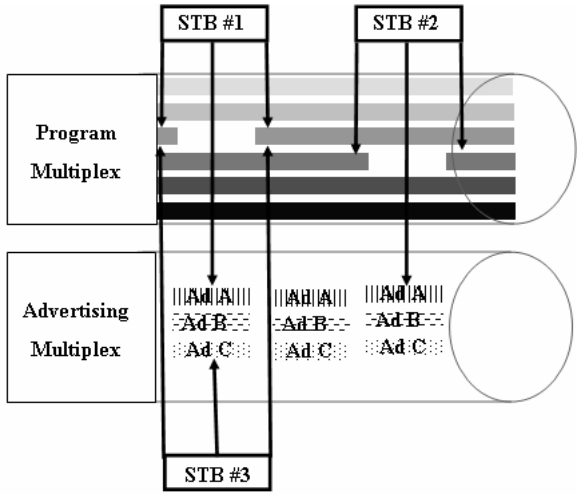

Figure 5: Client-based targeting in which each set-top box dynamically tunes to a different, ad-dedicated multiplex at times for insertion

Targeted addressable advertising practices are just emerging and there are several other models being considered besides those described here. For example, some are considering loading ad content onto set-top boxes' PVR (personal video recorder) hard drives so that targeted ads can be dynamically accessed without any need for altered tuning or additional content carriage. A drawback of this approach is that it's only applicable to the subset of viewers who have PVR-enabled set-top boxes.

MAXIMIZING NETWORK RESOURCE UTILIZATON

While targeted advertising has clear business benefits, cable operators must first consider how to cope with the additional load burdened on their system in terms of bandwidth consumption, headend resources and/or set-top box processing. For example, consider a reasonably sized cable system deploying switched digital broadcast. There could be more than 500 service groups, each switching digital programming within 8-12 QAMs. This can require about 60,000 unicast streams each with different ads. This will overburden legacy equipment. Part of the gain can be achieved through the fact that there will be replication of subscribers watching the same programming, or receiving the same ads, or both. These can be leveraged to consolidate certain steps of media processing and switching.

As resources scale up, operators can consider dynamic approaches to maximize precision of targeting when total load is lighter, and maximize efficiency when it's heavier. In this case switched unicast can be used when feasible, but when viewership is high, the plant can dynamically revert to switched multicast in order to conserve on stream capacity and resources like splicing.

An potential hybrid approach could be for a multicast to be broken into sub-groups by like profile, each of which receives a unique stream, so that while ads are not personally targeted, they are not bluntly broadcast either. Since many programming networks appeal only to a few demographics, this methodology can fulfill both the targeting and efficiency objectives of operators.

There are other efficiency gains that can be achieved through switching. If no subscriber is watching a specific program, there is no reason to run ads or perform splicing associated with that program, thereby saving not only network capacity but splicing resources too. The adoption of targeted advertising from a PVR within the set-top box can also enhance efficiencies, by loading ads to the DVR during periods of limited live plant utilization.

In a switched environment, a cable operator has insights into how subscribers and the program they are watching correlate.

This introduces some interesting opportunities, including the following:

- When there are multiple viewers, one option is to select a dominant demographic and use that as the basis for selecting an ad. Since people within a specific demographic are more likely to watch the same programs, this approach may be very successful. After all, this is essentially the basis of traditional cable ad sales;
- Additionally, when there are multiple viewers, an SDB system can determine if spare capacity is available and, if so, forward advertisements targeted at the unaddressed demographic groups within the node;
- If only one viewer of the network in SDB or if operating in unicast or nPVR, a one-to-one targeting opportunity appears, enabling the ultra-personalization of ads, even including the insertion of the subscriber's name in the promotional message;
- Finally, if no one is watching a specific program, there is no reason to run the ad associated with that program, thereby saving not only network capacity but splicing resources too.

In general though, targeted addressable advertising will increase the quantity of splicing resources required. For example, a marketer that was previously content to provide a single ad for a large audience with poor response rates decides to run multiple ads to more closely address the interests of her targeted audiences.

A smarter stream allocation methodology can be utilized by comparing the availability of ad content and the limited demographics that need to be targeted at any given time. Consider, for example, that many cable networks already target certain demographics, increasing the likelihood that a new viewer will be similar to current viewers. With that in mind, the following algorithm can be applied when a subscriber requests to a stream:

1) If a program is requested that is already being broadcast to one or more viewers, the new subscriber can be added to a multicast session - the SDB system compares the new user's demographics to all current multicasts of a particular network, and if a close enough match can be made, the new user joins that stream.
2) If a program is requested but either the demographics of the new viewer don't match those of any existing multicast session or the program is not already being broadcast, a new stream is generated.

Depending on the available ad inventory and current usage of a given network, this will utilize much less hardware while still making the most of unicast targeting ability.

TARGETING WITHIN ADDITIONAL SERVICES

On-demand networks, also referred to as non-linear networks, can attain similar advertising benefits as switched digital broadcast networks. An nPVR (networked-PVR) model is similar to switched unicast one, but uses a VOD server to create stream as needed. In this model, networks are acquired in real-time, with an on-demand session being created between the VOD server and the subscriber's set-top box.

Advertisers have been particularly concerned that ads are not included in many types of on-demand programming, or can be

skipped over. However, subscribers have revealed strong interest in free on-demand content, and some operators are beginning to provide them with ad support. Most likely there will not be much tolerance for the same quantity of advertising that generally occurs in live programming, but targeting ads could make up for this. Subscribers would be more willing to sit through fewer, more on-target ads. Advertisers would be prepared to pay more in order to be an exclusive, or one of few, sponsors of personally selected content to an audience that can be captive if fast-forward capabilities are suspended during advertisements.

The intelligence of VOD systems and unicast switching of them to subscribers allows the switched unicast method of ad targeting to be easily replicated for on-demand. Certain of the client-side models could also be utilized. Also, on-demand order patterns could be combined with other sources of subscriber data to enhance profiling.

Ads can be effectively inserted into on-demand programming in a variety of ways. These include:

- Bookend ads;
- Interstitial ads;
- Pause ads;
- Telescoping ads.

Bookend ads, also known as bumper ads, appear at the beginning and end of a VOD program. Although akin to the commercials that accompany the start of a movie on a DVD, bookend ads do not need to be random, but can be targeted based on information gathered from viewer surveys, or other relevant data.

Interstitial ads can be spliced into on-demand content such as a past season of a popular TV program, during what had been the commercial breaks in the original broadcasts. Additionally, the use of nPVRs enables interstitial ads to be paused during near-live broadcasts, allowing a subscriber to undertake some type of telescoping activity.

Interstitial ad replacement may actually be an imperative in some PVR content as the original ad content may have expired or no longer be relevant.

Pause ads can be used any time a subscriber pauses an on demand session. Some studies have shown that pause ads are the least intrusive to the subscriber, as they have already self-interrupted their viewing session. These studies have also shown multiple pauses per program giving a rich new source of ad inventory.

Telescoping enables a viewer to press a button on the remote control for more information or request a longer form of the ad, or peruse a topic of interest. PVR technology, networked or otherwise, enables subscribers to pause near-live broadcasts while telescoping. Once the ad has been viewed, the viewer can return to programming, at the place where it was paused.

In addition to live and on-demand video programming to televisions, cable operators can also consider additional directions to expand targeted advertising throughout expanding triple-play and quad-play activities. Data for ad targeting can extend to services like Web surfing. And targeted insertion can occur to additional services including on-line and mobile video, or data services in which cable operators can aim to

capture some of the success achieved in search advertising.

ENHANCING FUNCTIONALITY OF TARGETED ADS

Non-linear programming and switched digital advertising are two of many innovations increasingly available on digital cable networks. Multiple interactive and multimedia functions can be leveraged so that when an ad is targeted to carefully selected viewers, those viewers are well positioned to easily respond.

Targeting can be combined with logo insertion or other data overlays to further customize content. This could include messaging to appeal to different profile types viewing the same ad. Regional data could be overlaid on video to indicate a local retailer or provider.

Interactivity can make television advertising completely actionable, extending from just making an impression to effecting a transaction. As interactive technologies mature, these could be used to request more information, get a call from a provider, or even effect a purchase. There is a multi-billion dollar market of direct response advertising and home television shopping with even bigger markets achieved on the Web. A subscriber with a remote control in hand could prove to be fully interested in making a purchase without ever departing the television experience. There could also be means for a subscriber to port the interaction of an interesting video ad to a PC or portable device.

Actionable advertisements could enhance operators' business models in a number of ways. They could claim commission on sales or even sell directly themselves. Certainly their own offerings including customer support and premium service sales could occur by interactivity keying off of well targeted ad placements. Additionally, the Internet model of pay-per-click could be implemented such that advertisers are charged a premium whenever interactive functionality on an ad is accessed.

AD ENCODING FOR SWITCHED AND STORED NETWORKS

Switched and VOD advertising require ads to be encoded differently than on traditional ad insertion systems. Linear systems typically encode ads at full resolution with typical bit rates of 6 Mb/s CBR. In the case of stored content, ad encoding methods need to more closely follow VOD encoding specifications.

The industry is moving towards encoding all advertisements based on the CableLabs VOD encoding specifications. As the current switched digital broadcast servers and session resource managers use CBR 3.75 Mb/s standard definition and 15 Mb/s high definition streams, encoding all ads at this specification allows development of simpler splicers that are able to handle larger numbers of splices.

New session resource managers will be capable of handling an assortment of CBR bit rates. One method is to divide the current 37.5 Mb/s available in to sixty segments and allocate the bandwidth on a segment-by-segment basis. However, this may require some additional work from the SBM or session resource manager, if the network has been allocated less than the ads' 3.75 Mb/s or the 3.5 Mb/s that is typically in the ad. In this case a request will need to be made to the SBM for more bandwidth. Another option might be to encode ads at a slightly lower video bit rate so that the video and

AC3 audio is closer to 3.125 Mb/s, if twelve programs need to be accommodated in each QAM.

INTELLIGENT AD SCHEDULING SYSTEMS

With a large number of avails from the current linear broadcast, switched digital broadcast, nPVR and various VOD advertising methods such as pre- and post-bookend ads, the current systems were not intended to effectively sell advertising in this environment. One place to look for insight is Internet advertising, which various methodologies, including banner ad and video that can be dynamically selected. There are some unique issues currently with cable advertising that are not faced in the Internet world that need to be considered. The most important issue that Internet advertising has not really had to deal with is provisioning high quality content on to the appropriate server, it is very easy to pull an ad from a web site thousands of miles away, but the bandwidth does not yet exist to do this for content that is megabytes in size.

Another issue is that in this new model the operator may decide to start serving targeted impressions for content owners in addition to advertising on content and avails it has rights to. It is likely that these content owners will have certain vendors that they want to work with in this space. It is important that the ADM allow and control multiple ADS servers.

These new advertising methods will also likely require new sales and campaign management tools to effectively manage these campaigns as initially the number of ad avails will not be known. As the system plays ads though, it will need to acquire statistical data as to the expected inventory that will be available in the future.

The campaign manager should also be able to update current campaigns if they are not executing properly. It may need to alter the target demographics or other parameters to reach the desired advertising goal.

EXPANDING AD SALES MODELS BEYOND LOCATION

Other achievements in Internet advertising that could be considered for television include national campaigns and online sales of placements. Cable operators are beginning to sell ad insertion on macro-zone, in addition to micro-zone, geographic bases. This means that a national advertiser could purchase time across all of an operator's systems. Combining this with targeting could enhance this business model by allowing that advertiser to select its advertisement best catering to each profile type across an operators' subscribership, distinguishing household from household, nationwide.

In addition to national advertisers being interested in accessing all of an operator's subscribers, tiny businesses could have the same interest. Their appeal could be so precise that it's not worth their purchasing content within a single system, but there is economic justification across all of an operator's footprint. Consider a destination event for a small but highly dedicated affinity group: if the provider could access a highly fragmented and esoteric collection of people with aligned interests for video advertising, that could be highly valuable.

A new, technology-based sales and marketing method could enhance such nationalized ad sales. Real-time transactions could be implemented, resulting in an ad being instantly sourced and distributed by transport nationwide.

CONCLUSION

Adoption of switched digital broadcast networks continues to gain momentum in the industry. As switched digital broadcasting networks become more pervasive in the marketplace it enables a whole new level of enhanced services of which targeted advertising is a powerful force.

As the technology becomes more widely deployed, it will increase the ability of cable operators to successfully compete for local advertising dollars, especially compared to operators using legacy broadcast advertising models.

New technologies such as VOD and PVR have led to speculation of the decline of the TV advertising industry. However, those active in the advertising business, including cable operators and the marketers who run ads, have emerging technologies at their disposal. These can be leveraged to assure that advertisements are relevant and valuable to their audiences.

The Internet industry has flourished with advertising by directing relevant and actionable content to consumers. Switching technologies applied to video can be leveraged by cable operators to similar effect. The result is targeted advertising wherein subscriber information is incorporated into the determination of what ads are delivered, or selected, to the subscriber. This approach can be combined with other industry advances such as multi-service integration, interactivity, and ongoing data analytics to continue advancing the prominence of television as the seat of the most compelling advertising platform.