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“Switched Digital Video Lessons Learned”

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Table of Contents

Introduction.....	3
Program Selection.....	4
Grooming Signals, Conditional Access and Transport.....	4
Network Insertion and Effects on the Network.....	5
Client Application for Set Top box.....	6
Reporting.....	6
Operational Issues.....	7

“Switched Digital Video Lessons Learned”

Introduction

With the ever demanding quest for more bandwidth, Multiple System Operators (MSOs) are looking for innovative technologies to better utilize their spectrum. With the production of additional Hi-Definition digital programming, as well as Standard Definition digital channels, there is a serious shortage of bandwidth. In addition, there is a need to expand data carriage for Internet and Voice services for residential and business services, therefore, MSOs are looking for alternative technologies to meet the ever expanding demand for services. One of the ways to expand the programming offer is **Switched Video Broadcast**. Switched Video Broadcast allows the MSO to send selected programs via a multi-cast stream to a subscriber, which can be joined by other subscribers that are in the same service group area. This type of service will allow the cable company to send video programming only when requested, thereby, saving bandwidth that otherwise would be on a constant basis. While the use of multi-stream technology is not new, it was previously deployed for many years as a Video on Demand Service. With Switch Broadcast Systems technology the MSO can save as much as 25% or more of the bandwidth that they use today. This savings can be used for adding capacity to the existing services such as Data and Voice as well as HD-TV or new services including Targeted Advertising.

In implementing Switched Digital Services there are numerous problems that need to be addressed. This paper will share some of those problems and some of the solutions. Careful planning is required in order to install and launch such a service with as little impact to the operations as possible. There are six steps in preparing for Switched Broadcast:

- Program Selection
- Grooming Signals, Conditional Access and Transport
- Network Insertion and Effects on the Network
- Client Application on the set top box
- Reporting
- Operational Issues

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Program Selection

Selecting the right mix of programming is one of the most difficult steps because not everyone in a service group will want to watch the same programming. We conducted an interesting user group study based on least watched programs. After reviewing the 4,000 subscribers' viewing habits for 3 weeks, the study showed that out of 250 channels 42 channels showed less than 10 viewers watching during a 24 hour period. Taking the 42 channels and comparing the time slot for each viewer only 7 channels were watched at the same time. Therefore, you could put 42 channels into one program transport. This would be a savings of 3 transport slots or QAMs.

Grooming Signals, Conditional Access and Transport.

In order to switch a video signal the signal must be in a constant bit rate format. Today, programming comes to the MSO in a variable bit rate format. This signal must be put through a *clammer*, which is a rate shaper that changes the variable rate to one of a constant bit rate. The accepted rate is 3.75 mega bits per second. This rate is selected because QAM's have the capability of transporting up to 38Mbps in each QAM. It is important that the clamper setting be set to maximize the capability of the clamper to ensure the best quality signal is produced.

Once the signal has been clamped to 3.75 Mbps, the signal will require Conditional Access to be inserted. This is done by a QAM device that inserts the needed encryption into the stream. The stream is then returned to the Transport device for distribution to the cable network.

Once the streams have been returned for transport the transport device prepares a multi-stream transport in the form of a Gig E. This enables all streams to be transported to all distribution hubs and then sent to all subscriber service groups for distribution. Be sure you have sufficient bandwidth in the backbone network to support the additional program transports streams.

“Switched Digital Video Lessons Learned”

Network Insertion and Effects on the Network.

Inserting the signal into a QAM device is done in the same manner as a VOD signal - at the last distribution point in the network, usually the Hub location. Selecting the size of your service group will depend on several items. For example, what is the audience that will receive the programming? If the programming is ethnic oriented and the audience is of the same ethnic group, then that service group may require a smaller amount of subscribers or in some cases the service group may need additional bandwidth. This type of service group may require an extra QAM to handle the heavy traffic load.

Another effect on the network will be the data traffic. Once the set top box receives the Switched Broadcast Client, the set top box will start reporting back conditions that are accruing in the box. Data reported back will include the number of channel changes, the length a subscriber stayed on that channel, as well as every remote control key stroke. Once you have your network running with millions of converter boxes reporting every key stroke from the remote, the amount of data can cause data blockages on the upstream part of the network.

“Switched Digital Video Lessons Learned”

Client Application for Set Top box

A Switch Video Client needs to be installed on the Set-Top box; this application communicates over the upstream path between the set top box and the Switch Video Server. The set top client determines that the program requested is a switch channel, the set top application then sends an upstream communication to the Switch Server requesting the program desired by the subscriber. The Switch Video Server sets up the stream path and tells the set top where to tune. If any subscribers in the same service group request the same program, the switch video server will instruct that customers set top box to tune to the same video stream that is being view by the first subscriber. This application must run on the set top in conjunction with other applications and not interfere with normal set top operations.

Reporting

The Switched Broadcast Manager will provide enormous amounts of data. This data will need to be filtered into readable reports. Most Switched Video Systems come with basic reporting, is usually not sufficient for operational and product use. Be sure you have the correct reporting tools developed before you try to launch a Switch Video Service.

“Switched Digital Video Lessons Learned”

Operational Issues

Several operational issues that need to be addressed are in-depth training for the new Switched Video System technology, operational procedures (i.e., trouble ticketing, maintenance procedures, day to day operational instructions) will need to be put in place, and training for Customer Service centers.

Note, Cable Card customers will not be able to view Switched Video programs because of a one-way communication between the headend and the set top box. Cable Cards are not two-way devices; therefore, no switch services can be offered.