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PSIP Considerations for Channel Sharing

Benefits, Challenges, and Solutions Related to the Incentive Auction

Operational and cost efficiency are extremely important for today's broadcasters, especially considering that many stations have undergone significant architectural and workflow changes over the last several years to address technology changes. As the Federal Communications Commission (FCC) spectrum incentive auction approaches, many broadcast TV stations are considering deploying channel sharing as a means of increasing their revenue and cutting costs. Channel sharing allows two non-affiliated broadcast stations to share a single 6 MHz licensed radio frequency. While there are certain financial benefits to channel sharing, there are also technical and operational challenges. Aside from the business arrangements that must be negotiated between the cooperating stations, a number of technical issues must be considered to successfully implement such an approach.

This paper details the benefits of channel sharing in addition to reviewing the technical challenges and considerations as it relates to the management of Program and System Information Protocol (PSIP) metadata when implementing channel sharing to retain appropriate station level channel branding, service guide information, and maintain FCC compliance. Workflow integration with a TV station's traffic and automation systems and guide data listing service for both centralized and distributed architectures are discussed. PSIP insertion and bandwidth management considerations for both a statistical multiplex as well as fixed allocation models are examined. Security and permission requirements to appropriately restrict an affiliate's access and control over their channel information are highlighted. The paper will conclude by providing broadcast TV stations with a strategy for making a successful transition to a channel sharing model and providing viewers with a superior quality of service (QoS).

Benefits of Channel Sharing

The use of wireless services has exploded over the last several years. To address this prominent issue, the FCC will hold a first of its kind incentive auction in early 2016. The process

of assigning channels to the broadcast television stations that remain on the air after the incentive auction has been defined as “repacking” by the FCC.

During the incentive auction, broadcast TV stations can choose to sell their broadcast spectrum to the FCC. This would require them to voluntarily go off the air, share their spectrum with another station (i.e., channel sharing), or move to another channel in exchange for receiving part of the proceeds from auctioning that spectrum to wireless providers.

The FCC has proposed channel sharing as a method for broadcasters to stay on the air and reap financial gain from incentive auction. Of course, any financial benefits would presumably be shared with the other station sharing the spectrum. The FCC will still consider any channel sharing stations as being independent. This means they can each sell their stations independently, and each station on a shared channel will have all the must carry and retransmission consent rights that they had when they independently operated on separate 6 MHz channels.

PSIP Challenges Encountered with Channel Sharing

After two broadcast TV stations decide that they want to participate in channel sharing, there are some important business and technical decisions that need to be made, especially with regards to how they will merge together video signals and metadata, such as PSIP information, and transmit it over the air while operating out of separate news production facilities.

The first step often involves devising a plan for bandwidth allocation. With only 6 MHz available between the two stations, it’s important to decide ahead of time whether each station gets a fixed portion of bandwidth, or will be using advanced encoding techniques such as statistical multiplexing to adjust bandwidth on the fly. With statistical multiplexing, TV stations can deliver superior video quality at low bit rates, as the encoder includes a variety of settings, such as program-stream priority, division of the statmux pool, audio content bitrates, video format, etc., to determine the optimal amount of bandwidth for each program. Ultimately, this approach is more bandwidth-efficient, reducing the stations’ operating costs while enabling viewers to enjoy a better QoS.

If the stations choose to make statistical multiplexing a part of the workflow, they need to consider how it will be done technically. Will uncompressed video be sent from station A to station B and then multiplexed at the host station? The other option is for multiplexing to take

place remotely. Nowadays, two stations can easily participate in the same statmux pool over an Internet connection.

It's important to weigh the advantages of each statmux approach. The latter scenario is likely to be ideal since a high-quality rendering of an uncompressed signal will not need to be sent from one plant to another, saving significant bandwidth. However, both stations would need to have the same encoding equipment in place in order to perform statmuxing remotely. If the stations chose to statmux from a fixed location, it would be vendor neutral.

Bandwidth allocation directly impacts PSIP information. If the bitrate for PSIP information is set too high, unused bits may be lost.[1] If the threshold is set too low, TV sets may have trouble tuning or populating sufficient program guide information. The PSIP table cycle time will need to be adjusted based on various parameters related to the program stream count.

Moving beyond bandwidth allocation, the stations must determine a distributive workflow. Program streams will need to be routed to and from a centralized location. One station will be assigned the host and act as a downstream recipient of all the information that is coming from the other station. A reliable communication such as fiber link is recommended.

The next step is determining how to unify the generation and management of metadata. When two stations participate in channel sharing, a massive amount of information needs to merged together for PSIP info to be sent out accurately. To be FCC compliant, there are certain descriptors that need to be present in the emitted stream, such major and minor channel numbers, program titles, program descriptions, ratings, language choices, and closed-captioning information. It is required that stations ensure the virtual channels and RF channels are configured and assigned properly as these descriptors are what makes it possible for TV viewers to tune to the proper channel and access programming guide information. Without PSIP information, the TV set would not be able to tune into a broadcaster's program stream. Furthermore, when PSIP information is incorrect, stations could incur monetary fines from the FCC.

There are three main approaches that TV stations can adopt: centralized, distributed, or cloud. Under a centralized PSIP method, the host station manages all the PSIP information, giving remote access and control to the channel sharing station (see Figure 1). The metadata

[1] http://www.ctia.org/docs/default-source/fcc-filings/technical-report-of-the-klcs-kjla-channel-sharing-pilot.pdf

management system resides at station A (i.e., the host station), with station B accessing metadata operations via Web interface. The benefits of this approach are that the stations would only require a single metadata generator and management system, one statmux, and a single listing service ingest. With fewer products to maintain, reduced rack space, and less power consumption, the stations' service and maintenance costs would decrease. The extra equipment could optionally be used for spare and/or redundancy purposes.

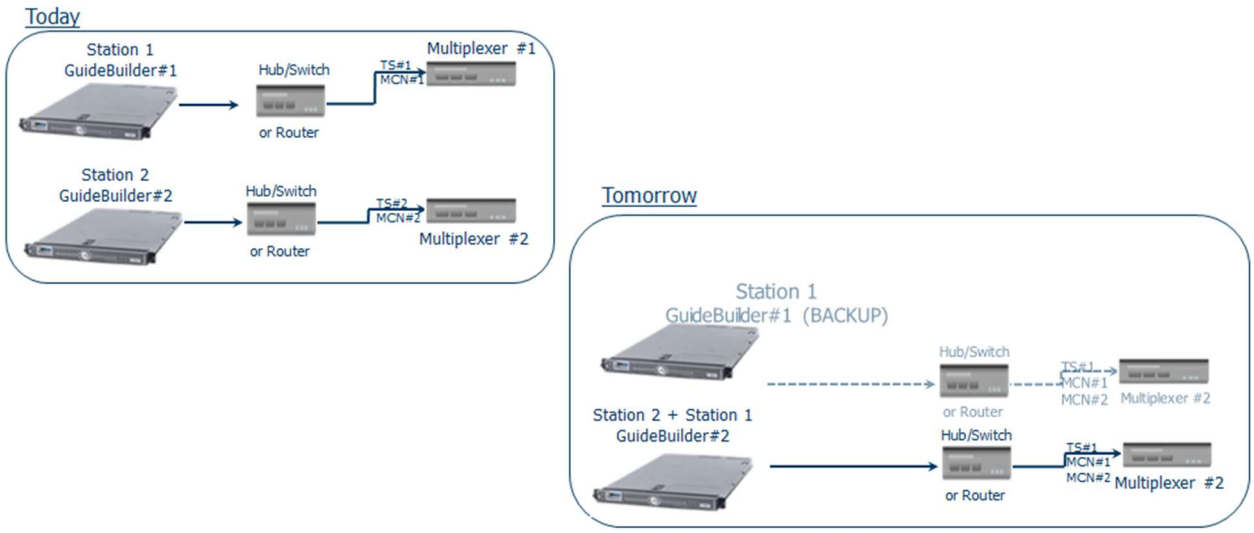

Figure 1: When two TV stations manage PSIP information under a centralized approach, the "host" station manages everything.

With a distributed PSIP approach, the stations each generate and manage their PSIP metadata locally. The metadata is then merged at the host site (see Figure 2.) A main advantage of this method is that both stations can continue generating and managing their PSIP information just as they were before they started participating in channel sharing. Stations would have complete ownership over their PSIP information, with minimal disruption to the metadata workflow. Statmux implementation and PSIP regeneration in the multiplexer is a must under the distributed PSIP method.

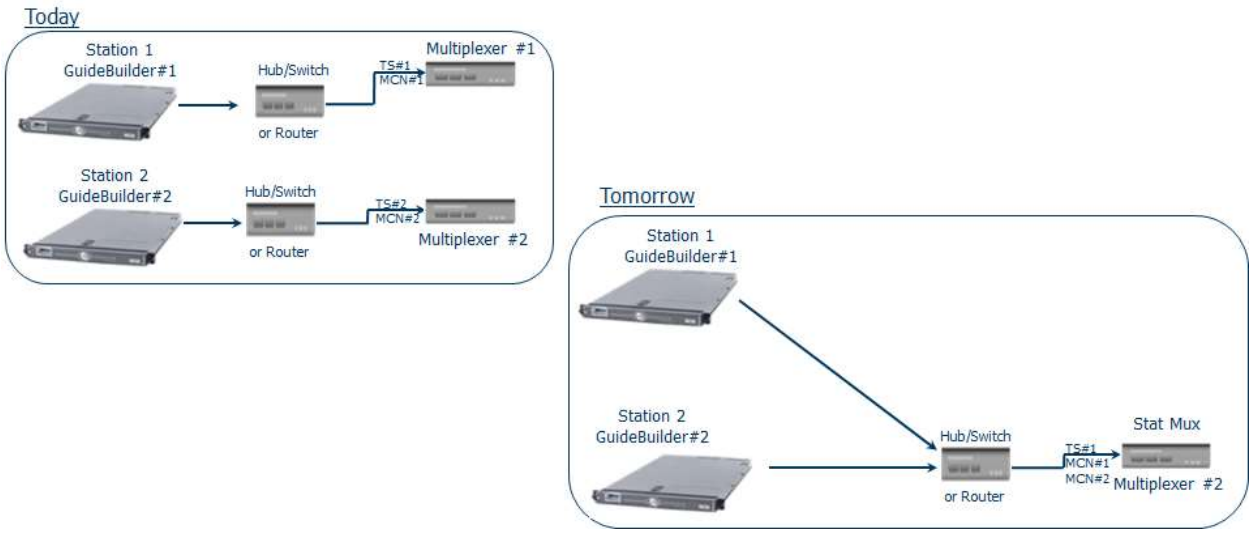

Figure 2: A distributed PSIP approach gives both TV stations control over their PSIP metadata via equipment located at each site. Metadata is then merged at the host station.

A third option involves managing the PSIP metadata in a cloud environment (see Figure 3.) As opposed to using existing metadata management systems or deploying new equipment, the stations would subscribe to a Software as a Service (SaaS). Both stations would remotely manage their PSIP information through a Web-based interface connected to a statmuxed encoder or a carousel multiplexer. Adopting a cloud-based approach eliminates the need for physical equipment in the facility, reducing CAPEX as well as OPEX by lowering power and environmental costs.

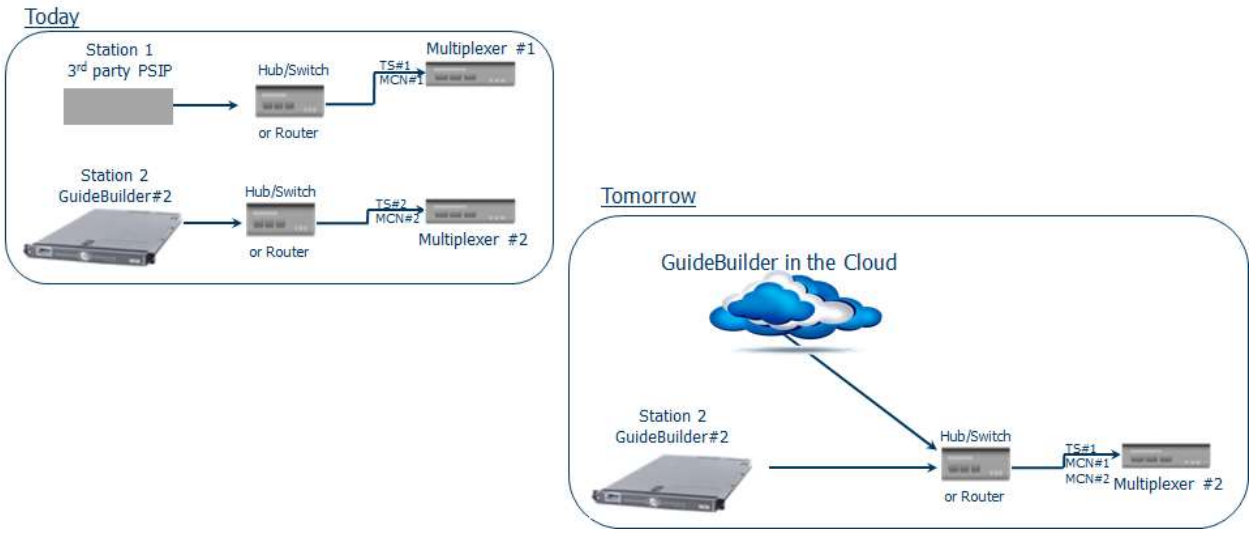

Figure 3: With a cloud-based PSIP approach, SaaS is used for managing the metadata.

Once a PSIP approach is chosen, the stations face other challenges. For instance, the majority of information used to generate PSIP information comes from the traffic and automation

systems. When channel sharing, the TV stations need to ensure that the metadata generation and management system they're using can signal multiple channel numbers and accurately describe the required program information from two disparate systems, as it's likely that the stations are using equipment from different manufacturers.[2]

Under all three approaches, integration with listing services essentially remains the same. By using a single PSIP generator that can simultaneously handle multiple listing services, the channel sharing stations can streamline this process.

Another issue that TV stations face is security and permission requirements. The host station will need to provide the channel sharing station with secure access to the metadata generation and management system. If station A is the host station and station B is the channel sharing station, station B will require visibility into the status of PSIP generation and control over making any changes. This information must be kept private so that each station is only able to view information about its own station.

Conclusion

Recently, The Wireless Association CTIA performed a test between two stations in the Los Angeles market, KLCS and KJLA, to explore the technical details and feasibility of channel sharing. Based on the trial, the association found that channel sharing can be done successfully; however, it requires significant planning and collaboration between both stations. More details about the trial can be found in the following technical report: http://www.ctia.org/docs/default-source/fcc-filings/technical-report-of-the-klcs-kjla-channel-sharing-pilot.pdf

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[2] http://www.ctia.org/docs/default-source/fcc-filings/technical-report-of-the-klcs-kjla-channel-sharing-pilot.pdf