

a combination of both. The Data Bridge provides an exchange mechanism between the NTSC and DTV plants for data signals. Thus data carried in the vertical interval of the NTSC signal can be extracted by Data Extractor and passed to the DTV plant. Likewise, the Data Inserter can insert data from the DTV plant into the NTSC vertical interval. The Data Server is the "Data Central" of the DTV plant. Except for closed caption signals that travel with the video (SMPTE 259/292) as ANC data packets or in some other TBD format, e.g., AES-3, all data broadcast signals, whether program-related or non-program-related pass through the data server. The processing of PSIP data, other PSI data (PAT and PMT data), UPID data and Conditional Access data is not shown on this diagram. As discussed above this data is processed in the management and control planes. There will have to be interfaces to the management and control planes at various points. Three such interface points are indicated on the diagram by the circled letter M. The interface to the input Demux allows data sent by the network to be delivered to the management and control planes. The interface to the data server allows two-way data communication between the server and the management and control planes; and the interface to the PSIP, UPID and PSI Generator allows the management and control plane to deliver the necessary data to the generator.

### ***Issues Pending***

A number of open standards issues were identified:

- Conveying EIA-708 data in SMPTE 259 and 292.
- Conveying EIA-708 data over the data link (RS232, RS422, Ethernet...) from the data bridge to the video encoder.
- Conveying EIA-708 data in AES-3.
- Conveying data from network to local stations over the distribution network.
- Definitions of interfaces to and from the management and control planes.

### ***Issues for Further Consideration by IS***

IS should influence the standards-making process with regard to the two critical needs of standards for the closed caption food chain and for the delivery of data from the network to stations over the distribution network. As part of its ongoing work on the control and management planes, IS should give high priority to the interfaces between these planes and the data plane of the DTV plant.

## ***Redistribution Signals***

### ***Introduction***

While the original scope of effort for the top down map addressed outputs from the station to the transmitter, it was noted that there are a number of other destinations which stations must feed their signal in a variety of formats. A group was assigned the effort to identify these destinations, the data rates that are likely to be delivered, and any functional requirements that must be added to the map to facilitate this redistribution of the station's programming to other facilities.

## ***Findings***

The group assembled a list of likely destinations that will receive program information from the station. Data rates may be 45 Mbps at contribution quality or 19.4 Mbps encoded ATSC bit stream. These destinations include:

- Cable head-end or MMDS services
- Satellite uplinks
- Microwave systems (may include direct feeds to translators)
- Telco systems (45 Mbps or ATM @ 155 Mbps)
- Dedicated fiber

In redistribution of the 19.4 Mbps signal, there are a number of likely destinations including:

- Microwave distribution systems
- Cable head-ends or MMDS services (same signal as the broadcast programming)
- Independent feeds to cable systems ( news or other programming that is different and separate from the broadcast signal)
- Satellite uplinks (DSS, syndicated programs, sporting events, etc. for distribution to other stations.)
- Translators fed directly (as opposed to over-the-air pickup of the broadcast signal)
- Dedicated fiber feeds

It is assumed that the above material would already include PSIP, EPG, metadata, etc. that is already encoded by the station.

It is also likely that the station would redistribute its content at rates higher than the standard 19.4 Mbps output required by the transmitter. To facilitate redistribution of the station signal to these destinations, additional functional blocks are required. As the redistributed output may exist at a higher bitrate than the 8VSB signal, Video and audio compression encoders must be added. Additionally, transport multiplexer and optional splicer and keyer functions must also be added to allow delivery of these higher bitrate outputs.

Likely destinations for these higher bitrate signals are:

- Microwave systems
- Cable head-ends or MMDS services
- Satellite uplinks (DSS, syndicated programs, sporting events, etc. for distribution to other stations.)
- Telco systems ( at 45 Mbps or ATM at 155 Mbps)
- Dedicated fiber feeds

With this level of service, the station will essentially act as an origination network service, and will need to supply PSIP, EPG, metadata, etc. (if required by the receiving end) as user data.

## ***Pending Issues***

1. Does ITU-R 217/11 (or draft SCTE DVS 071) include all of the modulation schemes currently in use for the services described above?
2. Information needs to be obtained from microwave vendors to determine the interfaces and levels of standardization adopted by those vendors.

3. At what point is the interface between the broadcast plant (at SDTI) and Common Carriers (DS-3)?

### ***Summary***

While stations must be aware and plan for the redistribution of their signals to various outlets, the functional equipment and the interfaces required are virtually identical to functions that have already been identified and documented. No additional standards were identified that require further development.

## ***Audio Plane***

### ***Introduction***

The study was done from the point of view of an Affiliate station that receives network and other external feeds, and produces some of their own (audio) program material. Three different types of station are covered. 1) those with an existing digital audio (AES3) capability 2) those with stereo analog facilities 3) those whose only interest is passing on the audio derived from an incoming ATSC transport stream.

The results of the study allow for 1) production and distribution of ATSC 5.1 channel audio 2) downmixing of 5.1 channel audio to 2 channel audio for NTSC compatibility or use in two channel analog plants 3) the audio pass through concept is treated later under "issues we missed". It was assumed that sufficient buffering and/or time stamping facilities are in place to ensure that the audio is in sync with its associated video at the output of any process.

### ***Methodology description***

The audio layer map development group assumed that there was a digital audio infrastructure. This allows the plant to carry the multichannel signals via multiple AES3 pairs. Alternately, methods of encoding the multichannel signal and multiplexing the associated metadata into a signal that can be carried on a single AES3 pair have been proposed. This encoded/multiplex concept has been included in the Map, as it lessens the load on the digital audio infrastructure and provides a path for the audio metadata. Separate metadata paths are shown on Audio layer of the Map, as the metadata is crucial to the operation of the audio decoders in the home receiver. Metadata authoring blocks are also included to indicate the importance of function, even though they do not process the audio. The stereo analog signal paths and equipment were not included on the Map because they were felt to be legacy items.

The group examined the Top Down Map dated 6/4/98 to determine if all essential functions were all accounted for, and modified the Map as necessary and/or refined the functions of various blocks.

### ***Findings***

The collaboration of the audio group resulted in the identification of a number of areas that required additional functionality and interfaces to be documented. While the carriage of audio metadata was given a significant amount of attention, it is assumed that metadata should have its own routing layer. To facilitate delivery of audio metadata, connections should be included between all audio decoders and signal routers. Similarly, paths from the routers to the AC-3 encoders should be made to deliver the metadata.