PowerVu® MetroMux Software

MetroMux Software Capabilities

MetroMux software allows signals to get on and off a multiplexed network like getting on and off a metro rail system. The complete signal or selected elements of the signal can be received at one or more points, fed into a MetroMux system and retransmitted via satellites with different coverage, or backhauled via E3 or DS3 links to another uplink.

Two major benefits are realized using MetroMux software:

- as there is some natural loss of picture quality every time a signal is recompressed, the ability to remultiplex the original signal using MetroMux software ensures that the original signal arrives at each destination with the same image quality as the first location. This eliminates the degradations in quality which can occur through multiple compression cascades.
- as recompressing the signal is not necessary, the costs and operating expenses associated with additional encoding and decoding equipment normally required for this process are eliminated.

MetroMux software converts a PowerVu® multiplexer into a remultiplexer, supporting the combination of MPEG-2 transport streams from various sources into one transport stream in real time. This is applicable to regional or global backhaul systems, as well as other networks with special requirements.

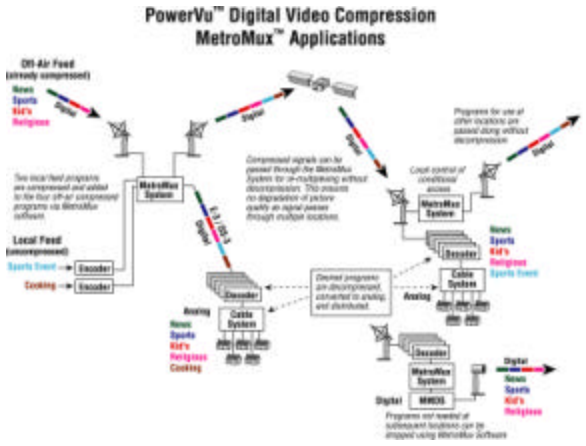
Distant signals can be added into the MetroMux system via Scientific-Atlanta's Telco Interface Unit (TIU), or directly from satellite via Scientific-Atlanta's PowerVu Commercial Satellite Receiver. PowerVu Conditional Access is removed at this point. The MetroMux system is able to re-map the Packet Identifiers (PIDs) of the incoming packets to prevent PID collision. New control information (PSI tables) and service information (SI) can be created locally and inserted into the remultiplexer via the PowerVu Command Centre (PCC). PowerVu conditional access is added also.

Backhaul Applications

MetroMux software provides an economical means of sending a signal over multiple hops in a network while retaining the original encoded video and audio quality. Normally, multiple compressed digital signals arriving at a teleport from different locations are decompressed, converted to analog or D1 format, recompressed and multiplexed together into a signal for satellite transmission. Using MetroMux software, the arriving signals do not require decompression before retransmission to another location.

Signals can be transmitted over the whole footprint. The complete signal or selected elements can be received at one or more points, fed into a MetroMux system and then retransmitted over further satellites with different coverage, or backhauled via E3 or DS3 links to another uplink.

In addition to supporting satellite programming distribution, MetroMux software's drop/add capability can support the insertion of locally encoded programming. A program can join the multiplex at one point, and travel through one or more MetroMux equipped installations, like getting on and off a metro rail or subway system.



For example, programs originating on the east coast of the USA could be uplinked for distribution to Europe, then turned around in MPEG-2 form and transmitted to Asia, all without conversion back to baseband.

Implementation

Practically, a PowerVu Commercial Satellite Receiver is required to receive each virtual channel. The SWIF output of the receiver is split; one output is connected to the primary multiplexer and the other to the secondary multiplexer. In this manner, regardless of which multiplexer is on line, the signal is received and passed through the multiplex. Local encoders can also be connected to the remultiplexer, allowing the combination of locally encoded material and material sourced from a distant location into one transport stream. This reduces the encoder requirement compared with decoding and then re-encoding the signal, from the standpoint of cost, rack space and power/air conditioning requirements.

The PCC-2000 or PCC-3000 control system controlling the remultiplexers is used to define virtual channels. Generally, it is not possible to create a program or virtual channel consisting of material from one location with material from another location, as the PTS (Presentation Time Stamp) values of the streams would be different. Similar PTSs are required to achieve lip synchronization and accurate buffer management, with the exception of data. Data channels do not use PTSs; therefore a data stream from any location could be part of a virtual channel originating elsewhere. Note that data itself is not strictly synchronized with the video and audio.

At the PCC, all incoming PIDs are remapped; in other words, the value of the PID is overwritten, either to the same value or a different value. This simplifies network management, as it is not necessary to co-ordinate PID values for virtual channels between diverse signal sources.

The only cross-network management concern is that the receivers intended to receive the signal and decode it must be resident in the database of the source system, and authorized to receive the transmissions. The remultiplex database manages all receivers within that service area, as new encryption is applied to the signal. Again this simplifies cross-network management, as a receiver is typically not intended to receive signals from many different sources. Adding new encryption implies that virtual channels and tiers can be re-used without coordination across databases as it is not necessary for one part of the global network to replicate or even know the tier assignments of other controllers in the system. Note also that new service information is created at the remultiplex point, requiring less management.

Specialty Services

The MetroMux package can be used to solve several problems which occur in some of the larger teleport locations.

The Occasional Use Problem

At times, space for occasional use with the right uplink footprint cannot be found on the satellite providing service to an installed base of fixed installation customers. The MetroMux package allows the signal to be transmitted from the remote location using other available capacity, and then subsequently received at a MetroMux site where it is combined into the bitstream and re-uplinked to the normal service satellite. This can be done without cascade effects and without the need for another encoder. As the PowerVu product line is compliant with MPEG-2 and DVB standards, this also means it may be possible to receive an in-the-clear outside broadcast signal transmitted using another manufacturer's SNG equipment, and distribute it, as the PowerVu Commercial Satellite Receiver has the ability to receive and decode signals over a wide range of symbol rates.

The Full-Time Service Problem

In a commercially-shared multiplex there are often full-time services which cannot be interrupted or removed (e.g., a 24-hour radio service) to allow a transmission from a remote location to take place instead (perhaps a business TV outside broadcast). Using the same method of retransmission for the occasional user, a signal from a remote location could be uplinked on any occasional use space

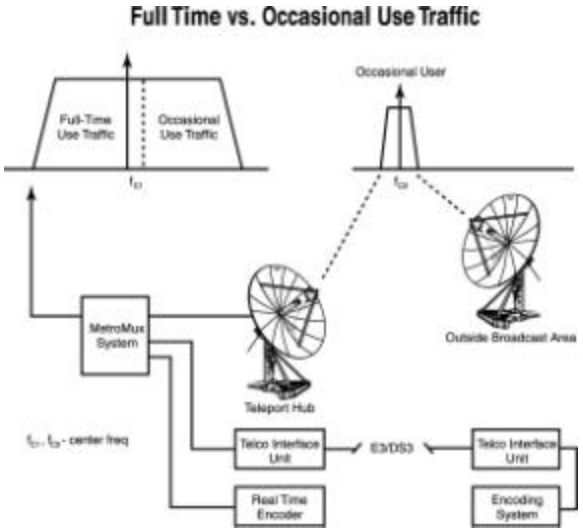
segment (perhaps even on the other half of the same wideband transponder) and then received and re-inserted into the full-time service at its usual frequency location without any disruption of the full-time service, using the usual link budget parameters. Since the receivers read the frequency plans and other control information, this process is transparent. Scientific-Atlanta receivers can also be forced to receive a particular channel within a multiplex if the backhauled service is defined as a special event. This capability eliminates the need for user intervention at the receiver.

Scientific-Atlanta's PowerVu system would also allow decoders not assigned to receive the full-time signal to be retuned to another frequency on the same satellite to receive an occasional use service. Using the MetroMux software in the manner described above, retuning is not necessary.

Global Network EMM (Entitled Management Message) Passthrough

EMM passthrough is an easy method of coordinating the SSN/EMM information throughout the network with out requiring all SSN records to be distributed to all the PCC systems in the network.

Any network composed of multiple PCC systems that needs a single integrated authorization point will require the EMM pass-through feature of MetroMux Software.



Fiber–Microwave Network Routing

PowerVu technology is finding deployment in E3 and DS3 networks facilitated by the PowerVu Telco Interface Unit (TIU). The TIU is a two-way device, meaning that a combination of TIUs and MetroMux packages can be used to achieve a hybrid contribution/distribution network.

Programming from a central program center can be carried by a TIU to regional locations. It can then be decoded into analog format or D1 format for retransmission via conventional methods, or fed into a MetroMux system and combined with locally recorded and generated programming for rebroadcast in digital format. However, regional sites are also often a source of programming with wider value. The return path of the TIU can be used to send the programming back to the central point, again without degradation. One regional site would probably not fill a full E3 channel, therefore E3 signals from possibly four regional points could be combined for collective return to the corporate location.

Summary

MetroMux software enables a wider distribution of programming while retaining the quality of the programming obtained at the initial point of compression. This reduces cost, rack space and power requirements compared to a system requiring decompression and re-encoding.

Further, MetroMux software is accessed through the graphical user interface employed across all PowerVu Command Centre models.

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Part Number 42A420 Rev B