Distributed Processing Encoder for Pay Per View

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ABSTRACT

This paper describes a distributed processing encoder for efficient conditional access control of Pay Per View (PPV) events. The encoder provides rapid deauthorization of subscriber terminals at the end of each PPV event. This permits immediate reuse of a program tag without loss of signal security. This encoder becomes an active part of a distributed intelligence conditional access control system in the CATV headend instead of the conventional passive encoder systems currently in use.

INTRODUCTION

Addressability provides individual control of multiple programs on a single channel. This is accomplished by assigning a unique controlling element (TAG) for each program segment. Initially a tag was assigned to a single premium service or tier of services. Traditional practice uses a separate tag for each premium service and each program segment of a PPV service. Not only should the tag be different, but a sufficient amount of time should have passed since the tag was last used, so that all decoders last authorized to use the tag are now deauthorized. The twenty tag Z-TAC system initially provided more than ample tag capacity for multiple premium and tiered services along with limited PPV offerings.

Over the past few years, the market for recurring PPV has exploded. The need for additional tags has placed a strain on the conventional tag management methodology of controlling programs.

IN-BAND ADDRESSING OVERVIEW

Spectrum conserving in-band addressing is used by the Z-TAC system to provide the conditional access control of individual programs. The Zenith Command Series System Controller sends the decoder authorizations for all premium services, PPV events, and attributes. This global list of decoder authorizations is optimized for recent transactions and data is sent continuously in parallel through all encoders in the system. This same data stream is used to provide remote encoder control and realtime two-way Z-View transaction control.

The system transmits the tag authorizations in four separate RAM group packets of 5 tags each. This is accomplished by transmitting three decoder authorization packets per Vertical Blanking Interval (VBI). The decoder requires four separate data packets to update its full twenty tag authorization profile. There are approximately 10000 packet slots per minute available. Transmitting one RAM group at a time gives a system throughput of approximately 2500 decoders per minute for full authorization via global data.

PAY PER VIEW ENCODER

The RAM group data format, to communicate the individual authorizations provides the means of communicating different data on specific channels. This independent data approach to controlling PPV, allows each PPV encoder to optimize the control of the decoders on its channel.

The PPV Encoder is allocated a particular program tag which is used for each PPV event scheduled on its assigned channel. Subscriber decoders are authorized in a normal fashion by the conditional access control computer; however, the PPV Encoder captures and stores in memory a list of all decoder addresses authorized for a PPV event on its channel. At the end of the event and through subsequent events, the encoder transmits rapid deauthorization commands to all decoder addresses that have been previously authorized for any PPV event on its channel. Since this list of subscribers is typically small in comparison with the global circulation list, deauthorization occurs rapidly, allowing immediate reuse of the PPV event tag assigned to the channel.

PPV transactions , whether from the Management Computer Interface, direct Automatic Number Identification (ANI) input, or Z-VIEW realtime interactive two-way, are processed by the Command Series Controller. The controller maintains the schedule of events, tag assignments, and advance buys. As decoders are authorized for a specific program, the decoder address and its RAM group profile are captured by the PPV encoder. Each PPV encoder keeps a list of decoder addresses authorized for the current program showing on its channel as well as the current program showing on the other PPV channels in its RAM group.

Each PPV encoder independently keeps a list of decoder addresses which have ever purchased a program on its channel. When the current program ends, the current decoder addresses become the highest priority deauthorization output. The decoder addresses are aged as additional programs are shown on a PPV channel. During a single program the 10,800 decoder addressing slots are optimized for the authorization of those who purchased the current program, the deauthorization of those who recently purchased a program on this channel or within this RAM group, and finally deauthorizations are sent to all decoder addresses which have ever been authorized on this channel and are not authorized for the current program.

A load shedding algorithm is used to ensure that each PPV encoder will "to thy own self be true". As additional decoder addresses are added to a "blockbuster special event" the encoder will dynamically reallocate the 10,800 decoder addressing packet slots and 64,000 active decoder address capacity to the event.

Current marketing inform-ation indicates that 80% of the PPV transactions come from 20% of the subscriber base. The current buy rates indicate that the PPV loading is 5% for the first showing and decreasing thereafter. An aggregate of 64,000 decoders can be active on the five channels within one RAM group. This PPV capacity can handle even the largest of subscriber systems.

FUTURE USES

The distributed intelligent in the encoder and the capability of circulating different decoder address lists on each channel opens the door for two-way channel monitoring. Unique system defined lists of decoder addresses could be assigned to each channel and polled independently.

CONCLUSION

By maintaining a list of decoders as they are authorized and aging that list as additional programs are shown, a collection of all decoders who have ever been authorized for any program on a given PPV channel are maintained in the encoder. This negative PPV list is sent, independent of the system controller global circulation, by the encoder during each event. This multilayered approach to deauthorization of tags, ensures the exclusive use of a single tag to a single PPV program maximizing the recycling of a scarce resource.