Launching An ANI Passing Impulse PPV System

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ABSTRACT

Pay-per-view is currently viewed as an important new source of revenue for cable systems. There are several technological approaches to the problem of order taking, among them is the use of Automatic Number Identification (ANI) based technology. ANI information: called and calling telephone numbers, identifying event and subscriber, are passed to the cable system headend where a system controller processes the impulse transactions and authorizes subscriber addressable converters in real-time without additional in-home hardware using rotary or touch-tone telephones.

INTRODUCTION

Impulse Pay-per-view (IPPV) is expected to be a new source of revenue for cable systems. However, there are a variety of transaction technologies available to accomplish impulse order taking. The dilemma facing managers and engineers is, how can this market be tapped without major capital outlay and increased operating expense? The solution selected for Centel's Traverse City system was launching an ANI passing IPPV system.

Traverse City, Michigan, was the site of an ANI IPPV trial for Centel Cable Television Company, launched May 1, 1986. The system uses Zenith Z-TAC addressable converters and CableData as a billing system. ANI information for 5600 Phonevision subscribers was supplied by Michigan Bell through the use of Science Dynamics, Multi-Access Cable Billing System (MACBS).

The criteria for selecting the order taking technology, as well as the experience of dealing with other variables in launching an ANI based IPPV system in Traverse City, Michigan, will be discussed. Among the factors discussed are:

- Network capacity and holding times
- Peak ordering
- Prefix considerations
- Third party ANI equipment
- Telco involvement
- System description
- Order and transaction sequences

The considerations before launching the ANI passing IPPV system and the experience gained through operation will also be discussed. Market research and customer reaction to the IPPV service will also be presented.

SYSTEM OVERVIEW

Automatic Number Identification (ANI) has been in use in telephone systems for quite some time. 800 and 900 prefix telephone numbers are a ready example. 800 numbers provide users free calls by charging the called number, which is likely located in another state. When such a number is called, the telephone network performs the following:

- recognizes the call as special and routes it outside the local central office switch through another part of the network for completion

- captures the called and calling numbers for billing purposes at a later time

Zenith, while working on its Z-VIEW two-way IPPV cable system, had developed a new system controller and software that permitted real time capture of two-way orders at 150 per second. Z-VIEW did this by detecting within the upstream data packet the ID of the in-home transmitter and cross referencing that to the subscriber addressable converter ID. After credit checks, the addressable converter was authorized.

The unique element was that the PPV subscriber database was contained in active memory in the system controller, and not on disc. This avoided any disc operating time and allowed near instantaneous look-up, processing and authorization. In a typical cable system the system controller/encoder authorization is driven by the billing computer - a process that can be measured in tens of seconds or longer. This was avoided by having the PPV database in active memory within the system controller, updated and tracking the billing computer database through normal edit commands. However, during the IPPV event ordering period, the transactions are in active memory and are recorded on disc by a background program within the software. After the event, the transactions are uploaded to the billing computer at a convenient time. This is a store and forward at the headend PPV system.

This order taking technology was translated to an ANI passing IPPV system, Phonevision, by recognizing that:

- the called number could be used for event identification
- the calling number could be used to identify the subscriber and converter ID
- called and calling numbers are provided by ANI
- ANI passing would be outside the local central office switch

The last item is crucial, because it means that the telephone newtwork would not be subject to the peak loading problems associated with other PPV systems using the telephone as the return path

In the Centel Traverse City cable system, PPV events are chosen by tuning to the barker channel. An event is selected and the corresponding toll-free telephone number is called, either a touch tone or rotary dial phone can be used since the ANI technology is not touchtone dependent. The IPPV subscriber call is routed through the local Electronics Switching System (ESS) to the Multi-Access Cable Billing System (MACBS). The system architecture is shown in Figure 1.

Optionally, there may be a Digital Multiplex System (DMS) used as a tandem and concentrator to link several ESS's or switches into one MACBS.

The MACBS takes the ANI information from the local ESS, translates it into a ASCII data packet. A pre-recorded digitally encoded voice response is heard, thanking the customer and requesting they hang up. Then, the packet is sent to the appropriate headend, with the called number indicating the event, and the calling number identifying the subscriber. The MACBS installed at Traverse City can send calls to four different headends or cable systems.

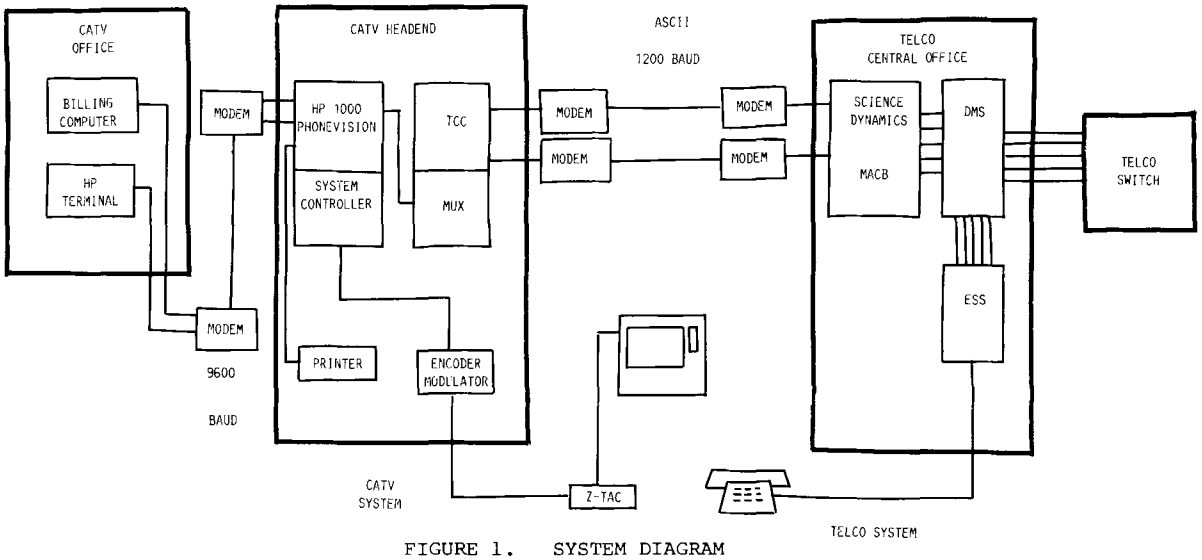

FIGURE 1. SYSTEM DIAGRAM

In the headend, the data is routed from the modems to the Telephone Communication Controllers (TCC's). The TCC verifies the protocal and holds the data in a buffer until the Multiplex (MUX) selects one of up to 16 TCC's. The Mux buffers and transfers the data into the HP1000 host computer.

The HP host computer searches the data base, previously downloaded from the billing system, using the calling number to identify the subscriber. If the subscriber has an addressable converter and is authorized to receive PPV, the HP acts as a standard system controller and authorizes the converter for the requested event by sending a downstream authorization through the channel encoder.

Upon completion of the event, all converters are mass de-authorized. Billing information remains in the HP's hard disk until purged, following a successful upload to the billing system. The storage of the transactions for post event processing is a positive feature for the cable operator. It permits IPPV even when the billing computer is down. The billing computer can be down for a variety of reasons:

- early morning down time for report generation
- modem or line failure
- billing system hardware failure

The last two are infrequent, but would represent revenue loss if the IPPV system was tied directly. The first item is fairly routine, and means that incremental revenue can be had from the night owls in your system.

TELEPHONE SYSTEM CONSIDERATIONS

The potential of an ANI based IPPV system is dependent on the percentage of your customer base the telephone company can deliver. To determine the percentage, the telephone company needs the number of subscribers by prefix, or NNX, you wish served. From the prefixes, the telephone company can determine which switches are involved.

Switch Considerations

A network could then be designed to link the switch under consideration into one or more MACBS. The number of ANI sending trunks used to link each switch to the MACBS is dependent on the subscriber base served, the expected call volume, and the holding time per trunk. Newer switches likes a 1ESS, 1AESS, 5ESS and DMS100 can be modified to pass the needed ANI to the MACBS by entering new translations.

The 2ESS and 2BESS switches require a software change called an Office Data Assembler (ODA) run. Due to the cost of an ODA run, this may delay the additions of those switches until the next scheduled software update. Older electro-mechanical switches may require physical rewiring. The Number Five Cross-Bar is capable of passing the ANI if strapped properly. Step-by-step switches may or may not be capable, if rewired, depending upon their ability to pass the ANI. All of these switches need ANI passing trunks to send the ANI to the MACBS, the number of trunks is dependent on the expected call volume.

The local telephone company staff determines what equipment changes are needed. Only after a timetable has been given showing when each prefix is available, can the true potential of an ANI system be explored.

Holding Time per Trunk

The amount of time that a customer remains on the line during a transaction is the holding time per trunk. Over the first ten months of this trial, the average holding time has been 16.5 seconds. The order message used by the MACBS in this trial was, "Your order has been accepted. Thank you. Please hang up." Shortening the message to just "Thank You", tightening up the switching time and automatically disconnecting the customer will shorten the holding time to approximately ten seconds per transaction.

At ten seconds per trunk, for a 24 trunk system, the maximum throughput per minute would be 144. The Science Dynamics MACBS has a capability of 128 trunk, at ten seconds per trunk 768 calls per minute throughput is possible.

It was expected that the majority of the order entry demand would fall in the last 5 minutes before the start of the event. However, the demand was much more evenly spread out over the 45 minute order entry time allowed before the start of the event. See Figure 2.

Ending the allowable order entry time at the start of the event resulted in a 18% rejection rate for calls placed after the start of the event. Allowing orders to be accepted up to 10 minutes into the start of the event reduced the call reject rate to 2%. This change in

the allowable order entry time was recently introduced and is not accurately reflected in Figure 2.

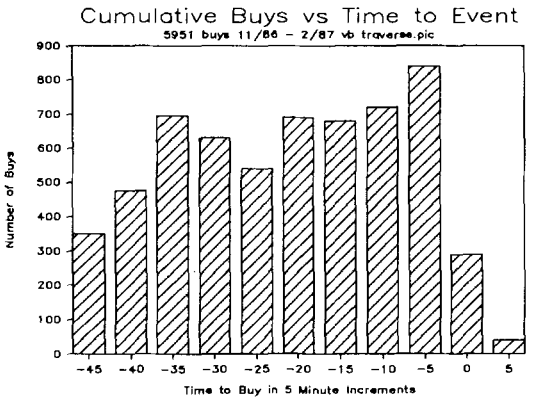

FIGURE 2. BUYS vs. TIME FOR IPPV EVENT

Database Accuracy

Once the telephone company has made the ANI information available to the cable system, some important links need to be made. First, the phone used to place the order must be linked to the subscriber, then the subscriber to their addressable converter. With the customer being identified by the phone used to place an order, the success of an ANI system is dependent on the accuracy of the data base. The particular home phone number being used as the identifier in a multi-line house or work phone number is very important, since an impulse pay-per-view order will be placed where the television is located in the home. Thus, the selection of the correct phone number among possible alternatives is very important. Having the correct customer home phone number on file to order IPPV needs to be clearly communicated.

This was accomplished through the barker channel, bill stuffers, and direct mail pieces. Also, verification of those subscribers with a listed phone number was done through the telephone company directory assistance department. Additionally, all customer contact with the CSR's includes phone number verification.

With the present software, only one converter per account can receive PPV. This converter is designated on CableData as the primary outlet and should be the only converter with its PPV flag at YES at a particular account. The link between a customer's phone number and their primary converter can be created only if the PPV flag is at YES. Therefore all converters entering the data base through the converter inventory program go on the customer's account with the PPV flag at YES. It is the responsibility of the CSR's to turn all but the primary outlet converters PPV flags to NO when starting new accounts or exchanging converters.

It's necessary to communicate to the subscribers that only one converter in their home is capable of receiving PPV. So if they order a PPV event and it does not come on the outlet they are watching, to check all the outlets. Customers with multiple converters should be informed as to which of their converters will be listed as their primary converter.

Periodically, a refresh is done to match the controller data base with the billing system. This refresh maintains the link between the customer's home phone number and a PPV capable converter. It is important that only one converter has its PPV flag at YES. In the event that more than one converter's PPV flag on an account is at YES, the phone number will be linked to the lowest converter number, which may or may not be the primary outlet. In this case, the customer may be rendered PPV incapable.

Equipment Utilization

There has been concern expressed about the peak ordering transient load, particulary by store and forward advocates, that may adversely impact portions of the local telephone network. Part of this concern may be caused by their use of an abnormally short order entry window: five minutes, prior to start of the event. Actual experience at Traverse City indicates that given a sufficiently wide order entry window, 45 minutes before and during the event, that peak loads capable of impacting the telephone network are never encountered.

Michigan Bell and Science Dynamics designed the ANI passing system to handle up to four cable headends. There are two banks of 12 trunks (24) and two banks of eight Multi-Frequency Receivers (MFR) (16). The loading of the MFR has also been a source of concern for some. Data was taken for four events with starting time and orders entered:

1:00 am	17
7:00 pm	144
9:00 pm	693
11:00 pm	22

Of the 16 MFR's available, the usage was: two MFR's handle 70 % of the incoming calls; an additional two MFR, 19.6 %; two more MFR beyond that, 6.8 % and three more MFR handle the remaining 1.9%. The number of cumulative MFR's required to handle total peak calls as a percentage are:

MFR	%
2	70.7 %
4	91.3 %
6	98.1 %
8	99.9 %
9	100.0 %

This demonstrates that half of the 16 MFR are not being used, in fact, two of the 16 MFR handle 70% of the calls. The concerns about peak loading are unwarranted.

The system was very conservatively designed and has quite a bit of expansion capability. The Michigan Bell and Science Dynamics portions of the ANI passing system worked flawlessy. Expansion to other cable systems within the calling area is under consideration.

MARKET RESEARCH

The participants in the Traverse City, Michigan IPPV test, Centel and Ameritech (Michigan Bell), commissioned Ad Factors Marketing Research Inc. to do a consumer opinion study of the PPV programming, Centel Cinema, and the ANI order entry system. A random sample of cable subscribers, who had access to the ANI order entry system in Traverse City, were selected. Telephone interviews were conducted between August 21 and September 9, 1986. The sample contained 638 subscribers:

- 247 who had not tried IPPV
- 145 one time users
- 246 multiple users

Of these:

- 65% non-users were aware of the service
- 42% of these had heard of the service via commercial insertion
- 93% of the users expressed satisfaction with ANI

The most likely IPPV user was profiled as younger, having a larger household and a premium channel subscriber. Relatively few negative comments about Centel Cinema were mentioned, the most common was about programming.

CONCLUSION

The ANI passing IPPV system trial in Traverse City, Michigan was an unqualified success. ANI order entry has been proven to be both customer friendly and technically reliable. This has been demonstrated through customer reaction and increasing buy rates. Cable customers enjoy the benefit of choosing and viewing individual events conveniently; the cable system enjoys new incremental revenue without large upfront capital expenditure, and the local telephone company initiates a new service. Perhaps as important, it was clearly demonstrated that the telephone and cable companies can work together efficiently for a common objective.

ACKNOWLEDGEMENT

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