ADDRESSABLE CONTROL FOR THE SMALL SYSTEM

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ABSTRACT

Cost effective addressable control is now available for the small system with as few as 1,000 subscribers. A system that is in the expansion phase of pay can also benefit from cost effective addressable control. The system can utilize the same headend components and home terminals after expansion.

Addressable control can provide improved program marketing techniques, reduced operating costs and enhanced program and equipment security.

The difference between this mini system and one where five to eight thousand or more subscribers are involved is in the control center. The control center is made up of relatively low cost, off-the-shelf components. However, a propriatory software program retains basic addressability and special event capability.

A financial analysis is included. The marginal investment for mini system addressable control, as compared to only hard security, pays back in about two and one-quarter years. Internal rate of return computes to fifty-five percent.

INTRODUCTION

Perhaps you are a small system operator with 1,000 to 3,000 subs who is considering adding one or more premium tiers. However, you need help in marketing, protecting and controlling this more costly product. Or maybe you are associated with an MSO in a small but growing system. You need a configuration that will hold operating costs down in the early growth phase. However, you want a system that will be applicable when you have grown to 10,000 to 20,000 subscribers. Whether you are a small system operator or part of a large MSO, addressable control can help you in all phases of your operation. Control center components and software that will make addressability cost effective in a 1,000 subscriber system are now available.

THE NEED FOR ADDRESSABLE CONTROL

In the past, addressable control was cost effective typically when a system had at least 5,000 subscribers.

Addressable control that is cost effective only in systems of that scale does not meet the needs of the majority of cable operators in this country.

The TV Factbook (1981-82 Edition No. 50) indicates that there are about 975 systems in the country with 5,000 or more subscribers. One can also derive from the data (see below) that there could be 1,715 systems (37% of total) with between 1,000 and 5,000 subscribers. Addressable control which is cost effective in the 1,000 to 5,000 range benefits the majority of system operators.

Subscribers Per System	Systems In Size Range
Over 5K	975 (21%)
1K to 5K	1,715 (37%)
Under 1K	1,889
	4,579

Addressable control can benefit any cable system. It provides the means to deliver and to control premium services including special events. It provides additional security for both program material and equipment. It assists the cable operator in dealing with collections, churn and temporary discounts.

BASIC FUNCTIONS OF ADDRESSABLE CONTROL

We shall refer to this addressable control for the small system as a mini system. This small system alternative will handle basic addressability functions in a cable operation of up to 8,000. Basic addressability functions are the following:

1. Authorization of individual home terminals to operate.

2. Pre-authorization to receive specific programs (including special events).

3. Delivery of the pre-authorized tier or program when transmitted.

4. Changing of authorization on command from the control center.

5. Suspension of all service on command from the control center.

In addition to responding to commands from the control center, the home terminal in an addressable system should be able to disable itself if:

1. The flow of data from the headend is disrupted.

2. It is disconnected from its source of power.

These last two characteristics guard against attempts to steal the home terminal itself. All of these essential functions are continued in the mini system.

OPERATIONAL OVERVIEW

The general operation of an addressable system is retained in the mini system. A key element is the microprocessor which is contained in the home terminal. This microprocessor enables the home terminal to respond to orders from the headend. The home terminal has a unique identity. When addressed, it will react as an individual unit.

The two kinds of data required are address data and program tag data. The address data tells the home terminal to operate and preauthorizes it to descramble programs with a certain tag identity.

The program tag data is sent with the program itself and identifies the kind of program. When the home terminal receives a program with a tag identification that it has been preauthorized to receive, it activates the descrambler and a clear image is received.

The individual home terminal must receive both kinds of data. The address and tag preauthorization must be included in information sent from the CPU. The program tag must be included with the program itself.

If the subscriber is delinquent or if a home terminal is reported stolen, authorization is withheld in the global address and the box does not function. Addressable home terminals are stored in inventory or carried on the installer's truck in a deauthorized (turned off) state. If a terminal is stolen, it is deauthorized and becomes worthless. The home terminal must be authorized in a system before it will function.

The home terminal used with the small system is common to that used with the total addressable system.

The headend for the mini system is also common to the larger system. It consists of a scrambler (or encoder) for each scrambled channel. Some scrambling systems require a video interface unit to supplement each scrambler. A tag generator is required to identify each program as it is transmitted. Both the headend components and the home terminal can continue to be used as the subscriber base grows and ultimately exceeds the capability of the small system control center. At that point, only the control center needs to be revised.
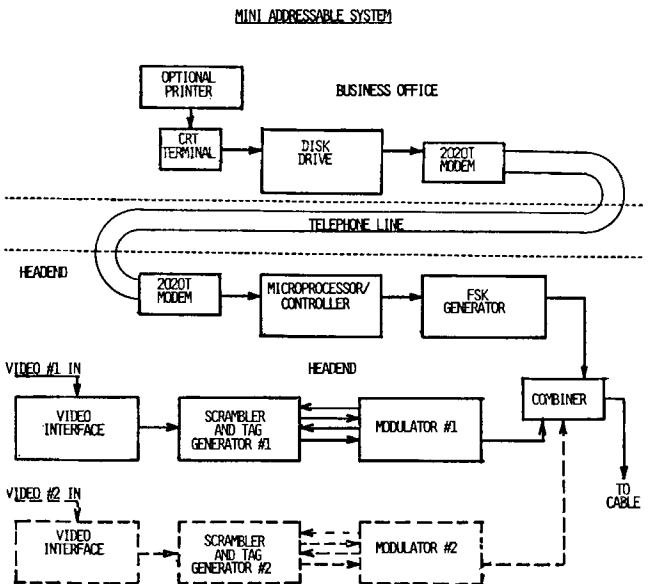
THE MINI SYSTEM CONTROL CENTER

The control center is where the mini system differs from the larger addressable system. The control center utilizes off-the-shelf low cost components to generate and store the customer file.
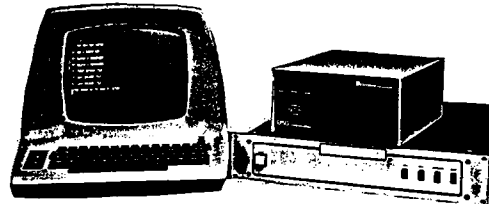
However, the software which drives these components is unique. Control center components consist of:

1. A CRT terminal

2. A 5¼" floppy disk and drive

3. A CPU microprocessor/controller

4. A FSK generator

5. A printer (optional)

MINI ADDRESSABLE SYSTEM

A CPU and the tag generator can be located at the cable system headend with the CRT terminal, printer, and disk drive located at the cable system control center. These are linked by phone line transmission media.

The system can control 16 tag levels. Tags can be applied to individual channels, groups of channels or program types regardless of channels.

The global file is continuously outputted to authorized service. The cable operator saves this file on a floppy disk and can then re-enter the file into the RAM of the CPU should it ever be lost due to power failure.

The software has six functions. The system prompts the operator throughout the operation.

The system features are:

1. <u>Add a subscriber</u>: The system requests a 4-digit subscriber number. Upon receipt of the number, it conducts a search to assure that it is unique.

2. <u>Change a subscriber</u>: This function provides the means for changing a subscriber decoder address on/off code and tag level authorization.

3. <u>Delete a subscriber</u>: This enables an operator to remove a subscriber from the file and opens the subscriber number and decoder address for reassignment.

4. <u>Printer decoder file</u>: The system can print day-to-day transactions or the entire decoder box file. The print out is useful for auditing and billing from the file.

5. <u>Save decoder file</u>: The global decoder file can be saved on non-volatile memory. This includes all subscriber decoder addresses and authorization levels.

6. <u>Load decoder file</u>: This function provides the means of loading the decoder file from non-volatile media back into the CPU.

If the cable operator wants to provide a special event beyond the scheduled premium services, it can be done. One or more of the 16 tag levels is dedicated to pay-per-view. A channel, the content of which can be preempted by the special event, is selected. At any time prior to the event, authorization data is downloaded to subscribers who have ordered the event. Programming which may be on the channel is not disturbed by the downloading. Then, at the moment the event is to take place, the scrambler is turned on and the channel is tagged with the tag bits previously selected for that special event.

Descrambling immediately takes place on all decoders into which preauthorization was previously downloaded. There is no waiting or transition time between regular programming and the special event.

The small system can handle 8,000 subscribers efficiently. This is the capacity of the 5¼"

floppy disk. However, use of the second disk results in some operating delays and inconvenience. Also, one soon encounters the limit of 9,999 which is determined by the 4-digit subscriber number.

The full addressable system becomes cost effective somewhere between 3,000 and 5,000 subscribers which is considerably below the 8,000 practical limit of the mini system.

TRADE OFFS FOR THE MINI SYSTEM

There are trade offs for the mini system. The software menu for the large system details many more business and control functions. Many of these computer software functions provide the added efficiency to operate a larger system. These include such things as:

1. A special installation test sequence

2. Home terminal tracking and audit

3. A history of decoder repair and status

4. Security file

5. Assignment of decoder to installer

FINANCIAL ANALYSIS - GENERAL ASSUMPTIONS

The initial investment in an addressable system is greater than that for a non-addressable system. However, benefits and increased profit can result.

Our analysis assumes that the cable operator has already decided to protect his programs with hard security. However, he is considering whether to install headend addressable control as well.

We will consider the marginal cash outlay and inflow which can be attributed to addressable control. We can then calculate an internal rate of return to determine whether or not the added cost for addressability is a sound investment. Our approach will be to consider the specific cost, revenue increase, or operating cost reduction which will result in a cash outlay or inflow. These will be summarized and the payback period and the internal rate of return will be calculated.

Cash Outlay

<u>Cash outlay</u> is assumed to take place in the first year, the year of construction. It is also assumed that the addressable home terminals are installed in all subscriber homes. By doing so, the system operator can upgrade a subscriber from basic to pay, change premium tiers, deliver special events, demonstrate new tiers, and suspend service by exercising only headend control. Since there is no additional cost to install an addressable terminal, installation cost is not a factor.

Relevant assumptions about the system are summarized in the following table:

System Assumptions
1,000 subscribers (60% pay)
35 channels (300 MHz)
3 scrambled channels

Three premium channels are to be offered by our example system, therefore, three sets of headend components will be required.

CASH OUTLAY ($1,000)

	Addressable	Non-Addressable	Change In Cash Flow
Control Center (CPU, Term., etc.)	13	Not required	
Headend (scrambler, etc.) - 3 sets	12	6	
Home Terminals, 1,000 units	126	77	
	151	83	
Investment Tax Credit (@ 10%)	(15)	(8)	
Cash Outlay	136	75	61

Cash Inflow

Cash inflow results from a number of items directly attributable to addressable control. Each of these sources of added cash flow will be explained before including it in our table.

There are two direct sources of added revenue, special events and lift.

We assume 6 special events per year are offered and that 50% of the base subscribes. They are included at $10.00 per event with 50% retained by the cable operator as net revenue. Some readers may feel that 6 events per year is optimistic. However, one must consider that 3 special events were offered in 1981 with only a few hundred thousand addressable home terminals in service. By the end of this year more than 2,000,000 addressable home terminals will be in place. Protection of the material while in satellite transmission will be more widely available. The increased market size and the increased program protection will attract more special event promoters.

Lift due to more attractive programming is assumed to add 10% to revenue. The basic and premium revenue (which would be the same for either addressable or non-addressable) is:

Program Subscription And Rate Charged

Service	% of Subs	Subs	Rate/Mo.	Annual
Basic	100	1,000	$7.75	$ 93,000
Pay #1	60	600	8.80	63,400
Pay #2	30	300	4.50	16,200
Pay #3	15	150	8.80	15,800
				$118,400

Lift at 10% equals $18,800

Several items of reduced operating cost and which are attributable to addressable control are included in the analysis as cash inflow. These items are:

-Reduced service costs to handle churn (disconnects/reconnects)

-Reduced service costs to handle tier changes

-Reduction of accounts receivable

-Reduction of box theft

Churn and tiering changes can be handled by entering data on the CRT at the control center. It is not necessary to roll a service truck to accommodate them. Therefore, we used the following assumptions:

-Churn affected 20% of pay subscribers per year

-Tier changes affected 20% of the total subscriber base each year

-Service calls were included at $20 for churn and tier changes

Accounts receivable also appear as an operating cost reduction (cash inflow). The cable operator can demonstrate the ability to suspend service from the control center, thus motivating the delinquent to settle. We included this improved cash flow at $1 per month per subscriber.

Theft of home terminals was included at 5% for addressable units compared to 15% for non-addressable. Based on a survey among cable systems equipped with addressable control in late 1981, the theft rate on addressable terminals was actually running as low as 1%.

Depreciation (seven year, straight line) is deducted from cash inflow. Cash inflow was arbitrarily reduced by 50% in the first year recognizing that a 100% cash flow will not be achieved instantly. The cash inflow for operation is summarized in the table below:

Table of Cash Inflow ($1,000)

	Year 1	Years 2-7
Increased Revenue		
Special Events	7.5	15.0
Lift	9.4	18.8
Decreased Operating Costs		
Churn	1.2	2.4
Tiering Changes	2.0	4.0
Accounts Receivable	6.0	12.0
Theft of Home Terminals	2.7	5.3
Depreciation Expense	(4.9)	(9.7)
Added Revenue + Operating Cost		
Reduction-Depreciation	23.9	47.8
Income Tax (@ 46%)	11.0	22.0
Net Income	12.9	25.8
Depreciation Add Back	4.9	9.7
Annual Cash Flow	17.8	35.5

Payback and Internal Rate of Return

Cash flow from the previous calculations is summarized:

Cash Flow ($1,000)

Year	Cash Outlay	Cash Inflow
0	61.0	-
1	-	17
2	-	35.5
3	-	35.5
4	-	35.5
5	-	35.5
6	-	35.5
7	-	35.5

Payback is the time required to recoup, in the form of cash flow from operations, the original investment. Payback, calculated from the above cash flow is 2.22 years.

Internal Rate of Return allows one to appraise an investment as compared to other opportunities. One can evaluate the return from a project considering the cost to finance it. Internal rate of return considers the time value of money. Internal rate of return is the discount rate that will reduce the present value of the cash flow over the life of the project to zero. The internal rate of return for our example system is 55.6%.

UPGRADE TO A LARGER SYSTEM

The mini system control center will handle up to 8,000 subscribers. However, long before this number is reached, the system operator may benefit by upgrading the control center. Only the control center need be affected by the upgrade. By doing so, the capacity will be increased directly. Further benefit will result from the more comprehensive software available.

CONCLUSION

The small system operator who is considering adding or increasing premium program offerings, should include addressable control in the plan. Addressable control will enable the operator to market and distribute premium product with greater efficiency. Added program and equipment security will be gained. The marginal investment for addressable control (as compared to hard security) in a 1,000 subscriber system meets the criteria for a good investment. The ability to replace the control center without affecting the headend components or home terminals allows economic expansion at a future date.