Reclaim Lost Revenue Through DAC Reporting Features

Introduction

Digital set top box Interactivity is an integral part of a Cable TV System offering and can drastically increases the amount of potential revenue through services such as VOD (video on demand) and PPV (pay per view).

The Motorola DAC (Digital Access Controller) can be an effective tool to monitor and pinpoint trouble areas for maintenance and service personal for the purpose of improving Cable System performance while simultaneously gaining potential lost revenue. The DAC has many internal reporting functions and custom scripts that can be utilized to extract data about the performance of the two-way plant. The use of these reports and scripts does not incur additional capital expense in which to find system problems, and becomes a valuable tool by minimizing work efforts in responding to these troubles. The reported data can be manipulated in any number of ways to result in useable information in which to direct service personal. As repairs are made, the reports can be repeated to measure and monitor success. The added effect of the repair process may be the additional collection and /or increase in revenue caused by improved network communications from the DAC, and other digital headend equipment, to the set top terminals.

Background

The DAC hardware consists of two main servers:

- The DAC
- RADD (Remote Addressable Danis/DLS).

The main function of the RADD is to control all set top functions and off loads these tasks from the DAC. The RADD controls critical polling and data collection functions as instructed by the DAC. For the purpose of this discussion, the DAC and the RADD are considered as one unit.

Each settop box (STB), in a working environment, is in connectivity with the DAC for a variety of reasons, but importantly, to upload PPV (Pay Per View) and Event Purchases and to control credit limits within the STB. This credit limit allows subscribers to impulse pay for programs, yet keeps control on spending limits and collections. If the STB does not respond to a DAC poll for more than five consecutive polls or five days then it falls into a state called “non-responder (NR). Should a NR fail to communicate with the DAC for more than 30 days (typically), then it further enters a state called chronic non-responder (CNR). CNR STB’s are handled differently in the DAC and are not part of the regular polling schedule. Delays in recovering CNR’s can lead to lost purchase collections due to timing issues.

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Generally, the time stamp on a subscriber initiated purchase and the billing system current time must be within 60 days of each other in order for the billing system to collect and authenticate purchases. This interval is a default and recommended setting within the DAC, but the DAC has the capability of extending it to 90 days. In practice, the interval is normally left at 60 days as it matches with most billing systems default time interval and billing expectations. So thus is the assumption that once an STB has entered a CNR state, it has likely surpassed this interval of valid purchase collection. Additionally, the STB had been given a spending credit limit via the billing system to allow impulse purchases. This credit was uploaded to the STB via downstream communications using the OM1000/2000 (Out of band Modulator) and is available to that STB unless some other intervention is initiated. NR and CNR boxes may appear to be fully functional from a subscriber point of view as they use up their credit limits. However, these purchases will most likely be non-collectible.

VOD (video on demand) purchases are not validated this way, but a STB must still have full two-way interaction to initiate VOD sessions. If the STB is not communicating on the 2-way plant, then it can not navigate the VOD guide screens or initiate a VOD purchase. These statements are true for both NR's and CNR's. Therefore, VOD is not available to a non-responding set top box and is now another source of lost or unrealized revenue.

A useful exercise is to use the DAC to report on the number of NR's and CNR's and estimate the potential lost revenue. This feat is easily accomplished by using DAC reports on PPV and Event purchases with average take rates and average cost per event and similar billing system statistics for VOD purchases. We simply multiply the total number of non-responding set tops by the average costs and average take rates to project the potential lost revenue. The sum of the results is the extrapolated potential lost revenue.

Over time, information has proliferated on "how-to-beat-the-system". Cognisant subscribers have learned that a small low cost band reject filter in the upstream will allow continued purchases in the STB, until the credit limit runs out, and then become non-collectible. This presents another problem. This is not defeating the encryption system, but just a clever way to watch some PPV events for free. A possible solution for this will be addressed later as a potential remedy in which to rediscover CNR's in the "Repair Process".

So far this discussion has uncovered that NR's and CNR's are a major source of lost revenue and that the DAC can report independently on either type. This makes the report data an excellent source of criteria to measure the success of a program aimed at resolving system problems that impede the collection of this potential lost revenue.

Data Collection

Now that the measurement criterion has been established, it is necessary to determine the reports that can be utilized detailing the NR and CNR performance.

Collection of the appropriate data can be accomplished by using or running three independent DAC reporting features:

- Gathering information on non-responders
- PPV and Event purchased uploads to the DAC
- A survey of digital system equipment in communication with the DAC.

One such report, when appropriately configured, results in reporting on the number of STBs configured separately as "on plant and off plant" and the corresponding counts of NR's in an "on-plant and off-plant" mode. Additionally, it identifies these counts by up stream plant labels. The importance of this report is not only does it develope the NR rate (after data manipulation) but also tells you where in the system the problems are. Figure 1 displays an example of collected data via this report.

23/02/2013 12:17				
NON_RESPONDING_COUNT	NON_RESPONDING_ONPLANT_COUNT	OFF_PLANT_COUNT	ON_PLANT_COUNT	UPSTREAM_PLANT_NAME
1439	764	715	2715	A_311
395	90	312	396	A_312
1655	769	973	1175	A_313
1	1	13	2643	A_314
2152	1034	1198	4955	B_411
647	316	361	1365	B_412
263	123	152	813	B_413

Figure 1: NR Report Results

The DAC can report on PPV and Event purchases uploaded to the billing system. This is a check point to make sure polling routines have been properly configured and that the DAC is indeed uploading the purchases made by the STB and forwarding these to the billing system on a regular schedule. For the purpose of this discussion, it is only used in this manner. The report is to be generated regularly and be analyzed to confirm this point. Once it has been proven that the DAC is functioning in the manner as is expected, then this reporting function can be terminated as it is not required for the analysis of the NR and CNR data. Figure 2 below outlines an example of this report.

The PPV upload report will indicate purchases over a time span of the last 30 days by set tops and display if the purchases have been forwarded to the billing system for collection. It is necessary to run this report to identify problems relating to the collection and forwarding of purchase information. Should STB's

BOX_CLEARED	BSI_UPLOADED	POLL_DATE	SERIAL_NUMBER	TERMINAL_ID
TRUE	FALSE	02/01/2013 10:56	GI4509NB2746	448754
TRUE	FALSE	02/01/2013 12:33	M40708NGY399	408335
TRUE	FALSE	02/01/2013 13:01	M40546NE3757	9963
TRUE	FALSE	02/01/2013 16:58	M40704NG2500	54612
TRUE	FALSE	02/01/2013 21:20	M40633NA1657	423107
TRUE	FALSE	02/02/2013 4:00	GI4511NC0877	448529
TRUE	TRUE	02/02/2013 4:00	M91111FX0502	298656
TRUE	TRUE	02/02/2013 4:00	M40721GBB777	113344
TRUE	TRUE	02/02/2013 4:00	M40612NG9611	445679
TRUE	TRUE	02/02/2013 4:00	GI4140NE8923	293138
TRUE	TRUE	02/02/2013 4:00	M40643NEH744	43132
TRUE	TRUE	02/02/2013 4:00	M91027ZB5995	424111

Figure 2: PPV Upload Report

continue to be polled and cleared but not forwarded to the billing system, then it is a simple matter of counting and producing a ratio of the number of non-forwarded purchases to forwarded purchases multiplied by the average PPV or Event cost to determine an average lost revenue in any particular time interval. Furthermore, it is an area for investigation on why this activity is not being captured by the billing system.

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 DAC 6000 Revision:  4.1 R2

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DISTINCT TIMEZONE'S USED:

 timezone_name
 --------------------------------------------------------------------------------
 EST-05EDT, Mar 2nd Sun 2:00, Nov 1st Sunday 02:00

================================================================================

NUMBER OF HEADENDS IN DATABASE:                                                1

NUMBER OF DOWNSTREAM PLANTS IN DATABASE:                                       5
  DSPs not linked to a RADD (Potential Problem if Non-zero):                   0

NUMBER OF UPSTREAM PLANTS IN DATABASE:                                       147
  Upstream Plants with no devices associated (Potential Problem if Non-zero):  0

NUMBER OF VIRTUAL CHANNEL MAPS IN DATABASE:                                   30

================================================================================


TOTAL NUMBER OF HEADEND DEVICES IN THE DATABASE (ANY STATUS):           57
TOTAL NUMBER OF RADD'S:                                                  1

TOTAL NUMBER OF SEM'S:                                                  21
TOTAL NUMBER OF OM'S:                                                    5

TOTAL NUMBER OF RPD'S:                                                  26
TOTAL NUMBER OF OTHER DEVICE TYPES:                                      3


COUNT OF DCT's BY TYPE/SUBTYPE**:

 Count       Type
 ----------- --------------------------------

       76712 DCT2000 TWOWAY
       26140 DCT2500 TWOWAY
          57 DCT3412 TWOWAY
         163 DCT3416 TWOWAY
         581 DCT6412 TWOWAY
         772 DCT700 ONEWAY
      160644 DCT700 TWOWAY
          59 DCX700e Embedded MediaCipher T
        2723 PACE DC550D TWOWAY
         559 PACE TDC575D TWOWAY
        6114 PACE TDC775D TWOWAY
         797 PACE TDC788D TWOWAY
  ----------
      275483 :<== TOTAL NUMBER OF DCT's

----------------------------------------------------------------
COUNT OF RESPONDING DCT's BY RETURN TYPE:

   Responding RF STBs:           152625
                                ----------
   TOTAL RESPONDING DCT's:       152625

----------------------------------------------------------------
COUNT OF CNR DCT's BY RETURN TYPE:

   CNR RF STBs:                   33207
                                ----------
   TOTAL CNR DCT's:               33207

* NUMBER OF DAYS BEFORE BECOMING CNR:                30


NUMBER OF DCT'S PER DOWNSTREAM PLANT:

 Count       Downstream Plant Index Downstream Plant Name
 ----------- ---------------------- --------------------------
      209801                      1 Hub A_DSP
       47155                      2 Hub B_DSP
        8960                      3 Hub C_DSP
        9493                      4 Hub D_DSP
          74                      5 Hub E_DSP
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Figure 3: Excerpts from DAC Survey Response

By querying the DAC for information on equipment connected to the DAC, the result is a report encompassing entire digital video system of which the individual parts are too numerous for this discussion. (As an interesting side note, it can be used to verify the value of the Motorola SLA contract to ensure the inventory is accurate).

However, some of the information is very useful for gathering system statistics such as:

- An accurate count of the number of STB's in the system
- Identifies on plant vs. off plant counts
- The count of CNR's, set top distribution by system or hub (if so defined)
- The number of two way/one way STB's
- Set top model and manufacturer
- Number of interactive enabled STB's
- Total number of responding STB's

The output of this file is in text format and requires further manipulation to select the appropriate data. Figure 3 is an example of the DAC survey, though it has been reduced greatly to display the pertinent information.

Once these three reports have been generated, then the results need to be organized and recorded in order to produce useable information in which to direct repair crews and measure their success. Microsoft Excel is an excellent tool for this purpose as the tables can be populated, data sorted and graphs produced to give quick visual snap shots of performance and development. The program takes time to formulate, but once constructed, the results can be tabulated weekly in a couple of hours or less.

Data Analysis

Analysis of the data is visually simple once an appropriate Excel spreadsheet is populated with the required information. In this way, we can see the effect of growth or digital penetration at the same time as seeing changes in the NR rate. Using the DAC survey, totals can be gathered on:

- STB population by hub
- Total STB's on plant
- Total responding STB's
- Total STB's in a CNR state

From these figures, the remainder of desired information can be calculated:

- Total off plant STB's
- Total NR's
- NR rate

- Percentage of NR's in CNR state
- Estimated potential lost PPV revenue per year (at current NR rate)

Figure 4 is a snap shot of several weeks of collected and formatted data.

	Weekly STB Stats	Dec 26	Jan 2	Jan 9	Jan 16	Jan 23	Jan 30	Feb 6	Feb 13	Feb 20
STB Population by Downstream Plant	*Hub A*	*198056*	*199044*	*200299*	*205550*	*205447*	*205213*	*205502*	*207506*	*209801*
	Hub B	*44238*	*44343*	*45029*	*45029*	*45181*	*45268*	*45432*	*45483*	*47155*
	Hub C	*8190*	*8277*	*8467*	*8467*	*8435*	*8539*	*8568*	*8601*	*8960*
	Hub D	*8380*	*8600*	*8852*	*8852*	*8916*	*8974*	*9041*	*9043*	*9493*
	Hub E	*81*	*80*	*68*	*68*	*68*	*68*	*71*	*71*	*74*
	Total STB's	**258945**	**260344**	**262715**	**267966**	**268047**	**268062**	**268614**	**270704**	**275483**
STB Activation Stats	*Total STB's "On Plant"*	*211127*	*212526*	*215324*	*216099*	*216723*	*218122*	*219521*	*220920*	*222319*
	Total Off Plant STB's	47818	47818	47391	51867	51324	49940	49093	49784	53164
	Off Plant STB Rate (%)	**18.5%**	**18.4%**	**18.0%**	**19.4%**	**19.1%**	**18.6%**	**18.3%**	**18.4%**	**19.3%**
Non-Responding STB's	*Total Responding STB's*	*157028*	*159392*	*160712*	*172712*	*174009*	*175375*	*176373*	*179426*	*182625*
	Total No. of Non-Responding STB's	54099	53134	54612	43387	42714	42747	43148	41494	39694
	Non responding rate (%)	**25.6%**	**25.0%**	**25.4%**	**20.1%**	**19.7%**	**19.6%**	**19.7%**	**18.8%**	**17.9%**
	Total No. of Chronic Non-Responding STB's	*48636*	*48082*	*39826*	*39826*	*37582*	*37246*	*38756*	*31576*	*33207*
	Percentage of NR's in CNR State	*89.9%*	*90.5%*	*72.9%*	*91.8%*	*88.0%*	*87.1%*	*89.8%*	*76.1%*	*83.7%*
Revenue	Estimated Lost Revenue/year @NR rate	**$118,477**	**$116,363**	**$119,600**	**$95,018**	**$93,544**	**$93,616**	**$94,494**	**$90,872**	**$86,930**

Figure 4: Weekly STB Stats

The importance of tracking these figures is to analyze non-responder rates as growth is generated and to estimate the revenue hit on the operation attributed to non-responders (and NR rate changes as a result of growth). If not reacted to, the NR rate will grow and potential lost revenue is proportional.

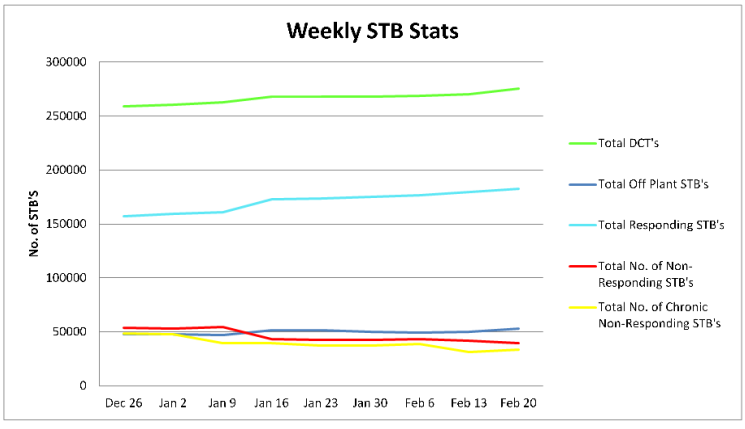

Figure 5: Graphical Representation of Weekly STB Stats

Using Excel, it is possible to graphically represent the data for a quick snap shot of weekly progress. See Figure 5. Each type of statistic can be represented as a unique attribute thus allowing quick interpretation of the collected data.

The DAC NR report results in more localized data. This data actually defines the upstream plant characteristics in terms of on/off plant responders/non-responders. Using Excel to sort and

display the data yields a powerful tool that can be shared with the repair department to help guide crews on troubled areas. (Discussed in section "Repair Process). It also proves to be an effective management tool for tracking the success of the repair crew's work.

Repair Process

The NR report can export its results in a CSV file format that opens easily with Excel. This makes a cut and paste method simple with the ability to sort appropriate data quickly. Figure 6 shows three weeks worth of sorted data identifying both on and off plant STB's allowing for the calculation of a NR rate by USP (upstream plant).

	Dec 26			Jan 2			Jan 9		
USP Name	On Plant STB's	Non-Resp (OP)STB's	NR as %	On Plant STB's	Non-Resp (OP)STB's	NR as %	On Plant STB's	Non-Resp (OP)STB's	NR as %
D_311	2749	938	34%	2758	913	33%	2784	930	33%
D_312	489	263	54%	475	242	51%	490	254	52%
C_412	1439	386	27%	1408	357	25%	1506	395	26%
C_413	807	177	22%	837	157	19%	802	174	22%
B_216	3999	690	17%	3982	698	18%	3973	689	17%
A_1101	1760	77	4%	1795	84	5%	1803	91	5%
A_1105	2068	182	9%	2067	181	9%	2062	190	9%
A_112	1903	904	48%	1898	897	47%	1879	884	47%
A_1121	1799	132	7%	1800	140	8%	1796	162	9%
A_1141	1971	156	8%	1962	170	9%	1957	178	9%
A_1144	1519	130	9%	1522	135	9%	1523	143	9%
A_1154	1043	47	5%	1103	54	5%	1126	58	5%
A_1155	2695	136	5%	2718	141	5%	2737	174	6%
A_1156	2893	143	5%	2978	155	5%	3020	186	6%
A_116	2097	862	41%	2083	856	41%	2073	847	41%
A_1161	3	0	0%	3	0	0%	3	0	0%
A_1162	432	22	5%	448	18	4%	458	19	4%
A_1186	510	111	22%	509	105	21%	515	104	20%

Figure 6: NR Report Data Sorted by USP

Graphical representation of this data is very powerful and is a quick indicator of where system problems are localized as seen in Figure 7. In this example, red defines the non responders and green defines the responders. Additionally, each point on the graph indicates the node or upstream path in the physical plant of the offending STB's.

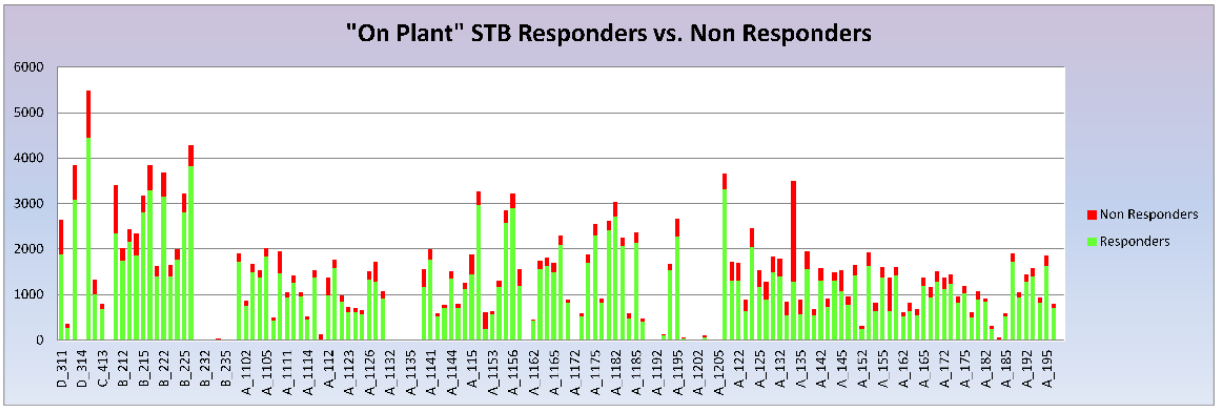

Figure 7: Weekly NR Chart by USP

Now that NR information has been localized to a node or USP, repair crews can expend less effort in finding system problems. There are many reasons why STB's stop responding including (but not limited to) the following possible causes:

- Home
  - External device hook up (such as VCR)
  - One way in house splitters
  - Illegal band stop filters
  - One way in house amplifiers
  - Excessive attenuation
  - Modem failure
  - Disconnected or powered off STB's
- Plant
  - Excessive return path attenuation
  - One way active or passive devices
  - Improper level setting of alignment of return actives
  - Return Laser distortions
  - Noise
  - Cable Problems
- Headend
  - Improper RPD (return path demodulator) installation
  - Improper return levels
  - Return combining problems
  - Return multipath
  - Network continuity
  - Data/frequency oversubscription
  - DAC Polling subroutine problems
  - Improper STB type add to the billing system
  - Off plant STB's remaining in On Plant state

There are multiple ways in which to deal with chronic non responder problems. The easiest is to ensure proper CNR polling schedules are set up to address non responding set tops. With this, the DAC performs a full power level poll and devotes more time to each set top than a regular purchase poll. This routine can take many hours to run and it is important to ensure that it does not overlap in time with other DAC efforts.

CNR's that are caused by in home problems are difficult to resolve and often, the subscriber is not co-operative in allowing access to the facility. In these cases, a DAC report can be used that identifies CNR's by serial number or terminal ID with a time stamp of the last time and date that it was in contact with the DAC. The report is likely to yield results of CNR's that have been out of contact for years. The CNR's

can be grouped together by time stamp to develop small groups of STB's in which to attempt a controlled recovery by means of service calls or customer call-in. The target group of CNR's can be removed from or changed in the DAC in a way to initiate a trouble call from the subscriber to the Call Centre. Caution should be used in deploying this method as too many trouble calls may overwhelm the Call Centre and ultimately the service department responding to the calls. Additionally, it is necessary for a CSR (customer service representative) to easily identify on the phone that the trouble call is in fact a CNR problem. One effective way in which to deal with this is to assign the target group of CNR's to a special channel map consisting of only one channel. The selection of the Cable Company's Community Channel is an ideal candidate as it is only available on Cable and thus makes the trouble call easily identifiable by the CSR. Once the subscriber reports that the STB will only receive the one channel, the CSR can ask a number of scripted questions in order to attempt to define the problem after which a "truck can be rolled" if necessary to repair or further investigate. Once the repair is made, the STB can be reassigned its original channel map. Obviously the result of this repair is to gain another possible revenue source.

Monitoring

Now that methods have been established, it is necessary to continually repeat the process at regular intervals to monitor the success of the program. If success is not being realized, then tactics must be changed accordingly. For the most part, the spreadsheets that were developed to record and sort data are "cut-and-paste" once created and repetitive data collection is relatively simple and quick. The spreadsheets, charts and graphs make an excellent means of sharing information among departments and becomes a useful tool to monitor on-going success. Results can be tabulated to extrapolate or project potential lost revue numbers due to non-responders to provide an assessment on the need for expedient repairs.

Conclusions

The results of such a program are many:

1. The DAC identifies multiple ways in which potential revenue may be lost, ie: billing system problems, NR's, polling problems, etc.
2. The data is easily obtainable with little effort and time.
3. The data can be manipulated to display pertinent information.
4. The data is easily transformed into charts and graphs for quick visual analysis.
5. The data contains geographical components allowing service crews to minimize their effort in finding problems.
6. The process is repeatable and measureable.
7. The program does not incur additional capital expense to deploy.
8. The program will help identify previously un-noticed system faults.
9. The DAC has additional tools to recoup some lost revenue.
10. Subscribers can be made to imitate trouble calls in order to localize an "in home" problem.

The overall result is an increase in potential revenue and in some cases recouping revenue that was about to become uncollectable. In a typical digital cable TV system, the value of the potential unrealized revenue can be higher than the costs of the work efforts required to recoup the majority of it.