

# The SAGATUG

# INTERFACE

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The San Gabriel Valley Technology User's Group. The Club for TRSDOS and MS-DOS

## Satellite Provider DIRECTV Plays Rough!

Roy T. Beck

As I am sure all of you know, DIRECTV is a major player in the world of Satellite Television, in which subscribers equipped with a parabolic dish antenna (typically 18" in diameter) can receive some 200 channels of TV programming broadcast from a geosynchronous orbiting satellite. DISH network is the second largest player in this business. Of course, it is a business, nothing is free in this world, especially when you consider the cost

## Club Dues Due

Well, it's that time again this year. The club dues are due again. And such a deal! You get all of the following:

- ◇ A monthly get-together with your cronies who interested in the technology just as you are.
- ◇ Demonstrations by club members and others on new products, nostalgic equipment and ideas on how to use familiar software.
- ◇ Almost all the donuts and coffee you can eat for a small contribution to the "kitty" (usually a \$1 or so).
- ◇ All this and more not for \$100 a year or a even \$50 a year but **only \$25 for a full year!**
- ◇ **So bring your dues to the meeting this Friday or contact Bob Day at day-bob@earthlink.net and work it out so you can get your check to him.**

of designing, fabricating and launching a complex satellite into orbit, plus the costs of operating the ground station, and acquiring the programming material to attract viewers.

However, as technically oriented people, we all may wonder how they exclude "free-loaders" who want the service without paying the monthly and pay-per-view fees. As a legitimate user, I have some slight understanding of their methods. First of all, a user must have an antenna and down-converter to detect the signal (which is in the GHz region) and convert the signal to a frequency range which can be transmitted over a length of coax cable to the "satellite receiver" which further converts the desired channel to channel 3 (or 4) to which your TV receiver is tuned.

The 18" dishes and the satellite receivers are readily available both new and used. Look for them at Radio Shack, Fry's, and the like in new condition, and on the internet or at garage sales to find them used. But, a further essential element is the access card, a small plastic card of the approximate size and shape of a credit card, which must be inserted into a slot on the satellite receiver. Of course you get one of these in the package from Radio Shack or other source, and you will likely find one in the used receiver which you might acquire via the Internet or in a yard sale or other second hand transaction. But either way, the system won't work until DIRECTV or DISH turns on the card, which they will do after you sign up for the service and contract to pay the monthly fee.

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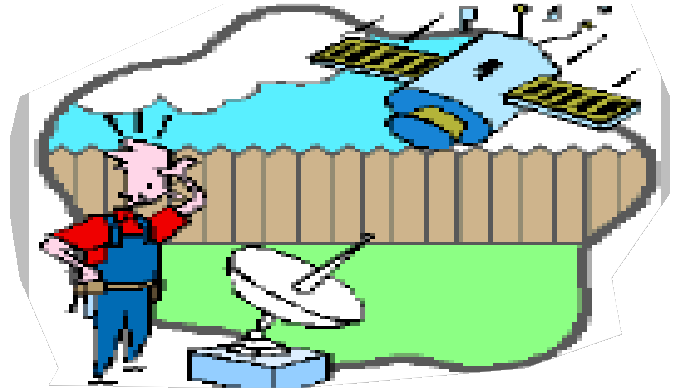
## **DIRECTV**

DIRECTV charges anywhere from \$20 to \$80, depending upon the level of service you desire. Mine goes for \$40 per month, which gives me (in Redwood Valley, Calif) the network stations of San Francisco, and a flock of other channels, such as History, TLC, A&E, HGTV and the like. I can also order on a pay-per-view basis sports games and other one-time events.

The access card is a programmable “smart” card, containing embedded circuitry consisting of an EEPROM, and some “write once-read many” memory. The satellite receivers are manufactured by a number of different vendors, including RCA, Hughes, Phillips, Sony, etc. They all have a slot for the access card. In order to turn on the service, you have to contact DIRECTV by telephone, give them your address (and credit card number if you want to have it billed monthly on the card) and the serial number of the access card. DIRECTV then broadcasts a message addressed to your card. The receiver detects this message by comparing the serial number in all the incoming message headers with the serial number embedded in your access card. When your message arrives and is recognized, the satellite receiver will revise the EEPROM in your card to show it is authorized and which channels you are authorized to receive.

### **Enter the bootleggers!**

Apparently a cottage industry has developed, aimed at spoofing the satellite receivers into thinking the access card in the receiver is a validly authorized card. This was inadvertently abetted by the issuance in 1997 of a new series of access cards identified as the “H card”. Apparently this card was either smarter or more easily accessed and altered by the bootleggers. When DIRECTV became aware of the large number of bootleggers taking advantage of the H card’s features, they did two things. First, in 1999 they replaced the H card with a new card design in newer receivers, which apparently are more difficult to spoof. They also began ECM (electronic counter measures) in an effort to defeat the bootleggers who were playing with the H card, which was issued in large numbers.



A recent article in the Los Angeles Times described the ECM campaign which DIRECTV conducted in the last few years. Apparently the H card has quite a bit of EEPROM memory which can hold executable code and is not limited to simple yes/no type data. Further, it is obvious that the associated receiver reads the card contents at least every time it is powered up, and probably more often (perhaps daily?) and any code patches are added to the code in the receiver’s PROM. In its effort to thwart bootlegging, DIRECTV has been downloading code patches to all the access cards. This sort of thing can be done easily by DIRECTV, and reminds me of the ongoing coding and code-breaking engaged in by all governments for the security of their military and other communications.

Most recently, DIRECTV decided to end the bootlegging once and for all (they hoped). They began downloading a series of code patches, each of which were apparently innocuous in themselves to the code-breakers. But the cumulative effect was to set up a large booby trap, the execution of which occurred on January 21st, a week before the Super Bowl XXXV. The technique was to execute code which would physically destroy portions of the access card circuitry. This of course would not be done to any legitimately authorized card, only those altered by the bootleggers. Evidently DIRECTV knew the tricks the bootleggers were using, and set up a search routine in their newly downloaded code which would recognize patches added by the bootleggers. Only access cards containing those specific patches would be damaged; legitimate card owners would be unaware of and unaffected by this cat-and-mouse game.

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## **DIRECTTV**

Sure enough, on January 21st, bootlegged receivers came up with a blank screen, and no channels of any sort were accessible. A nasty shock to the users of bootlegged receivers! Remember, many persons were in the “business” of modifying and peddling the receivers and cards and selling these to users who did not want to pay the monthly fees to DIRECTV. Thus there was a large “audience” of bootleggers who were suddenly “turned off” Sunday morning.

There are several internet sites devoted to this hacking effort, one of which (at <http://HackHU.com>) was cited in the Times article. I checked into this site this morning, and was astonished at its scope. Besides an awful lot of technical detail about hacking the H cards, it also had a reference to “Older news”, which I checked into. That was an archive file composed of “stream-of-consciousness” type material published by the SYSOP. This consisted of 29 pages of material, each item consisting of one or two paragraphs of hacking news, with a date, running from Aug 26 of 2000 to the present.

Apparently the hackers cannot restore the cards damaged by DIRECTV’s ECM efforts, but they are planning a work-around. This will probably consist of a adapter card, one end of which can be inserted into the receiver slot, and which has a female connector on the other end into which the disabled access card is plugged. Some logic on the adapter card then substitutes some code to replace the code which would have been found on the damaged area of the access card. I’m not sure I have all of this correct, but it is fascinating to learn the extent to which the bootleggers will go to avoid the monthly fees due to DIRECTV.

Note that there is also an EEPROM in the receiver itself. Apparently DIRECTV has been reluctant to modify these as part of their ECMs, but it is certainly a possibility.

A final kicker. When the hackers examined the last code patch down-loaded by DIRECTV, they found the embedded message GAME OVER. At least DIRECTV hopes so! We’ll have to wait and see.

It is obvious that DIRECTV decided to make a significant effort to eliminate the estimated 100,000 bootleg receivers. The article in the Times speculated that there could be legal repercussions to DIRECTV’s actions; one scenario was that a person who bought what they believed was a legitimate equipment setup and then scheduled a paying audience, as for example a Super Bowl party in a sports bar and then could not view the game, could sue DIRECTV for damages. My own feeling is that in such a situation, the judge would in effect tell the “victim” to go after the person he bought the setup from. DIRECTV retains ownership of the access cards, although they obviously make no effort to physically recover them when an account is discontinued. I cannot believe a hacker or his victim have any standing to recover damages from DIRECTV.

As the title says, DIRECTV plays rough.



**SAGATUG Meeting**

**Time and Place:**

**7 to 10 p.m., Friday, February 9, 2001  
Arcadia Park Senior Citizen's Center  
405 South Santa Anita Avenue, Arcadia.  
(In the park just south of Huntington Drive)  
Meetings held second Friday every month**

**Upcoming Events:**

**TRW Swap Meet**

Last Saturday, monthly, Manhattan Beach

**Pomona Fairplex, February 10 & 11**

(Sat. & Sun.) Bldg. 4 LA Fair grounds, Gate 14) -  
Admission \$7 plus parking

**Buena Park, March 10 & 11**

at the Sequoia Conference Center,  
7530 Orangethorpe, (Beach Blvd exit from 91  
Freeway) \$3 admission

**Reseda, February 24 & 25**

at the Sherman Square Entertainment Center,  
18430 Sherman Way. Admission \$3.

**Glendora Seniors Computer Club**

La Fetra Senior Citizens Center, 333 E. Foothill  
Blvd., Glendora, 2nd & 4th Wednesdays at 1 p.m.

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**Deadline For The Newsletter**

The deadline for the INTERFACE is the last Saturday of the month.

**Republication:**

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