



A MONTHLY  
NEWSLETTER

# WTS Connection

## Reliant on images from satellites orbiting Earth, cable TV signals highly impacted by solar flares

U.S. cable television systems deliver hundreds of TV channels to 60 million homes, ranging from major metropolitan areas to small rural communities. Current fiber-optic technology employed with cable TV also provides a growing number of people with high-speed Internet access. Some cable systems even let you make telephone calls and receive new programming technologies.

Today's systems are a far cry from the earliest versions that were, in effect, strategically placed antennas with very long cables connect-

ing them to subscribers' television sets. Because the signal from the antenna became weaker as it traveled through the length of cable, cable providers had to insert amplifiers at regular intervals to boost the strength of the signal and make it acceptable for viewing. According to Bill Wall, technical director for subscriber networks at Scientific-Atlanta, a leading maker of equipment for cable television systems, limitations in these amplifiers were a significant issue for cable system designers in the next three decades.

In 1972, a cable system in Wilkes-Barre, PA, began offering the first "pay-per-view" channel. The customers would pay to watch individual movies or sporting events. They called the new service Home Box Office, or HBO. It continued as a regional service until 1975, when HBO began transmitting a signal to a satellite in

geosynchronous orbit and then down to cable systems in Florida and Mississippi. Scientific-Atlanta's Bill Wall says that these early satellites could receive and retransmit up to 24 channels. The cable systems receiving the signals used dish antennas 10 meters in diameter, with a separate dish for each channel! With the beginning of satellite program delivery to cable systems, the basic architecture of the modern cable system was in place.

As the number of program options grew, the bandwidth of cable systems also increased. Early systems operated at 200 MHz, allowing 33 channels. As technology progressed, the bandwidth increased to 300, 400, 500 and now 550 MHz, with the number of channels increasing to 91. Two additional advances in technology — fiber optics and analog-to-digital conversion — improved features and broad-

cast quality while continuing to increase the number of channels available.

In 1976, a new sort of cable system debuted. This system used fiber-optic cable for the trunk cables that carry signals from the CATV head-end to neighborhoods. The head-end is where the cable system receives programming from various sources, assigns the programming to channels and retransmits it onto cables. By the late 1970s, fiber optics had progressed considerably and so were a cost-effective means of carrying CATV signals over long distances. The great advantage of fiber-optic cable is that it doesn't suffer the same signal losses as coaxial cable, which eliminated the need for so many amplifiers. In the early fiber-optic cable systems, the number of amplifiers between head-end and customer was reduced from 30 or **(See CABLE TV, Page 2)**

### INSIDE THIS ISSUE

More about cable TV  
and solar flares..... Page 2

Payment by  
draft can net customers  
a discount..... Page 2

## Cable TV signals impacted by solar flares...from Page 1

40 down to around six. In systems implemented since 1988, the number of amplifiers has been further reduced, to the point that only one or two amplifiers are required for most customers. Decreasing the number of amplifiers made dramatic improvements in signal quality and system reliability.

Another benefit that came from the move to fiber-optic cable was greater customization. Since a single fiber-optic cable might serve 500 households, it became possible to target individual neighborhoods for messages and services. In the 1990s, cable providers found this same neighborhood grouping to be ideal for creating a local-area network and providing Internet access through cable modems.

Cable TV starts at the antenna farm where the networks beam their programs using satellite to the local cable company and the various feeds are received from different satellites. Then the feeds are modulated to around 200 different channels with 600 MHz. The 200 channels will then be transmitted to a coaxial cable. The TV signals will then work their way down the cable to consumer houses. The cable service provider makes use of an amplifier

along the way to boost the signals.

In 1989, General Instruments demonstrated that it was possible to convert an analog cable signal to digital and transmit it in a standard 6-MHz television channel. Using MPEG compression, CATV systems installed today can transmit up to 10 channels of video in the 6-MHz bandwidth of a single analog channel. When combined with a 550-MHz overall bandwidth, this allows the possibility of nearly 1,000 channels of video on a system. In addition, digital technology allows for error correction to ensure the quality of the received signal.

The move to digital technology also changed the quality of one of cable television's most visible features: the scrambled channel.

The first system to "scramble" a channel on a cable system was demonstrated in 1971. In the first scrambling system, one of the signals used to synchronize the television picture was removed when the signal was transmitted, then reinserted by a small device at the customer's home. Later scrambling systems inserted a signal slightly offset from the channel's frequency to interfere with the picture, then filtered the interfer-

ing signal out of the mix at the customer's television. In both cases, the scrambled channel could generally be seen as a jagged, jumbled set of video images.

In a digital system, the signal isn't scrambled, but encrypted. The encrypted signal must be decoded with the proper key. Without the key, the digital-to-analog converter can't turn the stream of bits into anything usable by the television's tuner. When a "non-signal" is received, the cable system substitutes an advertisement or the familiar blue screen.

All of this gets mighty technical. The crux of modern cable television with WT Services in Hereford, Friona and Bovina, is that the video feed is received via satellite, gathered by a massive dish in downtown Hereford, then transported to homes and offices via fiber optic cable in Hereford, and coaxial cable in Friona.

Understandably, customers expect the cable TV signal that they are paying for to be perfect all of the time. That's virtually impossible given cable television's reliance on relaying signals to satellites in geosynchronous orbit and back down to the receiving dishes of cable systems all over the country.

Pixillated pictures that prove an aggravation to cable TV subscribers and disruption of the signal can be caused by atmospheric conditions, and primarily by solar flares. These flares, sometimes seasonal in nature, interfere with satellite feeds of TV signals, and sometimes, even wireless telephones. It's a problem not even NASA or the Pentagon are immune to—certainly not cable television networks and receiving systems—regardless of size.

### Payment by bank draft nets 1 percent discount

WT Services customers in Hereford can take advantage of a one percent discount by paying their bill by bank draft.

Customers who authorize this form of payment agree to have their bank account drafted for the amount of their outstanding balance on their account with WT Services. Drafts will occur between the 20th and 23rd of each month.

To arrange for payment of your WT Services bill via bank draft and net the one percent savings, contact the WT Services office in Hereford at 119 East 4th to obtain the necessary authorization form that includes bank routing and account information.