

I N N O V A T I O N S

A SERIES OF ARTICLES WHICH EXPLORES SOME OF THE COMPLEXITIES OF EMERGING TECHNOLOGIES

SET TOP UNITS, SUBSCRIBER TELEVISION AND YOU

BOB GREENEY, DIRECTOR ENGINEERING, PLANNING BRANCH, ABA, OUTLINES THE DELIVERY OF PAY TV SERVICES AND THE NEED FOR PRODUCTION STANDARDS FOR SET TOP UNITS.

Pay TV is just around the corner, at least that is what I read in my newspaper nearly every day. For most of us there is a jumble of jargon, delivery mechanisms, MDS, cable services, satellite services, cable-ready television sets, set-top boxes and on it goes. Let's demystify some of that jargon, as the latest techno-innovation is about to burst on the community.

DELIVERY MECHANISMS

Most of us are used to the terminology and probably understand what it all means. There are three main ways of delivering pay TV: by satellite; by microwave distribution systems; or by cable.

SATELLITE

Obviously this is one of the best methods to get the service to a widely dispersed audience. It uses the Australian satellite—or another satellite if you happen to live in an area where others can be readily received—to transmit the television services to your home directly. You need a satellite dish and special receiving equipment to tune the satellite signals and convert them to a form which can be watched on your television set. The satellite signals are received at frequencies at least 15 times higher than are used for free-to-air television services, so a normal domestic television receiver can not receive the signals without a device which converts the satellite signals to the correct frequency to be able to be used by your television set (called a down-converter).

The down-converter will include the subscriber management functions, that is the decoder which will allow subscribers to watch the signals received by their satellite dish and down-converter. Basically, the

subscriber management system has the ability to receive messages from the provider of the programs, indicating whether you have paid your subscription and are entitled to watch the specific pay channel, or pay-per-view program.

Delivery of satellite pay TV services has been determined to be by digital technology. Therefore, at least initially, the down-converter and subscriber management system, called the 'set top unit' (STU)—sometimes called a set top box—will also have to be capable of converting the digital signals to analog signals so that pay TV programs can be watched on commercially available domestic television sets. In the longer term, digital television receivers will become more common and the STU will not need to do a digital-to-analog conversion.

MICROWAVE DISTRIBUTION SYSTEMS

These are commonly known as MDS, and operate in the 2000 MHz range, compared with free-to air television which operates at 100 MHz to 800 MHz.

Pay TV services delivered by MDS will use terrestrial transmitters strategically located in each community to send the services to subscribers. Because MDS uses frequencies different from free-to-air television, they will also need a down-converter. Receiving antennas for MDS will be similar to UHF television antennas but much smaller; note that UHF television receiving antennas will not be adequate for receiving MDS pay TV services because they are not designed to, nor are they capable of operating efficiently at MDS frequencies.

As with satellite delivered services, the down-converter will incorporate the subscriber management system and decod-



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ing equipment so that authorised subscribers are able to watch the pay TV service of their choice.

Initially, MDS pay TV services will use analog transmission systems, although in the longer term they too will move to digital transmission technology. Some of the MDS services may use different modulation schemes, that is the way the television signal is encoded on the transmission. In those cases a conversion process will be provided in the STU so that the output can be watched on a standard Australian domestic television receiver.

CABLE TELEVISION

Cable television services will be delivered by high capacity cables laid in the street or on electricity poles and to which each subscriber is to be connected. Like the other delivery systems, cable needs to distribute the pay TV services using frequencies which are able to handle the amount of information required to transmit a number of television channels to subscribers.

In most cases, service providers will use frequencies similar to those used by free-to-air television services. These will also need to be converted so that they can be viewed on a normal television set. These channels are in the gap between the Australian VHF channels 12 (223–230 MHz) and the lowest UHF channel, channel 28 (526–533 MHz), and are known as the super- and hyper-television bands. They ▶

are used extensively in Europe for delivery of cable television services because they cannot cause interference to free-to-air services operating in the standard broadcasting VHF and UHF television bands.

Because of the number of pay TV services cable companies intend to provide, cables capable of carrying up to a hundred channels are likely to be needed. Initially they are likely to use analog technology, but the conversion to digital technology is likely to be rapid once component parts and suitable television receivers can be mass produced for the consumer market. This will lead to the availability of even greater numbers of pay TV channels.

RECEIVING ANTENNAS

In order to receive any of these services, and to receive available free-to-air television services, viewers will need the appropriate receiving antenna for each delivery mechanism. A satellite dish and associated receiver and down-converter for satellite pay TV services, a microwave antenna and suitable receiver and down-converter for MDS services, or a connection to a cable delivery system with appropriate receiver and converter for those pay TV services. It is not practical have a single antenna which is capable of effi-

ciently receiving services using each of these different transmission mediums. While it might be possible in the future to develop receivers and down-converters which have plug-in modules for each system, no such devices are currently available and if they were they would be prohibitively expensive. No doubt, with the pace of current technological development, the future could lead to integrated receiving systems which can accommodate the various delivery mechanisms, but today that remains a dream.

SET TOP UNITS

STUs, are going to be one of the critical elements in every subscriber's consideration. They are similar to VCRs except that they provide the interconnection from a different program source: that provided by the pay TV service provider. The choice of service by the subscriber will lead to the need for a suitable STU to receive the appropriate signals, down-convert them, convert them to the Australian television system standard, and provide the subscriber management system chosen by the service provider, the pay TV company.

While subscribers should really not need to know very much, if anything, about STUs, all will want to know how many boxes they are going to need on top of their television sets (at least until digital delivery systems become common to all delivery mechanisms).

There are a number of questions: 'how many boxes?'; 'what will be the output of the STUs so that I can interface it to my television set?'; 'will my free-to-air television services be interfered with by the pay TV services?'; 'what do I need to do to upgrade when digital technology becomes the norm?'

STANDARDS FOR STUS

Currently, the ABA, along with the pay TV service providers, broadcasters including the ABC, SBS, the Federation of Australian Commercial Television Stations, government departments, AUSTEL and cable system installers, are working with Standards Australia to consider these issues. They aim to develop consensus standards—standards which will have been developed jointly by all participants and with which those participants agree to comply.

The main concerns of this group are that the interface, or connection, between the STU and the television set is agreed. Users will be able to tune their television sets to the STU and get good picture and sound, and that no pay TV service will cause interference to reception of free-to-air television services.

To this end, STUs are likely to use VHF television channels 0 and 1 initially, switch-selectable by the user, as their output channel which is connected to the television set, or UHF channels within the tuning range of all Australian UHF television sets. The latter is a bit more complicated at this early stage because it is hoped that UHF channels just below channel 28 and above channel 69 will be able to be used so that there can be no risk of interference to any of the free-to-air UHF television services now operating all over Australia.

These extra UHF channels are in that part of the spectrum used for mobile communications in Australia, and therefore cannot be used for free-to-air television broadcasting. In Europe for pay TV cable delivery. It is expected that television tuners developed for the worldwide market will be capable of tuning to them as well as to the Australian UHF television channels.

CABLE READY TELEVISION SETS

This generally means that a television set is immediately able to be connected to a STU and be used to watch pay TV services. In most cases the truth of this statement will not be known until you have subscribed to a particular pay TV service and your STU has arrived and been connected.

The reality is that a television set will only be cable-ready if the STU provides an output which can be connected to the television set and you can watch pay TV without any further modification to your set. Most television sets can be said to be 'cable ready', the determining factor will be the output provided from the STU.

In the situation which is evolving, the output of STUs will use either VHF television channels 0 and 1 (switch selectable) or UHF television channels as the radio frequency output to the television receiver antenna input. In either case one could say then that your television is cable-ready. In other cases STUs may provide direct video and sound connections to television sets. This will only be

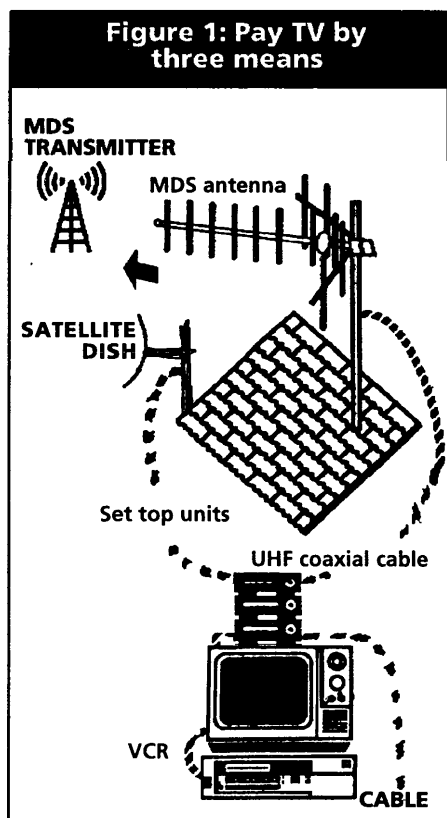
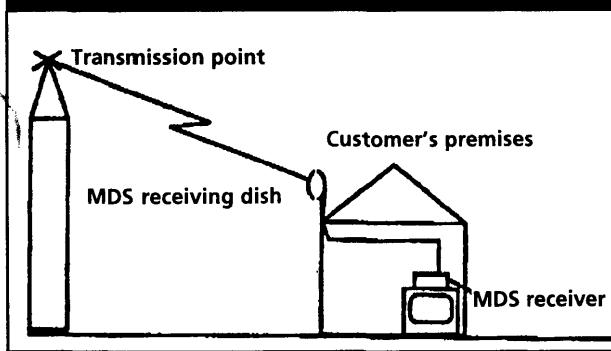


Figure 2: Typical MDS installation



useful for those viewers who have television sets with connections for external video and sound inputs. Other television sets may have a special connector, known as a SCART connector, which is specially provided for external connections such as pay TV. These will be useful where STUs provide a suitable output for connecting to the television set.

STUS AND VCRs

One consideration being looked at by the Standards Australia working group is: how can viewers have their VCRs and their pay TV STUs connected to their television sets and not have one system interfere with the other? Currently, many VCRs have a switch which allows the viewer to select either the program directly from their television antenna, or the program from the VCR on playback. This allows simultaneous recording on the VCR while watching another channel. A similar mechanism may be incorporated in pay TV STUs so that viewers can easily select their program source from free-to-air, pay TV or VCR.

CABLE TO THE HOME

Fairly straight-forward you say. In most cases, yes it is. The service provider will connect your home to their cable distribution system in the street nearby, for a price. But what if you live in a flat or apartment, or perhaps in a strata title home unit which is one of many homes on the premises?

The cable television company provides the service to the street-side connection to the apartment block or block of units, or the satellite or MDS receiver has to be located on the roof of the multi-storey building or the recreation area. How do you get the service in your unit or apart-

ment with the choice of the full range of services available in your area?

In these cases, it will be necessary to have a customer premises cable distribution system which is capable of distributing the pay TV services to each unit or home. Currently, such situations including hotels and office blocks, have cable systems for de-

livering a whole range of communications services, including data, telephones, free-to-air television and AM and FM radio throughout the complex.

Part of the work of Standards Australia is to look at what standards are necessary so that building owners can have some satisfaction that the cable distribution systems installed in their premises are capable of delivering the range of services tenants and owners are going to want. In some cases, it will probably be left to the owners of units and flats to have suitable cabling installed from the service provider's point of connection to their building or complex. In others a more integrated system might be considered more appropriate. There are still many questions to be answered, but with patience and a degree of wisdom, the industry will adopt standards which will lead to a minimum amount of discontent.

NOW AND THEN

One of the dilemmas facing pay TV providers is the need to provide services now which can be received by subscribers using existing television receivers, and then to be able to convert to digital transmissions systems for use with both existing television receivers and later with new generation digital television receivers.

This is going to be a very costly transition, and most likely one which will be managed by pay TV service providers, through change-over of STUs at the appropriate time. The change from analog to digital technology is not confined to pay TV either, but will also flow on to free-to-air television services around the turn of this century. Costs will be recovered from subscribers, but if we are to have pay TV now, then there will need to be a transition to all-digital systems in the future. ☐

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