Department of Communications, Information Technology and the Arts

Digital conversion of self-help television retransmission sites
Discussion paper

A submission by George Kozak - Consultant
(Modern Antenna Systems)

I serve as a consultant on the Technology Group of Digital Broadcasting Australia (DBA) and chair subcommittee CT-2-6 Cabled Distribution Systems at Standards Australia. I am also a member of the Digital TV Channel Planning Consultative Group.

I have over twenty years experience evaluating, fault finding, designing, installing and modifying MATV and CATV systems of all sizes.

In addition I have had involvement in self-help retransmission systems.

This submission covers the points as requested by the discussion paper : -

Whether the use of individual digital transmitters for each service or the use of multiplexers, would be the most effective option for converting existing analogue self-help retransmission sites to digital .

As each digital channel is not a single service as in analog broadcasts but a number of services (as multiplexed by the broadcaster, see Note below), the concept to utilise multiplexers in aiming to reduce the number of channels and transmitters required, is invalid, as it would not reproduce digital terrestrial broadcasts in the same format as at non self-help sites.

Remultiplexing would only reduce the number of services available and do so at considerable cost, as the off air received channels would also need to be decoded to the Transport Stream (TS) level prior to recoding, etc.

As the discussion paper points out this concept carries with it extra requirements for reprogramming when broadcasters change their mix of services, which occurs on a regular basis and therefore this concept is a false economy.

As is the case in MATV and CATV systems, the received off air digital channels at retransmission sites must not be altered in any manner other than channel conversion, as in doing so will not allow the viewer the ability to choose from the range of services a broadcaster provides.

Note : A broadcaster multiplexes the various services that they provide, e.g. one or more SD and HD programs, audio only programs, program guide, etc.

Other options for the digital conversion of self-help television retransmission sites.

A retransmission (or translator) site whether analog or digital takes the off air received channels (terrestrial), converts them to other channels and transmits them to the area to be served.

In the case of digital an extra step is included in professional equipment used in this process, that is error correction. This allows for the correction of any received errors in the off air incoming channels to the site and provides for the highest quality retransmitted error free digital channels. Except in the case of the most severe interference or signal distortion due to difficult reception conditions, the retransmitted channels are nearly the same quality as at a broadcasters primary transmitting site.

While this methodology is a sound engineering approach in retransmitters serving sizeable populations spread over any sized areas, by their nature self-help retransmission sites cover only relatively small numbers of viewers either in a compact geographical location or spread over a wider expanse.

Provided the off air received digital channels are of a moderate to good level of signal quality (not marginal) the requirement of error correction can be omitted, remembering that viewers digital receivers provide error correction as part of the decoding process. Any errors that develop between the retransmission site and the viewers receiving equipment are independent of the received channels arriving into the site and would be handled by their receivers in addition to the relatively few errors passed through the retransmission chain.

With this approach a sizeable reduction in both space requirements and cost can be achieved in possibly medium sized and definitely at small (and micro) self-help sites.

Such locations would make use of MATV / CATV headend agile digital channel processors / converters (with automatic gain control, AGC) which average around $1,000 plus per unit, allowing a five channel system with associated power supply, mounting bracket and associated components for approximately $7 - 8,000.

Depending on the transmitter output power requirements, each channel processor would feed a suitable RF power amplifier (approximately $1,000) serving as the transmitter, etc. In small and micro sized sites due to extra low power requirements (for digital less than 1, 0.5 or 0.25 W) the possibility exists that the processor outputs are first combined and then fed to a suitably derated larger RF power amplifier or either cascaded or parallel final RF power amplifiers, depending on requirements, rather than a single unit per channel.

This would bring the channel conversion, transmitter costs for five channels to around $15,000 for small and micro sized sites and closer to $20,000 for medium locations.

Unfortunately where one or more services are not available off-air (typically ABC, SBS) and are presently sourced via satellite, a TS outputting satellite receiver would

be required as well as a digital modulator in addition to a RF power amplifier per channel.

A further major cost reduction would be to avoid simulcasting at self-help sites in their entirety.

This would enable the reuse of analog channels and any suitable channel specific equipment (e.g. channel combiners, transmitting antennas, etc) which is already in use at a site and circumvents the cost of new adjacent channel combiners and approximately double the space and heat load for equipment housing purposes.

This approach has been feasible for the past two years as basic digital receiving equipment (Set Top Box) has been at or well below $100 per unit and as this would need to be the minimum outlay for viewers within five years, bringing this forward with a direct switch to digital could not be termed unaffordable in self-help areas.

Whether the DTH option for viewers residing in remote areas of Australia where the population is less than 500 should be adopted, rather than converting existing self-help retransmission sites from analogue to digital.

It needs to be remembered that in lieu of terrestrial digital transmissions, viewers who would need to make use of DTH would not necessarily reside in remote area or regional areas of Australia as per present classifications, but often relatively near regional centres or major cities.

Firstly to maintain compatibility with terrestrial digital services any move to DTH would need to address the current satellite transmission system (DVB-S) in that the installed receiver base can only decode SD services.

Receiving for instance the ABC or SBS satellite feed intended for terrestrial digital retransmission which contains both SD and HD services, would only allow decoding of the SD streams, automatically reducing the choice of receivable programming to DTH viewers.

DTH is only an option when the move is made to DVB-S2 with MPEG 4 and back compatible MPEG 2 encoding built into new satellite receivers, allowing viewers the full compliment of services and both SD and HD as available with terrestrial transmissions.

The discussion paper hints at this - *However future decisions about digital transmission may impact on the nature of DTH decoders required.*

Secondly, in light of creation of a third commercial remote area service in Western Australia, it is strongly recommended that a third commercial service be also introduced for central and eastern Australia. This would bring DTH services to an equal footing across the country and together with a move to DVB-S2 provide parity on the number and types of services available to viewers.

This approach would make DTH a viable choice for all viewers especially those residing in areas awash with or near to terrestrial digital transmissions yet unreceivable at their location for whatever the reason, rather than a second class option (less services and no HD).

Any views regarding the timing of digital conversion of self-help retransmission sites.

As stated earlier the cost to the viewer is already low, as a minimum outlay, to obtain digital reception on their existing analog TV receiver and unlikely to fall much further over the coming years.

This is not withstanding any costs to alter or upgrade any existing reception equipment (antenna, etc) which can vary considerably form site to site and will need to be addressed when invariably a change to digital reception is made, regardless of the time chosen to do so.

Considering the number of existing self-help sites and future sites yet to be identified, any unnecessary delay once digital off-air reception becomes available in an area serves no purpose other than to prevent the switching off of analog services.

In addition a direct switch to digital without simulcasting at self-help sites would provide a considerable cost saving and speed the uptake of digital TV as a whole and set a precedent for analog switch off, nation wide, as without digital self-help sites this would not be achievable in the first place.

George Kozak
Consultant
Modern Antenna Systems