

COMMENTS ON AUDIO SERVICES FROM AN MSO VIEWPOINT

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ABSTRACT

During the past year much has happened to develop the full potential of audio, yet much remains to be done. This paper is an expansion on ideas originally developed in the 1980 NCTA session on Audio Services. Thoughts concerning programming availability, satellite technology, premium signal security, and practical operator implementation will be presented.

INTRODUCTION

There continues to be a flurry of relatively low-level activity with respect to cable audio services. At least two satellite delivered cable TV channels are or will be equipped with full stereo sound, and approximately 7 (I think the number changes daily!) satellite delivered audio only services are on the drawing board. Needless to say, the main push for these services is from potential program suppliers who feel that a genuine unserved market does in fact exist. Since most of these suppliers view cable as their primary delivery vehicle, the MSO is wise to keep an eye on continuing developments.

KEY INGREDIENTS TO "MAKE IT HAPPEN"

There are three key ingredients that must be cultivated and blended to provide the successful implementation of an audio service revenue stream overlay.

1. Economic nationwide availability of unique audio product.
2. Development of acceptable cable delivery schemes for a premium audio signal.
3. Empathy by cable operators that audio should be taken seriously.

There are many interrelated marketing and technical issues of the above three factors that will be a part of the accomplishment of my objective: A quality premium audio service for cable subscribers.

THE PROGRAMMING ISSUES

One of the most common comments I hear when promoting audio services is to the effect that

"with over 9000 radio stations in the U.S. what can possibly be left undone - especially in the major markets?" My answer is to use the analogy to television, a medium that until the rebirth of cable provided very limited diversity. The same ideas that are resulting in success (and failure) stories with video alternative programming can be applied to audio. While not all audio alternative programming will be successful, I feel that several key technical ingredients are mandatory to define a minimum acceptable service:

1. Full Stereo - The home audio market is accustomed to it now and will accept nothing less.
2. 15KHZ Bandwidth - The public now associates quality with at least "good cassette deck" frequency response.
3. Low Noise - Stereo S/N ratios on the order of 60 dB should be the objective.
4. Low Distortion - The state of the art today is such that distortion levels of 1% or less are easily obtained.
5. Full Dynamics - The amount and type of audio processing used by radio stations in an attempt to "sound louder than anything on the dial" is just not necessary in the cable audio environment! Contrary to popular opinion, dynamic range is an attribute that is just now being exploited as an important element in all music formats. Even recent rock albums are taking advantage of the increased dynamics offered by digital recording techniques. Cable audio can provide enhanced dynamics without fear of competitive pressures associated with trying to sound loud.

Satellite subcarrier is the most viable method of nationwide bulk distribution of cable audio signals. Unfortunately with few exceptions it has been difficult to justify satellite subcarrier spectrum and inherent video degradation while maintaining "entertainment grade" audio parameters. It is encouraging to see the activity in the area of subcarrier transmission improvements. As cable audio grows it may be possible to justify using a full transponder for audio services.

To summarize this section, the work being

done today by several groups and individuals to define and overcome both technical and non-technical obstacles to nationwide distribution of cable audio services is most encouraging. They can't all be wrong!

DELIVERING AUDIO TO SUBSCRIBERS

Assuming that the programming folks get a quality product to our head ends, how do we best get the signal to the subscriber? The most common practice is to feed the composite multiplex FM signals to the plant at aural carrier level (approximately -15dB from video carrier level). Recent experiments in San Angelo show that this results in a delivered stereo S/N ratio of 55.5 dB at the end of a 22 amplifier cascade. (See Figure #1) Note that there is approximately 12.5dB degradation between mono and stereo signals at the subscriber drop. The cable industry is presently delivering marginal stereo signals at this level. Note that if this level is raised 5dB, the resultant stereo S/N ratio measured 59.5dB, which is acceptable. Consequent distortion products as a result of this additional amplifier loading should be insignificant but further analysis needs to be done. In terms of pure power loading, the addition of 50 FM carriers at a channel 6 video -10dB level will require an additional .38dB over and above the load imposed by the same signals 5dB lower in level. (Reference to a Fully Loaded 35 Channel System)

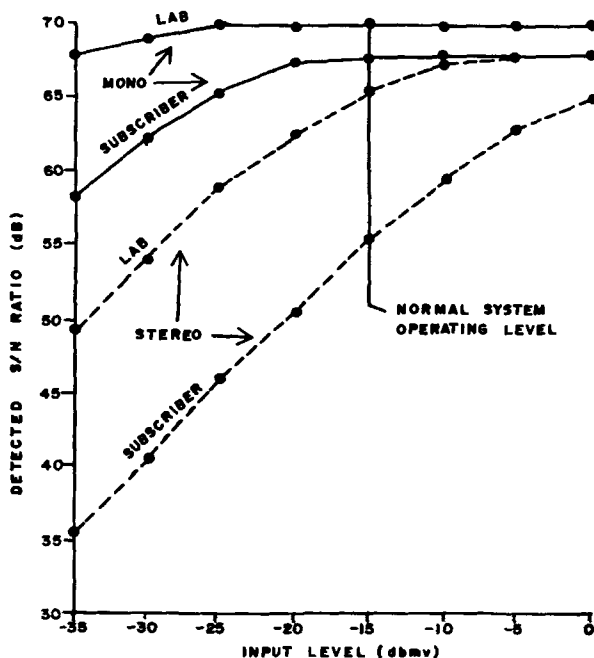


FIGURE 1 - MONO TO STEREO DEGRADATION AS MEASURED AT BOTH LAB AND SUBSCRIBER DROP ON SAN ANGELO, TEXAS CABLE SYSTEM. CASCADE WAS 20 TRUNK, 1 BRIDGER, AND 1 LINE EXTENDER.

For delivery of protected audio services, the operator has several options to consider:

FM Band Trap: Broadband FM traps have been built and are effective at points where the total rejection is greater than about 55dB. Since several areas in a trap stop-band are not attenuated 55dB or greater, care must be exercised when choosing premium audio frequencies. Trapping is probably not economically viable unless FM penetration approaches 40%.

Block Conversion: Simple frequency conversion as a method of "soft" security worked for several years in the early days of Pay TV and the same approach could be taken as an inexpensive vehicle to prove the economic soundness of pay audio. Using this method, premium audio services would be transmitted on the cable at some part of the cable spectrum other than the FM band (say 108-120 MHz) and simply converted back to the FM band by a "stereo-top" adapter. The block converter idea will not work in areas of high FM saturation due to frequency congestion.

Discreet Channel Converter: This device would be analogous to the single channel output CATV set-top converters in use today. FM signals would be transmitted in unused cable spectrum and converted to a single unused space in the FM band. Channel selection would be done from the "stereo-top" adapter. A variation of this idea would be to avoid the multiplex format entirely and transmit discreet left and right audio signals as individual low-level FM carriers. This would allow the use of extremely low-level signals (video minus 30dB) to provide high quality audio fed directly to the subscriber's amplifier. (Seems like a good use of 108-120 MHz!)

Digital and other High Security Techniques: It is possible to provide relatively high levels of security to the audio signal by digital or advanced analog techniques and limited research has been done in those areas pending proof of economic soundness of the pay audio concept.

CABLE OPERATOR EMPATHY

The best laid plans of the potential program suppliers will fail unless cable operators take the opportunity seriously! I compare the potential of audio hook-ups to that of second TV set outlet penetration which has shown significant growth as illustrated by figure # 2.

A recent "Business Week" article indicates that even though the U.S. component audio industry is "soft", sales have been in excess of 1 billion dollars annually since 1976.¹ Virtually all of those component units are connectable to cable systems.

A survey by UA-Columbia conducted in Alamo-gordo, New Mexico indicated that 10% of those responding would be interested in a pay audio ser-

vice offering 8 commercial free formats for a fee of \$3.50 per month.

Warner-Amex, in the process of doing market research for "The Musical Channel," discovered that 96% of those in the 15-30 age group possess an FM stereo receiver in the home and listen to them an average of 19 hours per week.

The UA-Columbia system in San Antonio recently passed the 50,000 subscriber mark with 33% of the subscribers electing to have their FM sets connected to the cable even though nothing more than Broadcast FM is offered.

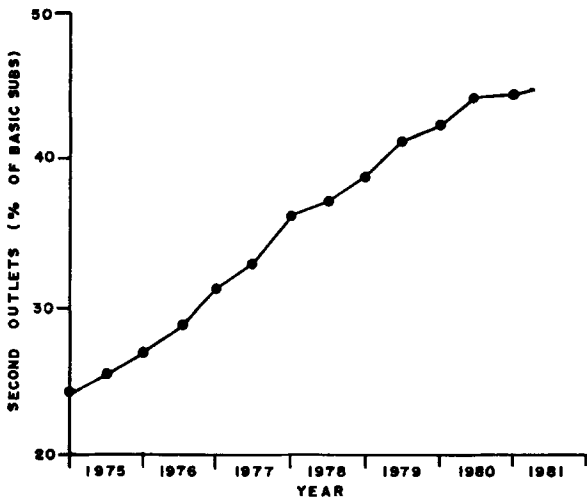


FIGURE 2 - SECOND OUTLET GROWTH HAS BEEN SIGNIFICANT AND RELIABLE OVER THE YEARS IN THE SAN ANGELO, TEXAS SYSTEM. FM OUTLET GROWTH COULD BE EQUALLY AS IMPRESSIVE.

We as an industry do have an obligation, even without mandatory legal requirements, to provide high quality signals as a part of basic service in areas where FM is promoted. Any system promoting FM service should possess a decent quality FM stereo tuner and an empathetic set of ears to judge overall quality of stations carried. Simple monaural tuners will not reveal the majority of problems that can ruin FM stereo multiplex.

Due to lack of measurement techniques for judging on-air FM transmissions without the aid of test signals, I can understand the reluctance of cable engineers to get involved with cable audio quality analysis.

SAN ANGELO FM UPGRADE

As a result of work done for last year's NCTA session on Audio Services, I was encouraged by UA-Columbia management to "upgrade" the FM service in San Angelo, Texas. The objective of the project was to provide a comprehensive high quality audio entertainment service that would be head

and shoulders above the off-air market, and monitor subscriber response to the program.

Prior to the implementation of this program, we had a total of 11 FM signals on the San Angelo cable system.

- 4 Local FM Radio Stations
- 1 Off-Air Direct Import (90 Mi.)
- 4 Terrestrial Microwave Subcarrier
- 2 Local Origination (Christian Radio and Background Music Service)

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Analysis (subjective, I might add) of our signals indicated that 1 local FM had severe multipath distortion in stereo and all terrestrial microwave stereo signals suffered from significant degradation in the form of beats and noise.

Working closely with both local system and corporate management, a revised FM band plan was designed and the necessary equipment was ordered to implement the service which included 18 sources; a 64% increase over the previous cable FM package. These sources included:

- 4 Local Off-Air (No Change)
- 2 Local Origination (No Change)
- 1 Off-Air Import (No Change)
- 7 Terrestrial Microwave (3 Additional Stations)
- 1 Satellite Subcarrier (WFMT-New)
- 1 Short Wave Channel (New)
- 1 NOAA Weather Rebroadcast (New)
- 1 WWV Rebroadcast (New)

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This package was designed to provide a significant increase in quantity and variety over any off-air or previous cable FM offering.

Technical implementation of the package was mostly straightforward. A new FM omni-directional antenna was purchased and provided excellent stereo pick-up of local signals. It should be noted that all heterodyne processors were adjusted for peak performance by both eye and ear. In some cases, the most distortion free stereo sound was not at the exact peak when going through the alignment with a spectrum analyzer.

All terrestrial microwave signals are processed with the unique up-converter manufactured by Leaming Industries. The active filter in this unit does a very effective job of removing audible beats from subcarrier derived stereo sources. A wide deviation Leaming unit is used for receiving WFMT via satellite. The NOAA and WWV package were purchased from Catel and do an excellent job.

One of our most innovative channels is our "Ear To The World" short wave broadcast service. Many people do not realize that a significant part of the world relies on short wave news and entertainment. Some very excellent programming is there for the taking! In fact, over 18 million short wave receivers have been sold in the U.S. during the past 10 years. There are currently 34 countries beaming short wave programming of which much is in English.² Utilizing a new receiver developed by Sony, we will provide a fully automated

24 hour per day short wave channel that can be programmed to provide the most interesting and beneficial programs to our subscribers. To the best of my knowledge, this will be the first fully automated 24 hour a day SWL cable service in the U.S.

WHAT ARE THE RESULTS?

The FM up-grade was completed on December 20, 1980. (The author really wanted WFMT for Christmas!) The next phase (and still continuing at this time) is to monitor the overall impact of the enhancement to the basic cable service.

Newspaper ads were run beginning in January 1981. Both Catel and United Video provided point of sale material which was distributed to local audio dealers at a luncheon announcing the service. An attractive FM channel guide was printed and made available. It is interesting to note that all of the 5000 guides originally ordered were gone within 10 weeks. One local stereo dealer provided an attractive demo unit for use in the front office of Texas Cablevision to aid in Cable FM demonstrations. This same dealer pays for the subscriber's FM tap installation with each stereo system sold. The most effective form of advertising, word of mouth, is just now getting underway.

I think that the best indication of interest in cable audio can be seen from Figure #3 which plots FM extension sales on a quarterly basis from 1975 to present. The first significant "peak" occurs coincidentally with the addition of a major market rock station (see my 1980 NCTA paper for further details).³ I have every reason to believe that the record activity level coincidental with the launch of "Musical Theatre Plus" will continue for some time to come.

SOME CONCLUDING REMARKS

I continue to operate on the faith that sooner or later the concept of premium audio will be proven and accepted and predict that within 12 months, at least two new cable oriented audio services will be available. Just like video - once it starts, look out!

A good imaginative and well planned cable FM service should at least be thought of as a natural part of the basic cable package. Good audio is appreciated by a demographically powerful group... the young adults who grew up surrounded by music and continue to enjoy it... all types of it! For example, the 25 to 34 age group is 57% more likely than the average of all adults to regularly listen to classical music.⁴

As Warner's "Music Channel" will prove, the subscriber's thirst for high quality stereo TV product will be unquenchable. The smart cable operator will realize this and capitalize early.

A good analogy to the development of audio services can be found in a recent paper describing the resistance to the development of Texas Instrument's highly successful "Speak & Spell"™ educational toy.⁵ The author states: "After the research is done and the data tabulated, the answers

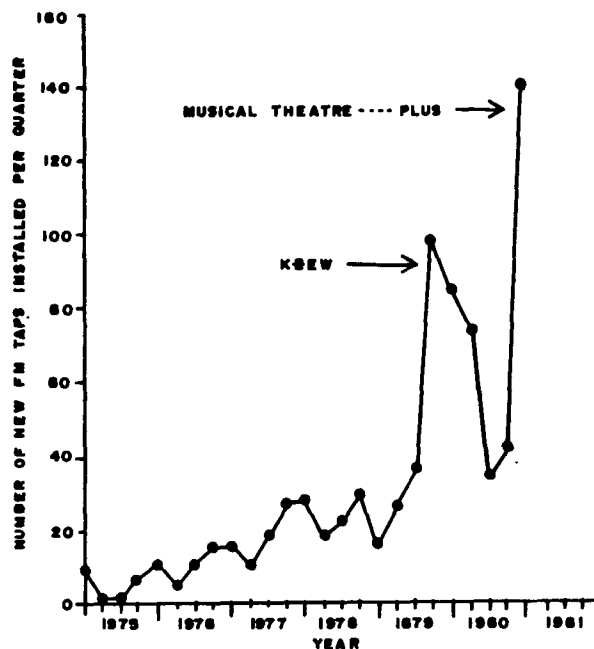


FIGURE 3-FM TAP ACTIVITY IN SAN ANGELO, TEXAS SYSTEM SHOWS OBVIOUS IMPACT OF K&EW IN 1979 AND "MUSICAL THEATRE ---- PLUS" IN 1981. THE POTENTIAL IS THERE!

are still the result of the convictions of the designer."

ACKNOWLEDGEMENTS

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