CONSIDERATIONS FOR IMPLEMENTING TELETEXT IN THE CABLE SYSTEM

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ABSTRACT

In a few years, commercial teletext service will begin in the United States. Technical standards, regulatory considerations and semiconductor designs will have been established to permit the feasibility of a teletext service for every market segment. The cable industry has an opportunity to exploit the versatility inherent in any teletext service. This paper is intended to identify the key parameters within the cable environment as they impact on the implementation of teletext.

A BASIC TECHNICAL DESCRIPTION

The term teletext refers to an electronic system where a data base of information is constantly transmitted via existing television signal paths to home TV receivers which are suitably modified or supplemented. The TV viewer, through a control box, can access and display this information in lieu of the normal TV program which is carrying the teletext signal.

The teletext signal, unlike the normal TV program, is a data signal. It is transmitted along with program on unused scan lines in the vertical interval. As viewed on a TV receiver, these lines are not normally displayed as they are located above the top of the picture. This is the same vertical interval where test signals to monitor transmission performance (VITS) and to provide automatic color adjustment in the home TV (VIR) occupy non-picture scan lines. Table 1 illustrates this vertical interval region. The line numbers which teletext occupies, at present, varies from user to user since there are no standards, as yet, governing this.

PRESENT VERTICAL BLANKING INTERVAL USAGE

LINE	FIELD 1	FIELD 2
10		
11		
12		
13	Teletext	Teletext
14	Teletext	Teletext
15	Teletext	Teletext
16	Teletext	Teletext
17	VITS*	VITS*
18	VITS*	VITS*
19	VIR*	VIR*
20	S.I.D.*	Unassigned
21	Captioning*	Captioning*

*F.C.C. Broadcast Standard Allocation

TABLE 1

The data present on the scan lines are in the form of bits. Groups of bits can represent, when decoded, letters, geometric forms, colors or merely system housekeeping. Figure 1 gives a basic illustration of the hardware used for a teletext system.

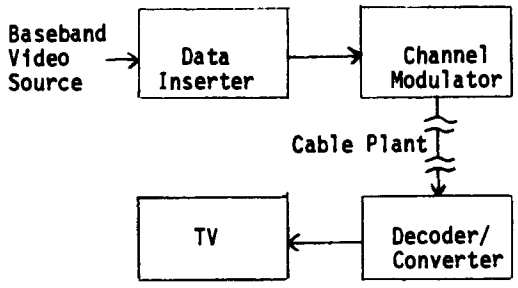

Figure 1: Basic Teletext System

The viewer gains access to this information through a decoder which is either internal to his TV or a set top adapter. The viewer controls the mode of teletext display with a calculator type keypad. He can select either normal TV programs or one of several teletext display modes. These modes may be full screen display of teletext, overlay of teletext on program, captioned teletext, or conditional display of teletext. The teletext information can be organized as pages and magazines. A page is a full screen of text and/or grafic information. A magazine may be composed of several hundred pages.

The number of pages present in the data base to be transmitted along with the data rate at which they are transmitted will determine the maximum waiting time (access time) for display of a page which the viewer randomly accessed. Pages are transmitted sequentially by number with the sequence repeated when all pages are transmitted. The number of TV lines used to transmit teletext will determine the data rate. A general rule of thumb is a transmission rate of 1.7 pages/second for each TV line used to transmit teletext data. In a four scan line system, 100 pages would have a maximum access time of 15 seconds. This, however, varies considerably with the type of data encoding used and the density of the pages transmitted.

Graphic information can be transmitted on a teletext system. Pictures are composed of colored squares placed in such a manner on the TV screen to give a low resolution picture much like a mosiac. Systems have been proposed which can produce a high resolution graphic display with a more advanced decoder. These graphic techniques are called Alpha-Mosaic and Alpha-Geometric.

A final term should be introduced here. Viewdata refers to the transmission of data via ordinary telephone lines for display on a modified home receiver. Instead of the information entering the home via a television signal, it enters through the home owners telephone line where it connects to a decoder for display on the TV receiver. It is an interactive system in that the user accesses information directly from the data base computer through his telephone. The data transmission rate is about one-tenth that of teletext but, because it is interactive, it need only transmit the information requested by the user. Most teletext systems were originally viewdata systems. Hybrid schemes are possible, where the user requests information via a telephone line but receives the requested information over a television channel, either cable or off-air.

THE TELETEXT DECODER

The standards which will eventually be adopted will be primarily concerned with over-the-air broadcast teletext transmission. Only a few lines in the vertical interval will be used for teletext as this is all the braodcaster is allowed for this type of service. While this will be fully compatible for the CATV operator, it will fall short of the potential he has.

The system operator has the ability to send teletext on all TV lines instead of programming. This will greatly increase both throughput and the amount of information to be delivered to the subscriber. In addition, the cable system has the ability to provide an interactive system which is considered the logical extension of teletext.

The important thing to realize is that if the subscriber has available to him a TV set with a conventional teletext decoder in it, then the system operator can do no more than provide teletext service in the same manner and format as do the broadcasters. What must be developed is an upward compatible system which will allow cable to expand and exploit the conventional teletext service and TV set decoder to fully utilize the available bandwidth on cable.

The teletext decoder can take on many forms. Basically the decoder accepts an NTSC baseband video input with the teletext data encoded on it. The output is usually Red, Green, and Blue signals to drive the picture tube in the TV set directly. This is illustrated in Figure 2. The set top decoder would have circuitry to convert the R, G, B signals to an NTSC video signal modulated on a TV channel frequency.

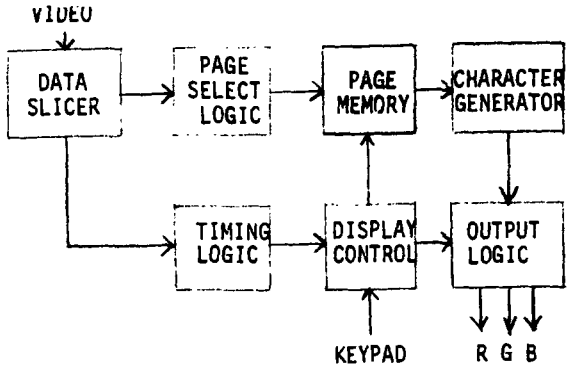

FIGURE 2: Basic Teletext Decoder

For cable, however, this set-top decoder function can be made an integral part of channel converters and descramblers presently used for cable TV. The converter already performs channel selection. The IF can be demodulated, decoded and remodulated. Teletext functions and channel selection can share a common keypad.

Teletext decoders will be offered by TV receiver manufacturer's as an integral part of the TV set. Initially, however, there will be a market for external decoders to be used with existing TV receivers. The combination converter/decoder can be offered at a premium to cable subscribers giving them the ability to make use of existing teletext services. The implementation of the decoder function in the converter, need only be the addition of field installable circuits so that a separate box need not be inventoried.

THE TRANSMISSION OF THE TELETEXT SIGNAL

The system operator can implement teletext by simply allowing teletext on his off-air signals to be passed on to his subscribers for decoding by subscriber provided decoding equipment (i.e., teletext TV set or set-top adapter). Unfortunately, this does not allow the operator to generate any additional revenue.

The next level of implementation is where the operator buys teletext generating equipment, the same the broadcaster buys, and inserts teletext the same way as the broadcaster, into the vertical interval of his locally originated channels. He would then generate revenue from his locally originated teletext service. The main drawback to this scenario is that initially there will be very few teletext TV sets or decoders owned by subscribers. In addition, the relatively high cost of teletext generating equipment will probably make the approach unfeasible during the infancy of teletext. An alternative to this approach would be for the system operator to rent teletext set-top decoders to his subscribers as previously described.

A third approach would be one where a system channel would be dedicated to teletext service. It can be made compatible to existing commercially available, broadcast standard, decoders. Let us say that broadcasters use three lines in the vertical interval for teletext, say lines 14, 15, and 16. The system operator, on a full channel basis, has 240 lines or 80, three line channel slots available. A set-top decoder can be developed for the cable industry which would select any one of these 80 teletext/data services and "down convert" them to the standard three vertical interval lines. It can then be decoded and displayed by the subscriber's teletext TV set. If the subscriber does not have existing provisions for decoding teletext, a teletext decoder can be incorporated into the 80 channel data selector at little additional cost and connected to the antenna terminals of simple TV sets.

The system would generate its revenue by "renting out" these 80 data channels to various information suppliers or use several of them for his own purposes. Each one of these 80 data channels would have the capacity to transmit the equivalent information of 10 billboard channels as they now exist on a system.

One final extension of this type of system would be where the operator would take the broadcasters teletext signal and place it on one of these 80 data channels and offer one package containing all the teletext information available on his system channels.

Some thought has been given to using the CATV channel as a wideband data channel without "packaging" it on TV lines. This would make distribution of the data impractical since it could no longer be monitored by conventional TV test equipment and no longer be handled and "dealt with" like a TV signal. A new frame of reference and way of thinking would need to be established by the system operator in maintaining such a service.

COST PROJECTIONS

It is assumed that the cost of the decoder during the first years of teletext service in the U.S. will determine how many consumer users there will be. It is for this reason that the cost of the teletext decoder is so sensitive an issue. The various proposed systems presently being evaluated reflect themselves differently in decoder costs.

Basically, four or five LSI integrated circuits form the nucleus of a teletext decoder. The complexities of these circuits varies from systems presently being proposed. These circuits are going through iterations in design but are still awaiting a firm U.S. standard before accurate pricing is made.

Based on proposed designs of systems presently in use, it has been projected that a complete teletext decoder chip set will cost about $35 - $40 in large production quantities. This would mean a retail cost of about $200 to $250. It should also be kept in mind that with the large quantities of units that can be sold in the cable market, the possibility exists for a custom LSI to be designed to cost-effective implement the functions I previously described.

Information provider terminals or the equipment necessary to generate and store teletext pages will be priced at $10,000 to $20,000.

CONCLUSIONS

It should be realized that teletext service will become a practical, widespread reality within a few short years. The cable industry must embark on a design and development plan which will extend the fundamental broadcast teletext service into the wide open frontier of cable.

This paper has not addressed what services would be offered on teletext or precisely how revenue is to be generated. These questions are presently being answered by other professional disciplines. There must, however, be an ongoing dialogue between all those involved with the various aspects of teletext development to insure a cohesive, unified system.

The subscriber's TV set will become open game for anybody who wants to use this consumer display device for uses other than television viewing of movies, sports, and sitcoms. Our industry's bread and butter will compete with yet unknown activities for the subscriber's TV set usage time. We must be prepared to meet this imminent challenge.