FULL FIELD TIERED ADDRESSABLE TELETEXT

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Tiering and addressability are not new concepts to the cable television industry. However, the application of these concepts to full field teletext presents an exciting new service which can be offered. The ability to subscribe to specific categories out of a large, instantly available, data base is both technically feasible and affordable. The capability of full field tiered, addressable, and scrambled teletext to offer a profitable service today is further enhanced by future expansion possibilities into the areas of two-way interactive services, home games and computers.

INTRODUCTION

Many teletext systems are under consideration for use in both broadcast and cable applications. All these systems have been defined in a way which allows full field operation. However, very little has been said about how such a system would operate. Presented in the following discussion are some ideas which form the framework for a successful application of full field teletext.

Full field teletext offers tremendous throughput of data into the home. Coupled with addressability and tiering concepts already being widely used in the industry, a system that offers selective subscription to large amounts of information can be offered.

Using the North American version of the British teletext system as a model, a calculation of the system throughput can easily be made. Assuming a 40 character 24 row page display format, it takes 30 horizontal scan lines to transmit a full page. If 250 lines per field are allocated for text, the full field throughput will be 500 pages/sec!

$$(250 \text{ lines/field})/(30 \text{ lines/page}) \\ *(60 \text{ fields/sec}) = 500 \text{ pages/sec}$$

In a system designed for a worst case wait of 10 seconds to receive a page, a 5000 page data base could be available. With such a data base the average wait for any page would be only 5 seconds. If a longer average access is tolerable, such as 10 seconds, a 10,000 page data base could be offered. For purposes of this discussion a 5000 page data base will be assumed. Although the British teletext system was used in this calculation, the other teletext systems under worldwide consideration have similar average page lengths, leading to a similar result.

One of the exciting characteristics of electronic data bases is the ability to have the information instantly updated. For example, if 250 pages of a data base are assigned to the latest news, weather, and sports information, continuous updates in these categories could account for thousands of pages of information presented in a day's time. Hence, the amount of information that could be passed through a "5000" page data base in a single day is almost unlimited. The main reason for having 5000 pages becomes the ability to assign sections of pages to specific information services.

Tiering allows these sections of a large data base to make sense from a customer point of view. A sufficient number of tiers, say 40, will allow for a considerable selection of "programs" to be offered. It is not the purpose of this paper to point out the programs that could be delivered via teletext, however, some categories are: news, weather, sports, entertainment, professional information, business information, television guides for the cable system, classified advertising, shopping information, etc... By having 40 independent tiers of programming it is felt that a profitable (for the cable operator) and interesting (for the customer) service would be offered.

Along with tiering comes the concept of addressability, where each customer has a unique subscriber code that he is identified by. The tiering authorizations could then be sent specifically to each decoder as part of the overall teletext data stream. To keep the head-end equipment simplified, it is proposed that this data be sent as specially coded teletext pages, as part of the normal full field transmission.

As a necessary part of any tiered, addressable system, whether it carry video or teletext programming, a scrambling method is required. In the case of video, it is a system design concern as to what extent the scrambling can be beaten by "pirate" decoders. For digital transmission of data there is considerably greater freedom in designing levels of scrambling, all the way

from simple inversion of the data (similar to video inversion) to encryption which requires a digital key to unlock. As a minimum, some scrambling is required to prevent a decoder designed for receiving normal broadcast teletext from having access to the subscription portion of the data base.

DECODER FEATURES

Not all subscribers will be interested in receiving subscription teletext information. As a result, it is not appropriate to include a text decoder of the required complexity in the cable converter itself. This leads to the concept of a modular add on teletext decoder. In this case, the converter must be manufactured with a provision to connect modules of this type. With some thought, other modules may also be defined that would be connected at this interface. The specifications that are desired for such a system architecture are as follows (assuming a baseband remote controlled converter):

1) Video signal input and output.
2) Remote control input and output.
3) Audio signal input and output.

All these signals could be made available on a single connector with a shorting plug installed for normal operation of the converter.

The teletext decoder would include only the required circuitry to grab pages, check authorization information, respond to user requests and generate the teletext video in a compatible form with the mode of operation (text or caption mode). The display format would be 40 character rows with between 20 and 24 rows per page. Graphics modes would also be available depending on their cost benefit ratio. Certainly the mosaic type graphics would be offered since they "come for free." Various color choices would be available such as the eight combinations of red, blue, and green.

A typical user session might involve the following steps:

- User selects text mode.
- A system welcome page is presented.
- Emergency information pages are identified.
- Personal or group messages are noted as being available, with optional viewing.
- The system index page is displayed, without page selection ranges.
- (Decoder acquires user tier authorization information.)
- A modified index page is shown with valid page ranges.
- User selects valid pages and continues session.
- (Decoder continues to monitor status for authorization or system changes.)

The last two items are where the majority of the time will be spent in a typical session. User page requests will be "delivered" with an average wait of only 5 seconds. The decoder will also periodically check the system and user status, making any changes known to the user during the session. This is important since some users may leave a single page selected for a long period of time, say, for the purpose of monitoring their favorite stock information.

Special features which a system such as this could offer are numerous. An obvious use is as the downstream channel for two-way interactive actions. Also, an enhanced version of this teletext decoder could form the basis of a home TV game or computer, where games and programs are sent as part of the teletext data stream. The tiered addressable aspect of the decoder would be an essential ingredient in delivering these kinds of services.

HEADEND REQUIREMENTS

The equipment and personnel requirements at the headend will vary depending on the amount of service provided to the subscribers. Let's take a look at what is required for a minimal system installation, where most of the information is delivered to the cable operator from outside information providers:

Equipment	Estimated $
Headend computer/software	20,000
5 Mbytes of memory	35,000
Channel inserter	10,000
Local editing console	6,000
Remote entry modems	2,000
Contingency	2,000
Total	$75,000

The cost of this 5000 page system can be reduced by roughly $25,000 if one starts with only 1000 pages. Hence, a $50,000 investment is sufficient to start. At any time, the system could be expanded with additional pages of memory.

The headend computer is the "traffic controller" of the system. It takes incoming information from the billing computer (tier authorizations), from the outside information providers (via the remote entry modems), and from the local editing console (local information, emergency alert information, customer messages, etc...). The memory store of 5 Mbytes holds the currently active 5000 pages; these are loaded from the computer and backed up on disk storage devices. The channel inserter takes information from the memory store and generates the full field teletext. Note that the computer is not directly involved in the rapid recirculation of the 5000 pages, instead the channel inserter works directly

with the memory store on a continuous basis. The local editing console is used for creation of the local part of the data base. This console could also be used for entry of customer tier authorization information, although the preferred method is from the master billing computer.

One of the interesting tasks of the headend computer could be to format the incoming information providers copy into the appropriate display format that is required in the system. However, many sources of information will come preformatted, since there is reason to believe that unique editorial styles will develop as teletext becomes more popular.

SUMMARY AND CONCLUSIONS

A full field, tiered, addressable, and scrambled teletext system has been described. This system could be implemented based on a variety of current teletext technologies such as 1) British teletext, 2) French teletext (Antiope), 3) Canadian teletext (Telidon), or even 4) AT&T PLP teletext. Decoder characteristics from both the system and user perspective have been discussed. Headend costs have been estimated for two system configurations. Known technology allows text services to be offered in a cable system which will far exceed the scope of competitive services soon to be available from standard broadcasting. Furture extensions of a system such as this can cover such topics as two-way interactive services, home games and computers.

The availability of hardware and information providers in the next year will initiate what promises to be an exciting application of text delivery into the home.