

Electronic Program Guide Applications The Basics of System Design

William L. Thomas
TV Guide On Screen

Abstract

Some of the earliest features promised as part of the information highway will be embodied in Electronic Program Guide applications. These applications will provide an integral element of the navigation systems being developed to support new services which will be offered to consumers. In this paper, the system design requirements for a generic program guide application will be described.

EPG SYSTEM OVERVIEW

Electronic Program Guide (EPG) systems are currently under development for first deployment in cable, satellite and consumer electronics products.

On the surface, these applications seem simple in comparison to much of the sophisticated computer software now available to consumers through personal computers. However, due to the cost constraints inherent in mass produced consumer products, such as the first advanced analog and digital compression based cable converters, there are challenges in designing, implementing and supporting these new EPG products.

Program guides will be the first widespread interactive software applications to be seen directly on the TV screen along with television programming. To perform the necessary functions, the cable based systems must be comprised of at least the following elements:

- Method for gathering TV listings
- Extracting system specific information
- Sending the data to the local cable system
- Coordinating with the system controller
- Transmitting the data to the converter
- The guide application itself

In addition to having the basic elements in place, system technical issues relating to downstream transmission capacity limits must be taken into account. These factors include updating the program listing database and application software downloading

The level of user functionality must be carefully considered, and will be implemented with different characteristics for advanced analog, first generation digital and future advanced digital platforms.

Naturally, the user interface is receiving much attention as the first systems are being developed. To consider what is possible for upcoming EPGs, general user functions such as displays associated with channel changes, and listings by time, channel or category will be described. In addition, favorite channel, program restrictions and messaging features will be introduced. A critical part of the interface is presenting a variety of premium services such as subscription channels, pay per view, or Near Video On Demand (NVOD) information in a compelling fashion. These and other "look and feel" issues will be described and illustrated with example screens from a prototype application.

ELEMENTS OF EPG SYSTEMS

As described previously, there are a number of basic elements which must be present to have a complete EPG system. Each of these must be designed both to be efficient in their own right, and to work well with the other parts of the system. Let's consider each in turn...

Gathering TV Listings

There are only a few organizations that currently gather nationwide TV listings information. They include TV Guide, TV Data, and Tribune. Currently this data is primarily used to support printed guides, daily newspaper listings, and scrolling electronic channel guides used in many cable systems. In today's broadcast and cable environment, collecting listings information requires significant manpower.

Listing information includes broadcast time and channel, and program name. Various lengths of program name must be composed, so that they can be used in different printed or video display situations. For each program there may also be additional information including descriptive copy, list of actors, MPAA ratings, year of production, star rating, language, category (sports, movie, children), closed captioning and stereo broadcast mode.

On a nationwide basis, listing information must be collected from over 1100 VHF and UHF high power broadcast stations. In addition, low power stations must also be collected for cable specific guides. All cable networks, including national PPV must be collected. In the future, national NVOD schedules must also be captured.

System Specific Information

Given a complete set of listings information, including local broadcast, cable networks and PPV a system specific set of information must be made. This may be done before the data is transmitted to a cable system headend, or may be done locally at the cable system from a nationwide data feed including all listings information. In either case, an accurate channel lineup is required as the basis of the selection process.

Local listings information, such as the local community access channel programming should be included. If offered, local PPV schedules including pricing information must also be collected in the database.

Sending Data to Local Cable Company

As mentioned above, the listings information must be sent to the local cable system where the guide application is offered. Typically this will be via a satellite link, although in the early stages of deployment, there may be telephone based methods of data delivery.

In an EPG application program, it is important that listings information be accurate and up to date, as seen by the viewer. Clearly, this is one of the major benefits of an electronic delivery system. Given this requirement, the frequency of update is a critical design factor, as programming changes occur on a frequent basis. Printed publications are typically closed once a week. A goal for electronic publishing, such as EPGs, is for a daily close and transmission to the cable system. In the future, almost real time updating of the data used in the EPG is a desired target.

Interface with System Controller

The program schedule data used in a local cable company must be synchronized with the cable converter system controller for proper operation of the application. This is required for several reasons.

First, any pay services which are offered must be reflected in the user interface of the EPG. If a customer is authorized to receive a subscription service, the guide must list the service and allow tuning. If not, a marketing opportunity presents itself for the operator and the guide application is an excellent vehicle for selling the service.

Second, any PPV listings must tie back to the proper internal security tags used for order management. Pricing information is an obvious data element which must be coordinated between the EPG, system controller and billing system used by the cable operator.

Third, if shared channels are present, this must also be handled in an appropriate fashion by the guide.

Transmitting Data to Converter

The actual transmission of the listings data to an individual converter will be handled differently by specific hardware vendors. Both "in channel" (VBI) and "out of channel" (RF Carrier) approaches will be used. In most cases the converter vendor provides the headend equipment to transmit the listings data in a secure fashion. In other cases, there will be more of an open architecture approach.

For the majority of advanced cable converters, either analog or digital, it is also possible to download the EPG application program itself.

As such, a separate function is required to manage the proper version of software which needs to be running in each model of the cable converter.

The Guide Application

There are many features which can be offered in an Electronic Program Guide. A prototype system has been developed to illustrate a full featured application under development by TV Guide On Screen. Several features from this system will be discussed to illustrate key aspects of the user interface.

The first mode of operation is a simple, yet powerful extension to the current channel up/down function provided on cable converters. This is the "FlipTM" mode, which is illustrated in Figure 1. In FlipTM mode, a legend is added to the bottom of the screen showing channel number, call letters, current program name and running time. This allows the consumer to change channels and immediately determine what program is running, even during a commercial break. After a few seconds the display will go away.

A more advanced mode of operation is "BrowseTM", as illustrated in Figure 2. In this mode, it is possible to change the legend without tuning to a new channel. Both the channel listing and time can be changed. In effect this mode allows the consumer to scan programming that is being offered at the current time on other channels, or look into the future, without disrupting the current program which is being viewed. To navigate this feature, the user must learn to use left and right arrow keys, as well as the up and down arrow keys that they are already familiar with. Also illustrated on this screen is a mail waiting icon which is used by a system messaging function.

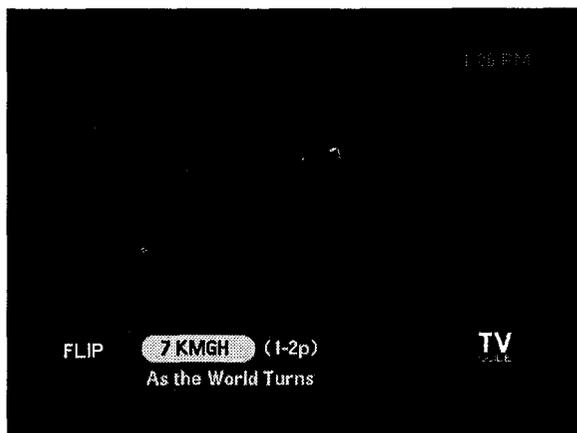


Figure 1. Flip™ Mode

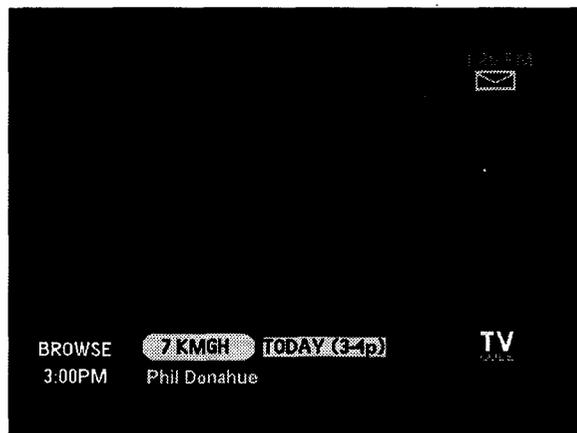


Figure 2. Browse™ Mode

To support the ever growing number of channels that are being offered on rebuilt cable systems it is desirable to provide a "Locator™" function, as illustrated in Figure 3. In the prototype this function is reached by tuning to Channel 1, or by the main menu as described below. This feature lets the user find any channel by broadcast, cable, premium or PPV category. By the user navigating to the desired channel, and then choosing the entry, direct tuning occurs.

In addition, the Locator™ screen can be used to program a favorite channel list, which can

be invoked in any mode of operation of the EPG. Favorite channel will be of growing importance to the consumer as the number of channels grows.

To access other EPG features the user chooses the "Main Menu" which provides three categories of features. First, TV listings by Time, Channel or Category under the TV Guide area. Second, PPV and Premium Services under the home theater. Third, customer service features such as messages, Lockout™ and help would be provided.

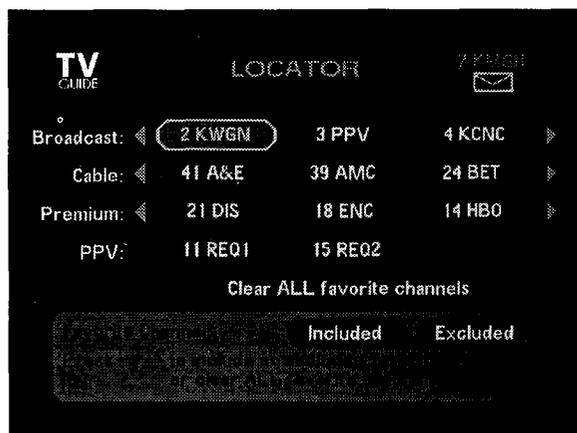


Figure 3. Locator™ Screen

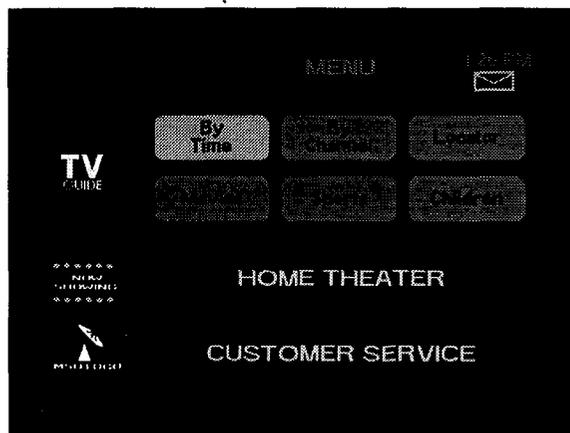


Figure 4. Main Menu

Looking at the Listings by Time feature, as shown in Figures 5 & 6, it can be seen that channel number, call letters, program name and running time can be provided. The "i" icon allows the user to see more information

on the program, such as movie descriptions, or sports event details. If the program is currently available it can be tuned immediately by navigating to the desired

program by using the up and down arrow keys and then choosing the program.

Future times can be examined by using the right arrow key to shift to the next half hour time interval. As shown in Figure 6, a

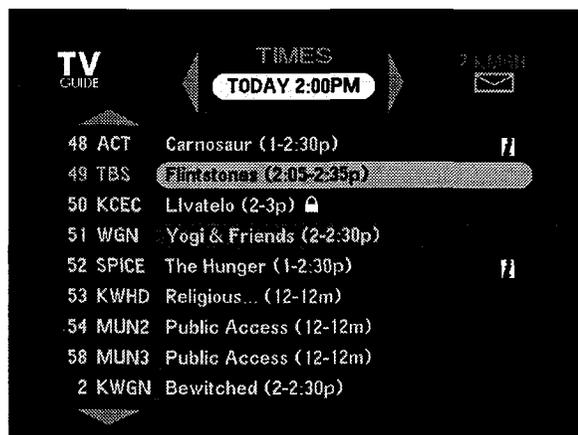


Figure 5. Listings by Time

“Reminder™” can be set by the customer if a future program is desired for viewing. If set, a Reminder™ legend will appear at the bottom of the screen shortly before the program is scheduled to be broadcast.

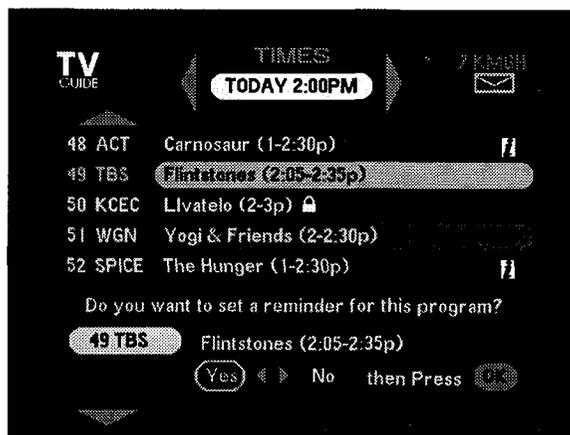


Figure 6. Setting a Reminder™

Other important features of the EPG are to provide support for various premium services offered by the cable operator. A screen which would allow premium services to be ordered from the EPG is illustrated in Figure 7. Impulse subscription to new services is a benefit which will certainly be explored in more detail as these applications are rolled out. Note that in this screen, HBO has already been ordered, as the check mark indicates that the customer is already a subscriber.

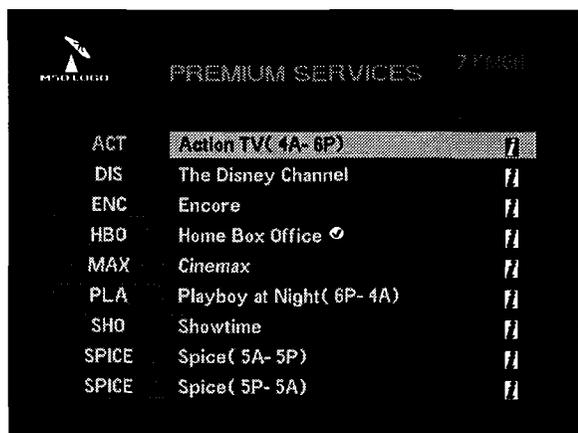


Figure 7. Pay Services

The last feature to be described in this paper is the “Lockout™” capability of the guide. Lockout™ features can be very powerful, as they can include limiting access by rating, theme, channel, or a specific program name. In all cases, a password or PIN code would be required to set Lockout™, and to access programs which have been restricted. Industry consensus on ratings codes would be beneficial to the success of such a feature.

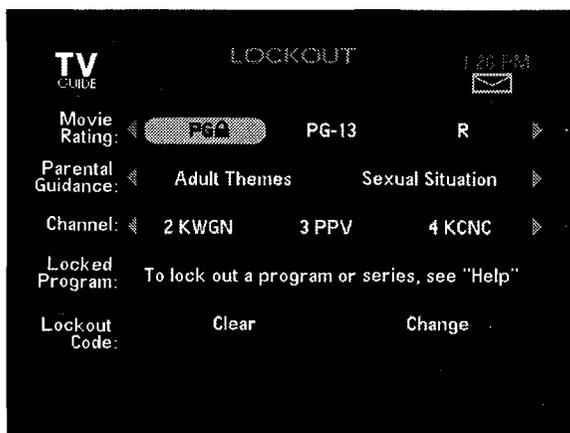


Figure 8. Lockout™ Screen

It is expected that many more features will be provided in a guide application as these products mature. However, it is important to keep the initial products easy to use, and yet offer powerful features that appeal to the consumer. This is the challenge of designing the user interface, as well as other aspects of the system.

The Future

This paper has explored the basics of an Electronic Program Guide. As with most products, there is much more that goes on behind the scenes to complete the implementation of the system.

Such topics as how to design the system to withstand power failures, perform in field

installation and training of the customers will need to be determined as these systems near deployment to the field. The frequency of listing data updates, application program download and how these relate to the data transmission channels which are available also need to be resolved for initial rollout of these systems.

As the first of a new breed of interactive products, EPG applications will have cable customers moving into new experiences in using their television sets. Based on initial research, market tests and first hand experience, there will be no turning back as this class of product will be an important new service for the industry.