

Introduction

Macrovision™ is a copy-protection scheme for analog NTSC, PAL, YUV, and RGB video signals, commonly used in the consumer market. Copy protection is implemented by modifying the video signal so that an analog VCR cannot track the video signal for recording, but a TV will still display a normal image. DVD players, digital settop boxes for cable and satellite systems, and VCRs all include Macrovision copy protection.

This application note goes over why Macrovision detection is needed for various markets, and how the HMP8117 NTSC/PAL decoder bypasses Macrovision copy protection using the Videolyzer algorithm. The HMP8117 is only available to Macrovision-authorized suppliers, and they are responsible for ensuring that all video sources that were originally copy protected, are re-encoded with copy protection.

Why Macrovision Detection Is Needed

As work progresses on the next-generation digital settop boxes, the desire to handle over-the-air broadcasts and other video sources, such as DVD players and VCRs, became apparent.

Satellite Settop Boxes

For satellite settop boxes, an outside antenna is commonly used to receive local TV stations not available via the satellite system. By routing these video signals through the settop box (Figure 1), on-screen menus, channel numbers, and other information may be overlaid onto the video signal before driving the TV. The MPEG2 decoder provides the ability to generate overlay or on-screen-display (OSD) information, in addition to decoding the MPEG stream from the satellite. Thus, the satellite and local TV stations are treated the same by the settop box, and present a common look and feel to the user.

In addition, many satellite settop boxes now support the ability to input other video sources, such as DVD players, VCRs, etc. The general concept is that all video sources go through the settop box to drive the TV. Again, this allows the ability to provide a common look and feel to the user, regardless of the video source.

However, many DVD and VCR sources are copy-protected. Without a NTSC/PAL decoder specifically designed to handle Macrovision, the video signals will not be properly decoded to allow adding the OSD information and re-encoding to drive the TV.

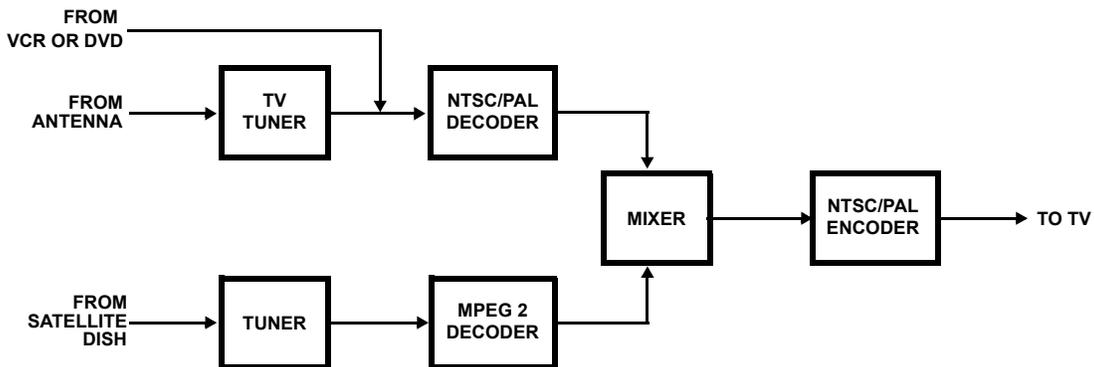


FIGURE 1. TYPICAL VIDEO PATH OF SATELLITE DIGITAL SETTOP BOX

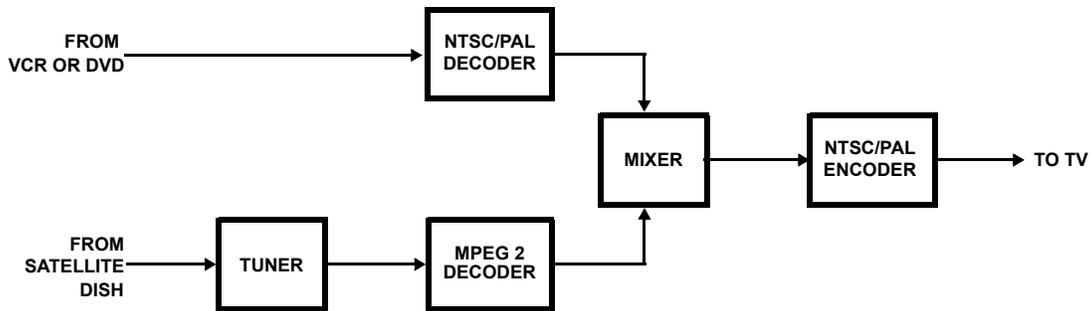


FIGURE 2. TYPICAL VIDEO PATH OF CABLE DIGITAL SETTOP BOX

Cable Settop Boxes

For cable settop boxes (Figure 2), a similar situation exists, except the handling of local TV stations is not required.

Televisions

Televisions are another application for video products such as the HMP8117 that detect Macrovision. Although Macrovision regularly tests many TVs to ensure they work with Macrovision, there are a few instances that create temporary customer dissatisfaction until the Macrovision algorithm is updated. By using such a product, the designer is assured that consumers will not experience any problems with Macrovision copy-protected video sources.

Detecting Macrovision

To detect Macrovision, the HMP8117 looks for any AGC and pseudo-sync pulses (AGCPSP) during the vertical interval. It also monitors the color burst information each line for the “color striping” technique used by DVD, where up to 4 out of every 20 lines have a portion of the color burst offset by 180 degrees.

However, just detecting Macrovision is not enough. The NTSC/PAL decoder must also compensate for the sync amplitudes to ensure the decoded video data is at the correct levels. Without the compensation, video data levels could be off as much as 25%, resulting in a picture excessively bright and saturated.

In addition, the settop box must re-encode the video with Macrovision again before driving the TV. Thus, the copy protection algorithm used by the source must be passed on to the software and NTSC/PAL encoder. The type of Macrovision used is conveyed to the software by two status bits:

- 00 = no copy protection
- 01 = AGCPSP present
- 10 = AGCPSP + 2 line color striping present
- 11 = AGCPSP + 4 line color striping present

An interrupt may be generated whenever these status bits change, allowing the software to determine the type of copy protection so the programming of the NTSC/PAL encoder (such as the HMP8173) can be adjusted.

The Macrovision algorithm may not be constant for an entire program, and may vary on a field-by-field basis. This information should be passed on to the software and NTSC/PAL encoder on a field-by-field basis.

Summary

This Application Note discusses why detecting Macrovision is useful for various market segments, and how the HMP8117 NTSC/PAL decoder implements Videolyzer Macrovision detection. As the first Macrovision-authorized NTSC/PAL decoder to implement this feature, settop box and TV design has become simplified.

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