

Revision History

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A	January 12, 2005	Initial release.

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Introduction

1.1 About This Manual

This document describes how to install Conexant's CX23882 and CX22702 DVB-Terrestrial (DVB-T) and PAL receiver card (henceforth called DVB-T and PAL card). The DVB-T and PAL card allows you to receive DVB-T and PAL broadcasts. The procedures include verifying that the DVB-T and PAL card is functioning properly. The DVB-T and PAL card, contained in the CX23882 and CX22702 DVB-T and PAL Evaluation Kit (EVK), is a single-height card that plugs into an unused PCI slot in a Windows PC.

The DVB-T and PAL card must be used in conjunction with an antenna to receive DVB-T and PAL broadcasts.

This document is organized as follows:

- ◆ Chapter 1: Introduction. Provides an overview of this document and direct video broadcast
- ◆ Chapter 2: Prerequisites. Lists the prerequisites for performing the remainder of this document
- ◆ Chapter 3: Installations. Describes how to install the DVB-T and PAL driver installation package, which includes the DVB-T and PAL drivers
- ◆ Chapter 4: Functional Verification. Describes how to verify that the DVB-T and PAL card works properly.

1.2 DVB-T Background

The DVB-T standard is based on Coded Orthogonal Frequency Divisional Multiplexing (COFDM). It is the youngest of the three core DVB standards and also the most sophisticated and flexible digital terrestrial transmission system. The CX23882 and CX22702 DVB-T and PAL card implements the complete DVB-T (ETS 300 744) standard and is DTG, EACEM, and NorDig compliant. The card supports 2K and 8K transmission modes.

1.3 DVB-T and PAL Component Overview

The CX23882 and CX22702 DVB-T and PAL card contains three primary parts:

- ◆ CX23882 broadcast video decoder (also used in MPEG Personal Video Recorder and TVFM designs)
- ◆ Digital and analog tuner
- ◆ CX22702 demodulator

The system components required for receiving DVB-T and PAL signals, shown in [Figure 1](#), are:

- ◆ Hardware:
 - CX23882 and CX22702 DVB-T and PAL card
 - DVB-T or PAL TV or PC monitor
- ◆ Software:
 - DVB-T BDA sample application or Graphedit software
 - Software MPEG decoder

The signal flow passes from the antenna to the DVB-T or PAL TV or PC monitor as follows:

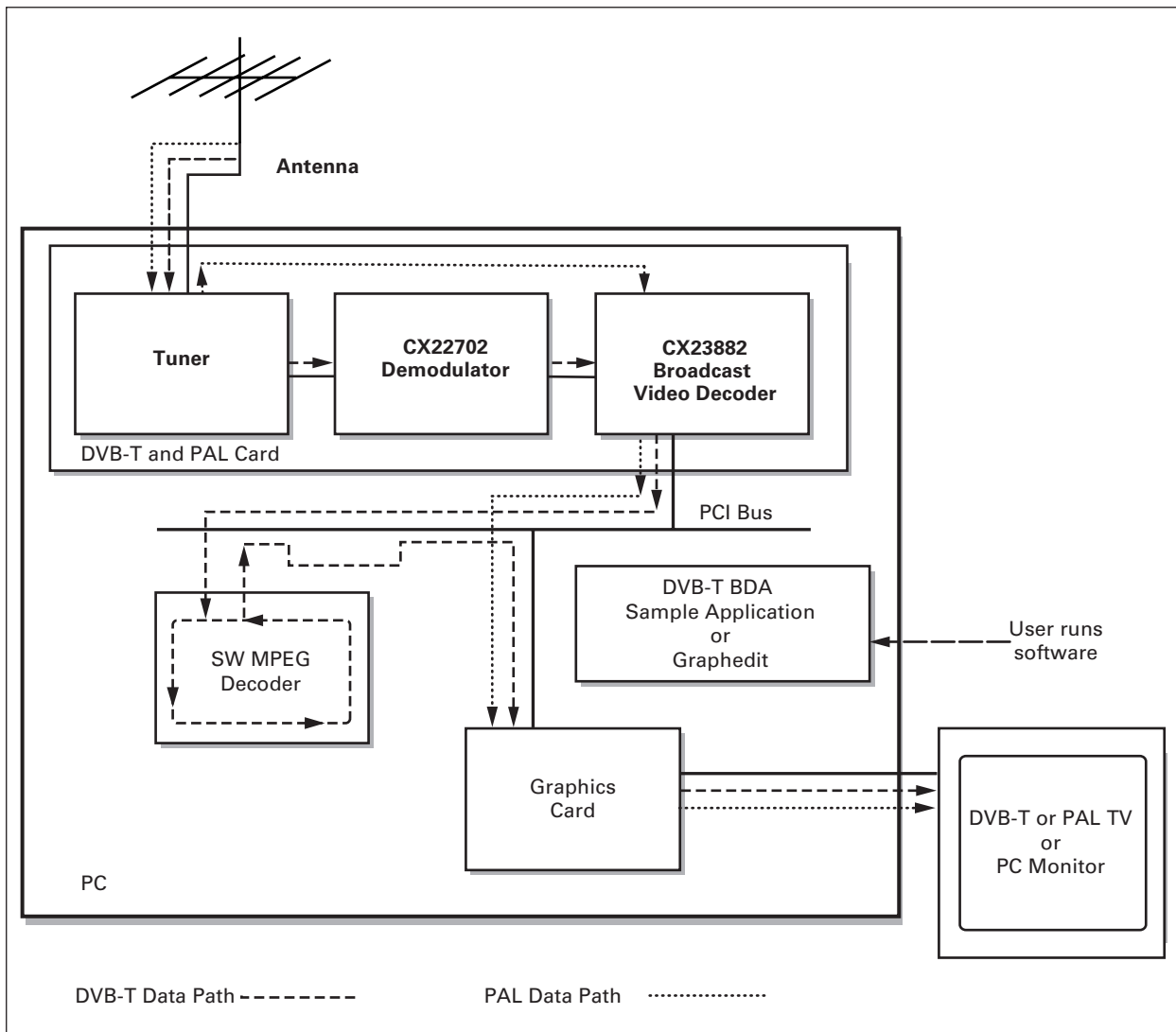
DVB-T Signals

1. The antenna, plugged directly into the DVB-T and PAL card, transmits the DVB-T signal to the tuner.
2. The tuner passes the received signal to the CX22702 demodulator.
3. The CX22702 demodulator extracts the MPEG Transport Stream (TS).
4. The extracted MPEG TS passes to the CX23882 broadcast video decoder.
5. The CX23882 broadcast video decoder passes the MPEG data to the PCI bus.
6. The MPEG decoder receives the MPEG TS through the PCI bus, decodes the MPEG TS, and passes the decoded data to the DVB-T TV or PC monitor.
7. A consumer runs application software DVB BDA or Graphedit (installed on the PC) to view the decoded MPEG data stream on the DVB-T TV or PC monitor through the PCI bus.

PAL Signals

1. The antenna, plugged directly into the DVB-T and PAL card, transmits the PAL signal to the tuner.
2. The tuner passes the received signal to the CX23882 broadcast video decoder.
3. The CX23882 broadcast video decoder decodes the analog signal and passes the decoded data to the PAL TV or PC monitor through the PCI bus.
4. A consumer runs application software DVB BDA or Graphedit (installed on the PC) to view the decoded data stream on the PAL TV or PC monitor through the PCI bus.

Figure 1. DVB-T and PAL System Components



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Prerequisites

This chapter describes the prerequisites for performing the tasks described in the remainder of this document.

2.1 System Requirements

2.1.1 Hardware

The minimum hardware requirements for running the test application used during DVB-T and PAL card functionality verification are:

- ◆ PC running Windows XP, XP Pro, or XP MediaCenter (aka XP MCE) operating system
- ◆ Minimum 1 GHz PC (robust enough for SW MPEG decoding)
- ◆ High-end graphics adapter card (64 MB memory minimum)

2.1.2 Software

The minimum software requirements for running the test application used during DVB-T and PAL card functionality verification are as follows. To determine if the below software is present on the PC, select Start button > Settings > Control Panel > Add/Remove Programs

- ◆ Microsoft DirectX 9.0 SDK or later
If not present, install per [Section 2.1.2.1](#).
- ◆ MPEG-2 software decoder (third-party software), such as InterVideo
If using a PC running the XP Media Center operating system, an MPEG-2 software decoder was originally installed on the PC. If an MPEG-2 software decoder is no longer present on the PC, install it.
- ◆ Conexant's DVB-T and PAL drivers
If not present, copy the DVB-T and PAL driver installation package (CX23880 setup .exe file) to your hard drive.
- ◆ Optional software for debugging: MPEG-2 transport stream diagnostic filter M2Tscope.ax
If not present, install per [Section 2.1.2.2](#).

2.1.2.1 Microsoft DirectX 9.0 SDK Installation

If DirectX 9.0 SDK or later is not installed, do one of the following:

- ◆ Download DirectX 9.0 SDK from Microsoft (www.microsoft.com) by doing a search for the SDK on the Microsoft Web sit, selecting the SDK for download, downloading it, and running the installer dx9sdk.exe or
- ◆ Install DirectX 9.0 SDK from disk by running the SDK installer dx9sdk.exe

2.1.2.2 MPEG-2 Transport Stream Diagnostic Filter Installation (Optional)

If an MPEG-2 transport stream diagnostic filter is needed for debugging, install M2Tscope.ax as follows:

1. Place a copy of M2Tscope.ax into \windows\System directory
2. Register M2Tscope.ax as follows:
 - a. Select Start > Run.
 - b. Enter `Regsvr32 \windows\system32\M2Tscope.ax`=
A message reports a successful installation

2.1.3 System Setup

The system components must be set up for functional verification.

Installations

At this point, you have performed the prerequisites, described in [Chapter 2](#).

This chapter describes how to perform the following procedures:

- ◆ Copy the sample application file
- ◆ Install the DVB-T and PAL card
- ◆ Install the copied DVB-T and PAL driver installation package

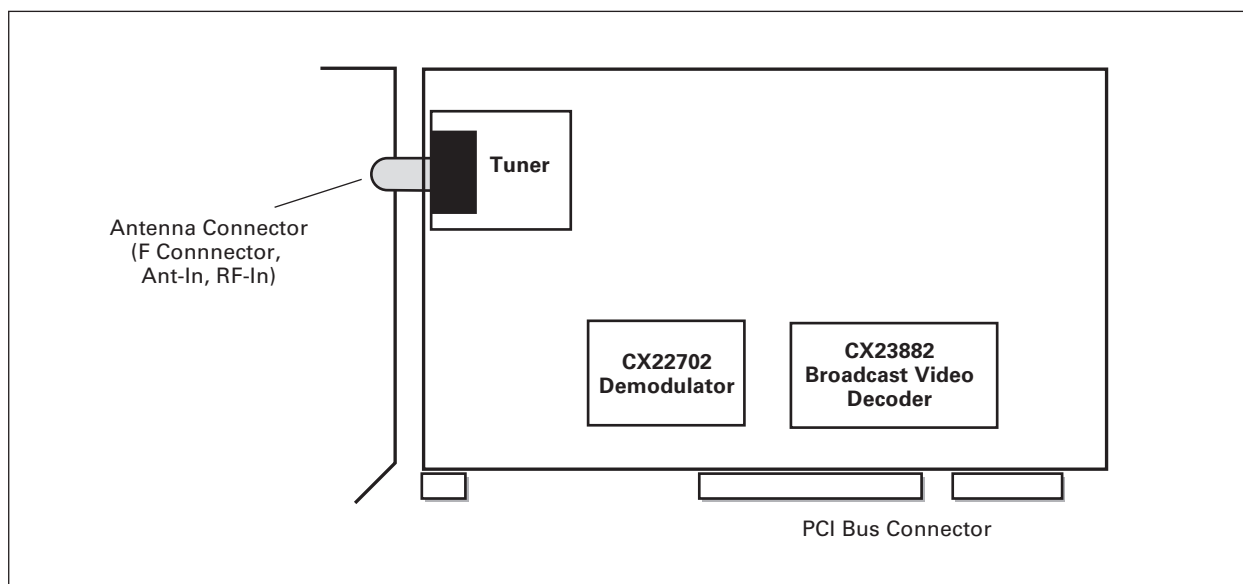
3.1 Copy the Sample Application File

Copy the Conexant sample application file, filename BDA DVBT.exe, to your PC desktop. The location of the sample application file to copy is stated in the EVK cover letter. You will execute and configure this file later, in [Chapter 4](#).

3.2 Install the DVB-T and PAL Card

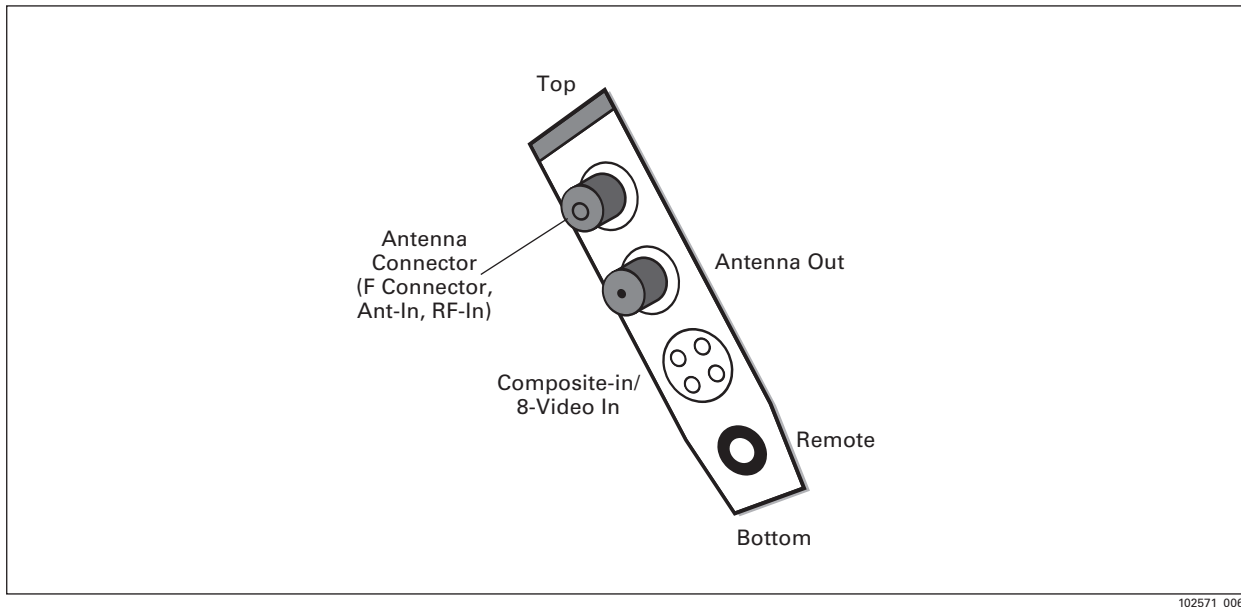
1. Power down the PC.
2. Install the Conexant DVB-T and PAL card into a PCI slot. To ensure that you are installing a Conexant DVB-T and PAL card, ensure that it contains the components specified in [Figure 2](#).

Figure 2. DVB-T and PAL Card



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3. Insert the RF connector into the "Antenna In" (F Connector, Ant-In, RF-In) connector at the top of the PCI card, as shown below.



4. Power up the PC.

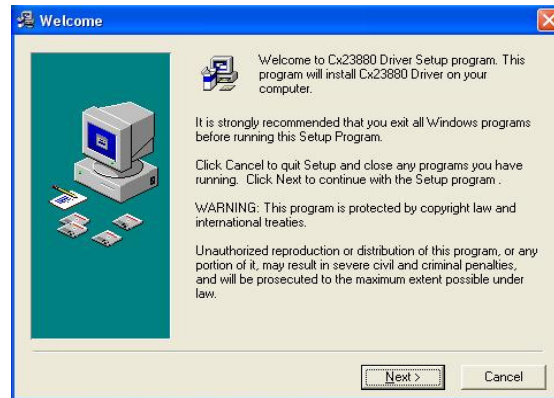
3.3 Install the Copied DVB-T and PAL Driver Setup .exe File

When you perform this step, you are executing the DVB-T and PAL driver installation package (CX23880 setup .exe file) that you copied to your hard drive as needed in [Chapter 2](#).

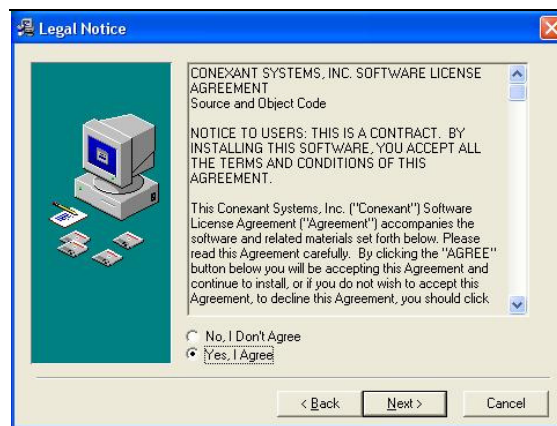
1. Run the setup .exe file by double-clicking the CX23880Setup[version number].exe icon at its installed location.
An "Initializing Wise Installation Wizard" message appears for a few seconds, indicating that the setup process has started.



A warning appears, asking that you terminate any running programs.

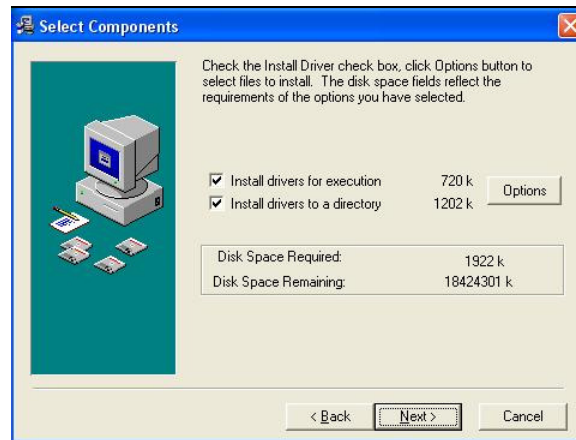


2. Terminate any running programs.
3. Click Next.
A license agreement appears.
4. Review the license agreement.
5. Do one of the following:
 - if you accept the terms, click the Yes, I Agree radio button, then click Next to continue the installation process.
 - If you do not accept the terms, click the No, I Don't Agree radio button. You will not be able to continue the installation process.



The remainder of this procedure assumes that you clicked “Yes” in step 5. A Select Components window appears with both types of installations selected (the default):

- Install drivers for execution
- Install drivers to a directory.

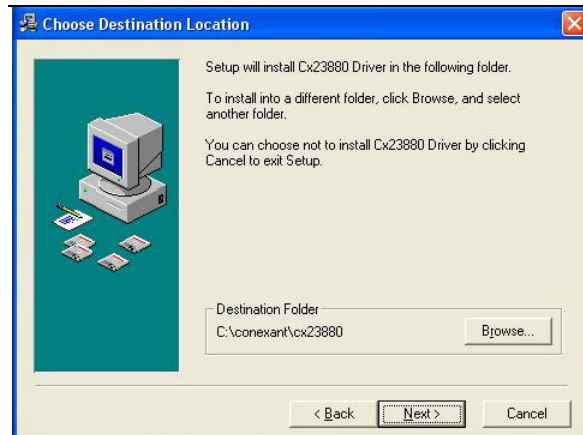


6. Keep both or only one checkmarked selection, as appropriate.
7. Make note of which selection or selections you have checkmarked; you will use this information later in this procedure.

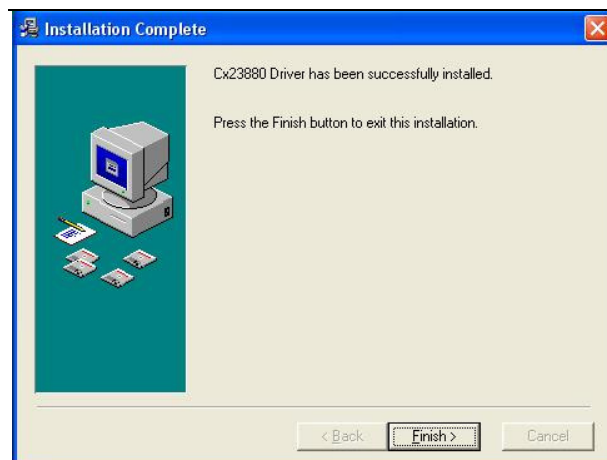
8. In the Select Components window, click Next.

One of the following occurs:

- If you checkmarked Install drivers to a directory location or both Install drivers for execution and Install drivers to a directory location in step 6, a Choose Destination window appears.



- If you checkmarked only Install drivers for execution in step , the Installation Complete window appears



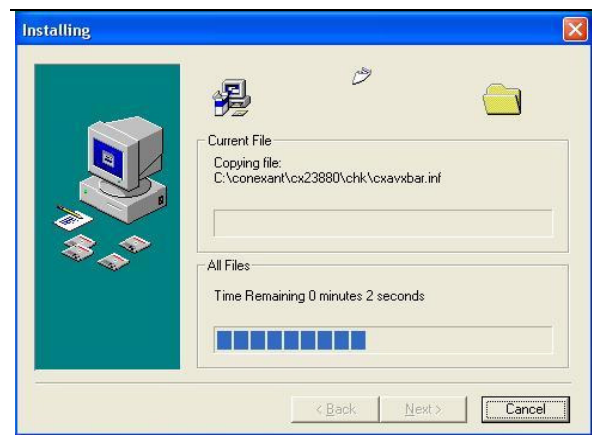
9. Do one of the following, depending on the type of window that is currently displayed:

- If a Destination window is displayed, continue with step 10.
- If an Installation Complete window is displayed, skip to step 11.

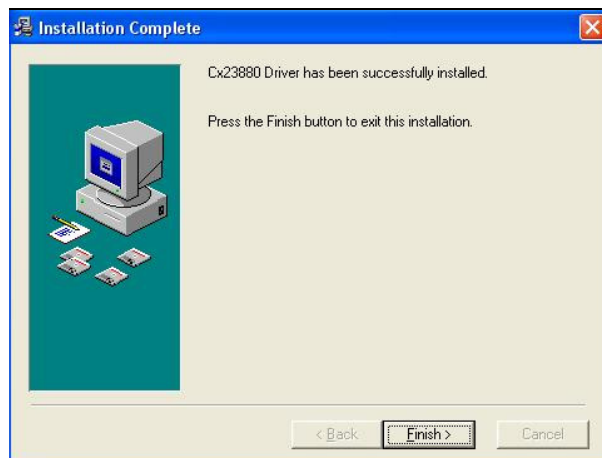
10. In the Choose Destination window, do one of the following:

- If you checkmarked *both* the Install drivers for execution selection and the Install drivers to a directory selection in the Select Components window in step 6, click Next.
- If you checkmarked only the Install drivers to a directory location in the Select Components window in step 6, click Browse or Next, as follows:
 - If you want to specify the driver directory destination, click Browse. In the resulting Select Destination Directory window, navigate to the desired location and then click OK.
 - If you want the drivers to be placed in the test application default location (C:\Conexant\CX23880), click Next.

An Installing window appears while the software driver files copy to the specified or default location.



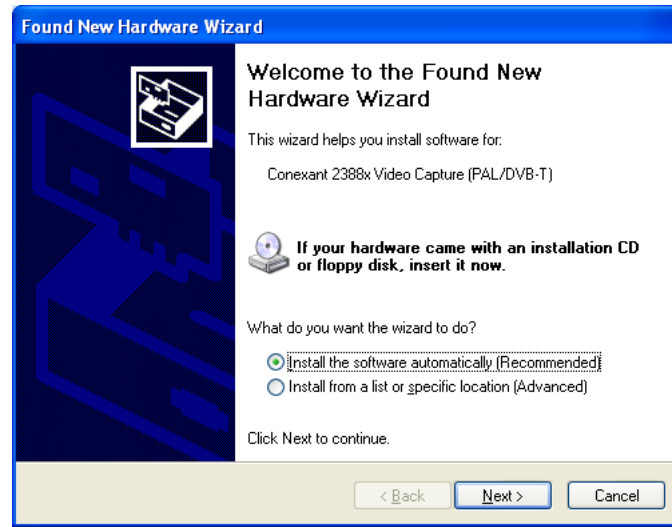
An Installation Complete window appears when the file copying is complete...



11. In the Installation Complete window, click Finish.

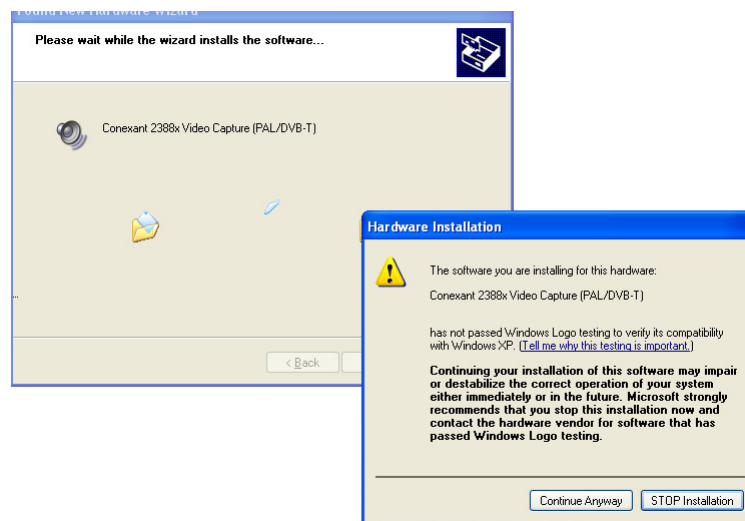
The Plug-and-Play Hardware Wizard scans for hardware changes.

When the Plug-and-Play Hardware Wizard finds the DVB-T and PAL card, a Found New Hardware Wizard "Welcome" window appears that asks what you want the wizard to do. This is asking where you want the driver files to be installed



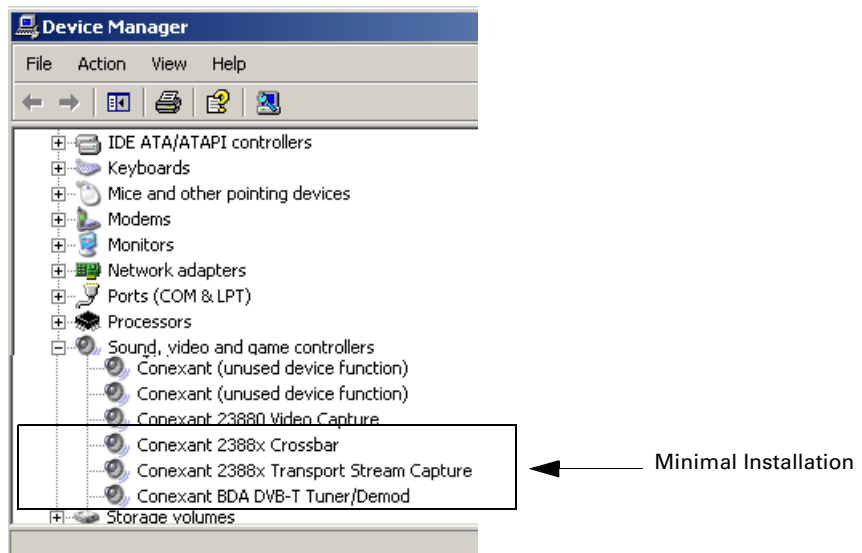
1. Select Install the software automatically (recommended).
2. Click Next.

In the Found New Hardware window, a “Please wait...” message appears that lists the found Conexant BDA DVB-T and PAL Tuner and Demod. If the newly installed drivers are not Microsoft-certified, a Hardware Installation window also appears. Microsoft-certification of a driver means that Conexant has tested the driver and that Microsoft has approved the test results.



3. Click Continue Anyway, allowing the software driver installation process to continue.
The Found New Hardware Wizard “Welcome” window appears for each remaining DVB-T and PAL card-related hardware device that the Plug-and-Play Hardware Wizard finds during this installation process.
4. Click Next and Continue Anyway as needed until the Welcome window no longer appears.

5. In the Device Manager window, open the Sound, video and game controllers directory to verify that the drivers have been installed. Several versions of the DVB-T and PAL card exist, and previous hardware installations may have resulted in driver installations; the list of drivers in the Device Manager will therefore vary. Verify that at least the three drivers indicated as "Minimal Installation" below are listed.



Functional Verification

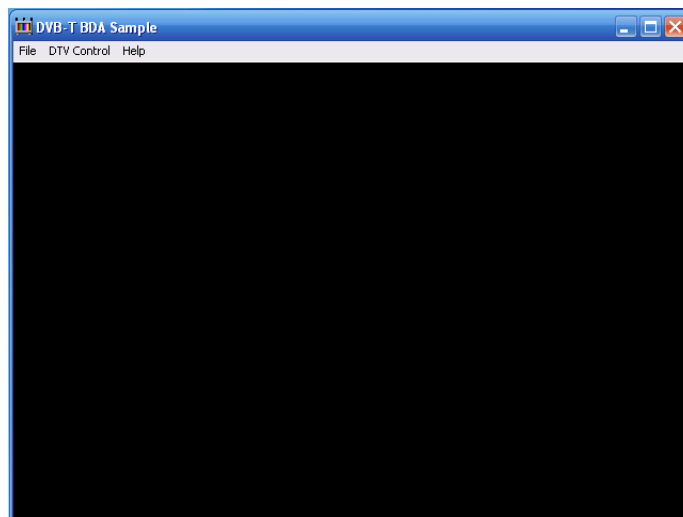
This chapter describes how to verify that the DVB-T and PAL card is working properly. The test uses a small, Conexant-designed TV software application, the installed DVB-T and PAL drivers, and a selected antenna to test the DVB-T and PAL card.

To perform the functional verification, do the following two tasks:

- ◆ “DVB-T Testing” on page 21
- ◆ “PAL Testing” on page 23

4.1 DVB-T Testing

1. Do one of the following:
 - From the command line, enter "BdaDVBT.exe" or
 - Double-click the BdaDVBT.exe icon, on your desktop (copied there while performing the steps in [Chapter 3](#)).The DVB-T BDA Sample window appears.



2. In the DVB-T Sample window, select DTV Control > Build Graph.
3. Wait a few seconds.

4. Select DTV Control > Run Graph.
The sample application builds a graph without your observing it. The window remains blank.

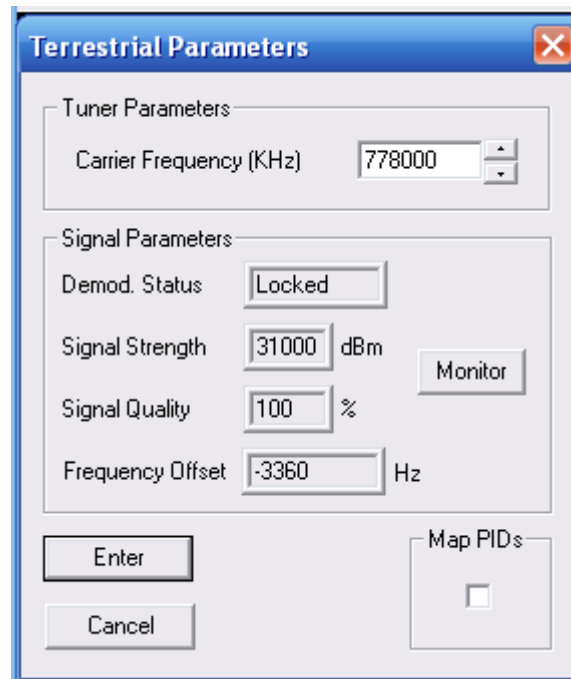
NOTE:

If the sample application is not able to build a graph, an error message appears, as follows:

If your PC is running the Microsoft XP or XP Pro operating system, two possible causes of an error message are: (1) missing or corrupt software MPEG decoder or (2) incorrect Conexant DVB-T and PAL card installed. For causes other than these, contact a Conexant FAE to help resolve.

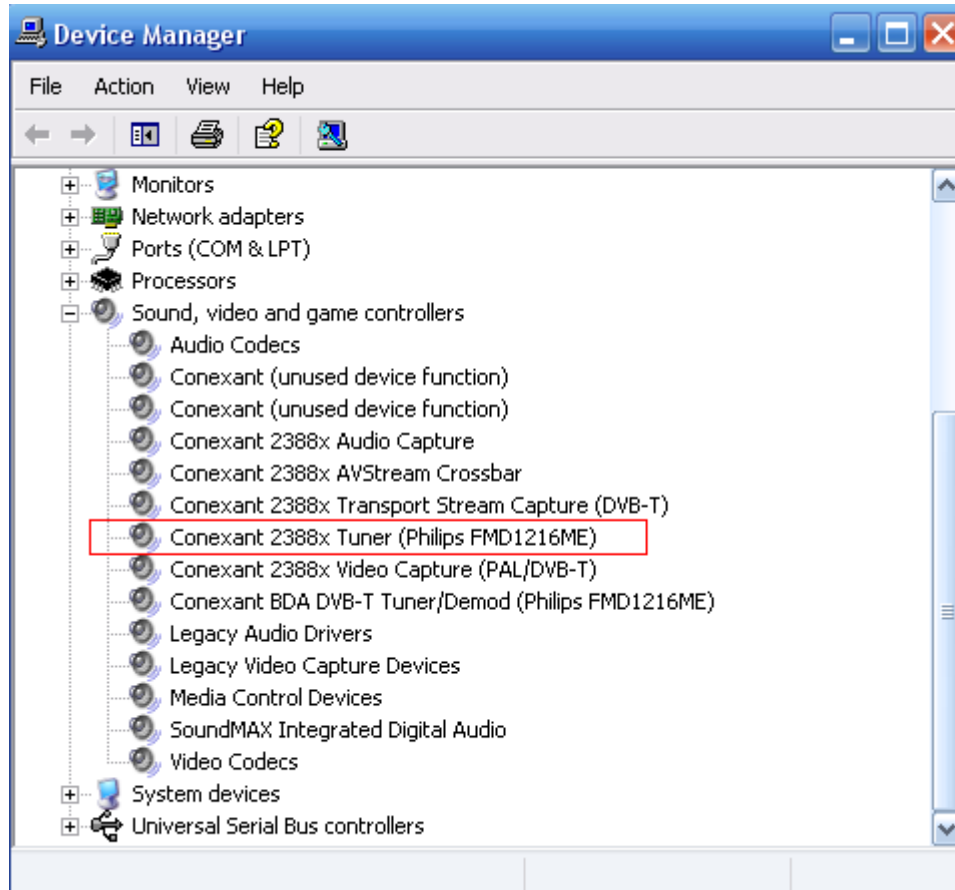
If your PC is running the Microsoft MediaCenter operating system, two possible causes of the error message are: (1) a software MPEG-2 decoder is not currently present on the PC or (2) the installed graphics card is too old to be compatible with the MediaCenter operating system, requiring that it be replaced with a newer graphics card.

5. Select DTV Control > Select Channel.
A tuning window appears with the default settings for the test application.
6. Select DTV Control > Select Channel.
A Terrestrial Parameters window appears with the default settings for the test application, similar to the following.



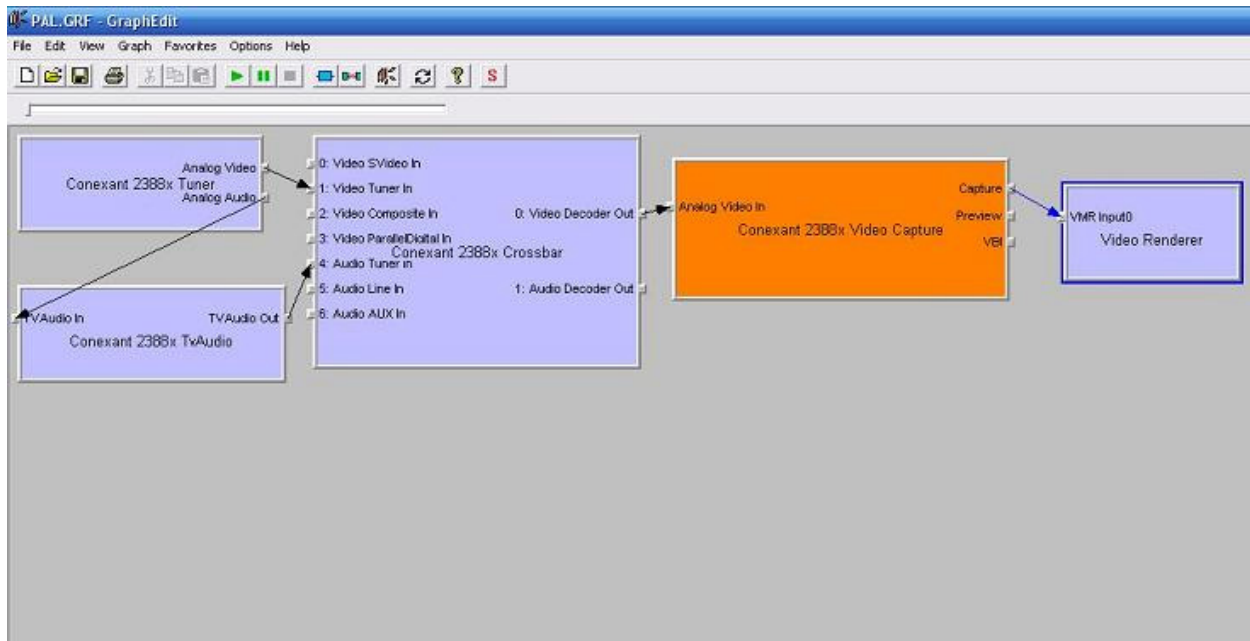
4.2 PAL Testing

1. Open the Device Manager window.
2. Review the Sound, video and game controllers listing to confirm that “Conexant 2388x Tuner (Philips FMD1216ME)” is listed. This indicates that the board is capable of receiving analog broadcasts in conjunction with digital TV broadcasts.

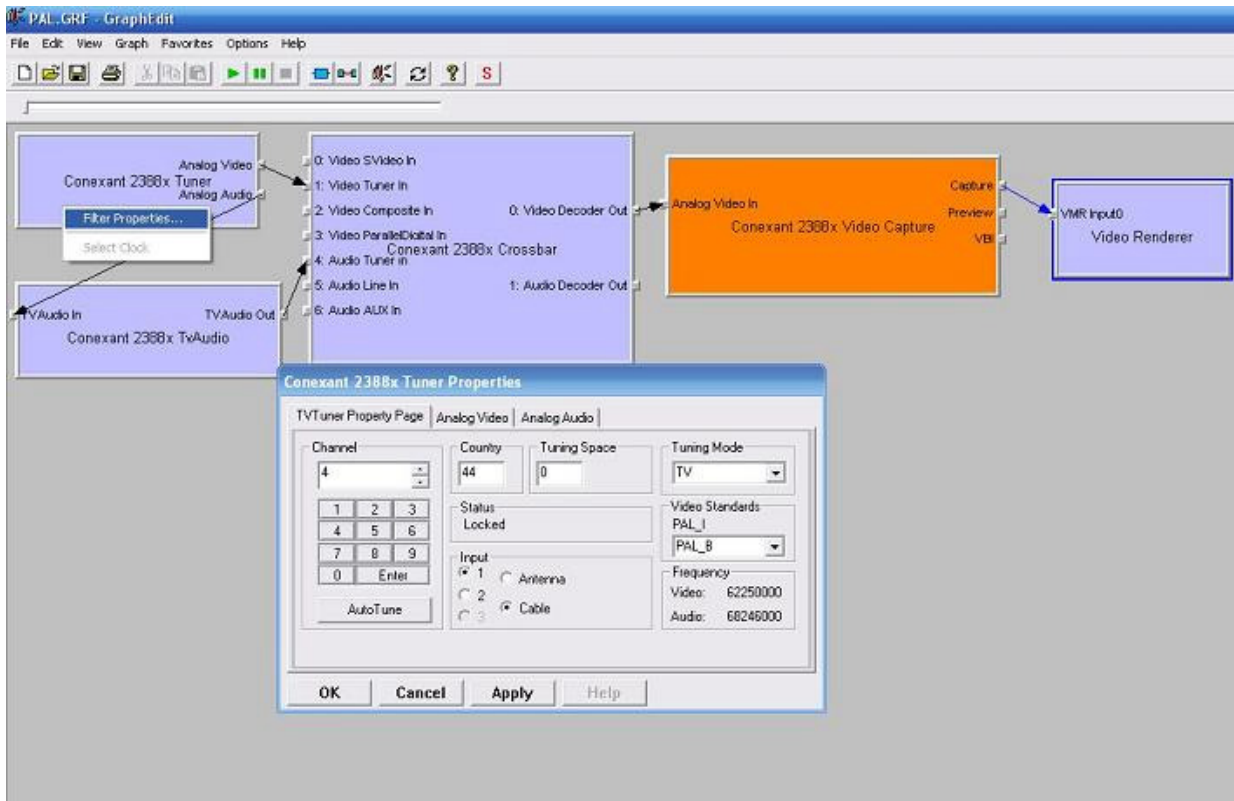


3. Use the Graphedit application to insert filters corresponding to all filters listed in the graph below. This graph is what you will use in the remaining

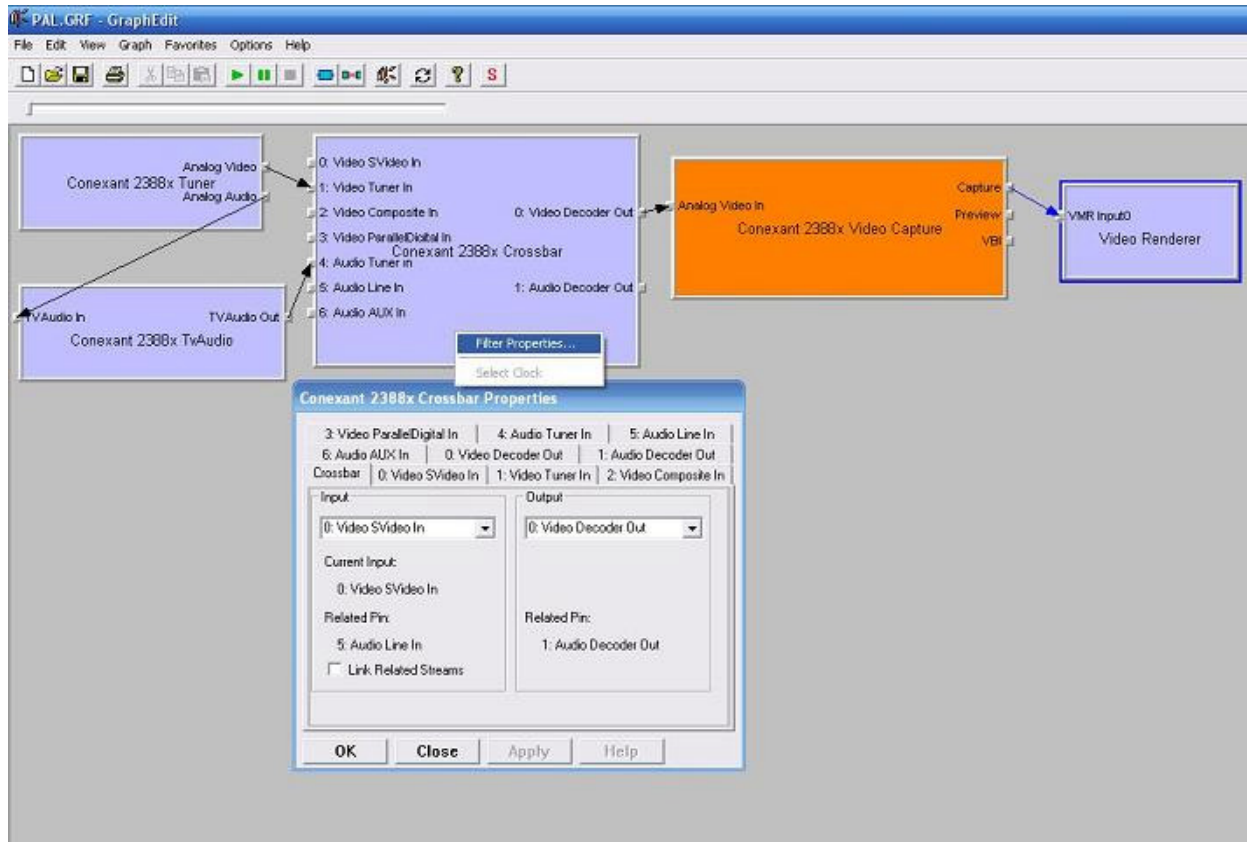
procedure to verify that the analog portion of the board is functioning properly.



- Right-click Conexant 2388x Tuner, and select Tuner Properties from the resulting menu. The Conexant 2388x Tuner Properties window appears.

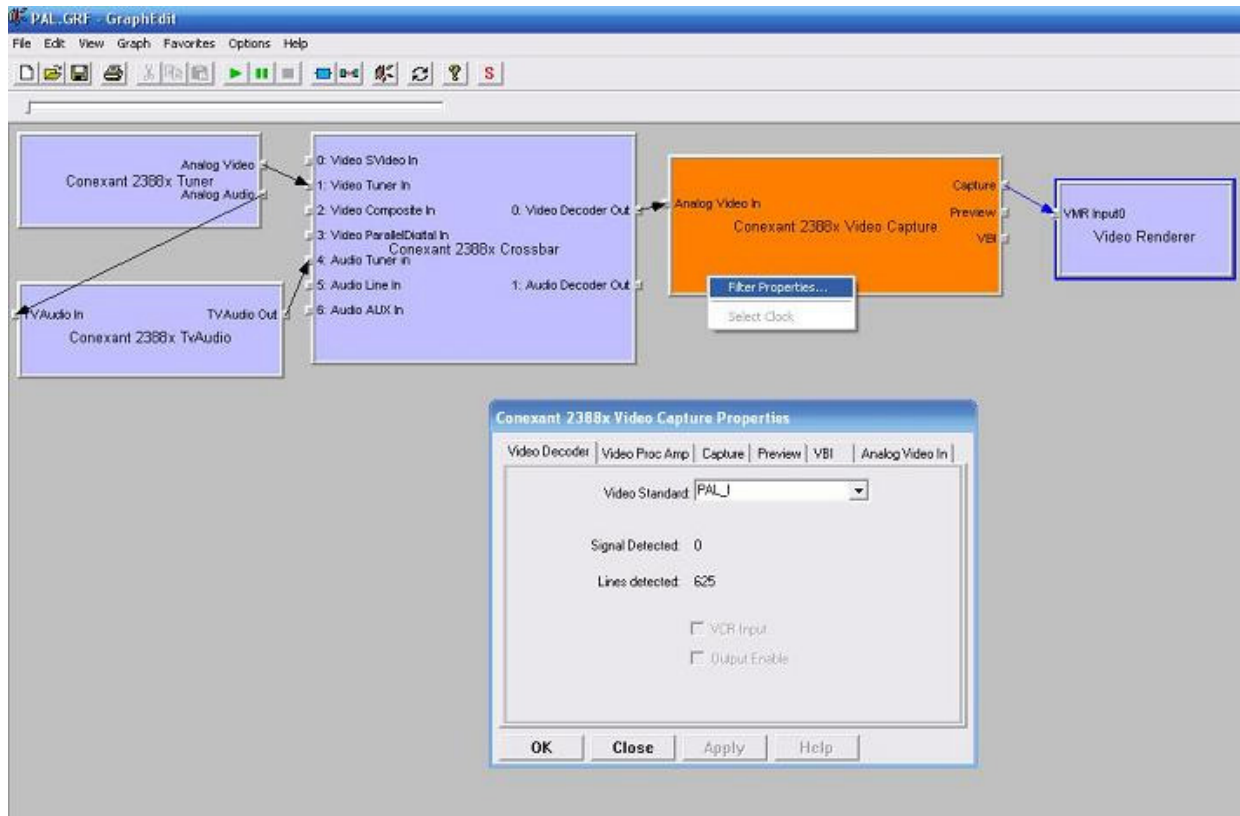


5. Tune to the desired channel, using all the fields in the Conexant 2388 Tuner Properties window.
6. Click OK.
7. Right-click Conexant 2388x Crossbar, and select Filter Properties from the resulting menu.
The Conexant 2388x Crossbar Properties window appears.

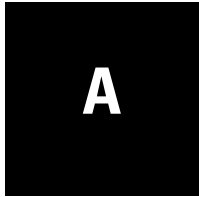


8. Set the Input and Output of the board, using all the fields in the Conexant 2388x Crossbar Properties window.
9. Click OK.

10. Right-click Conexant 2388x Video Capture, and select Filter Properties from the resulting menu.
The Conexant 2388x Video Capture Properties window appears.



11. In the Conexant 2388x Video Capture Properties window, verify that PAL appears in the Video Standard field.
12. At the top of the PAL_GRF GraphEdit window, press the Play button on the menu bar.
13. Wait a few seconds.
A window appears, streaming an analog broadcast. This indicates that the DVB-T and PAL board is able to receive PAL broadcasts.

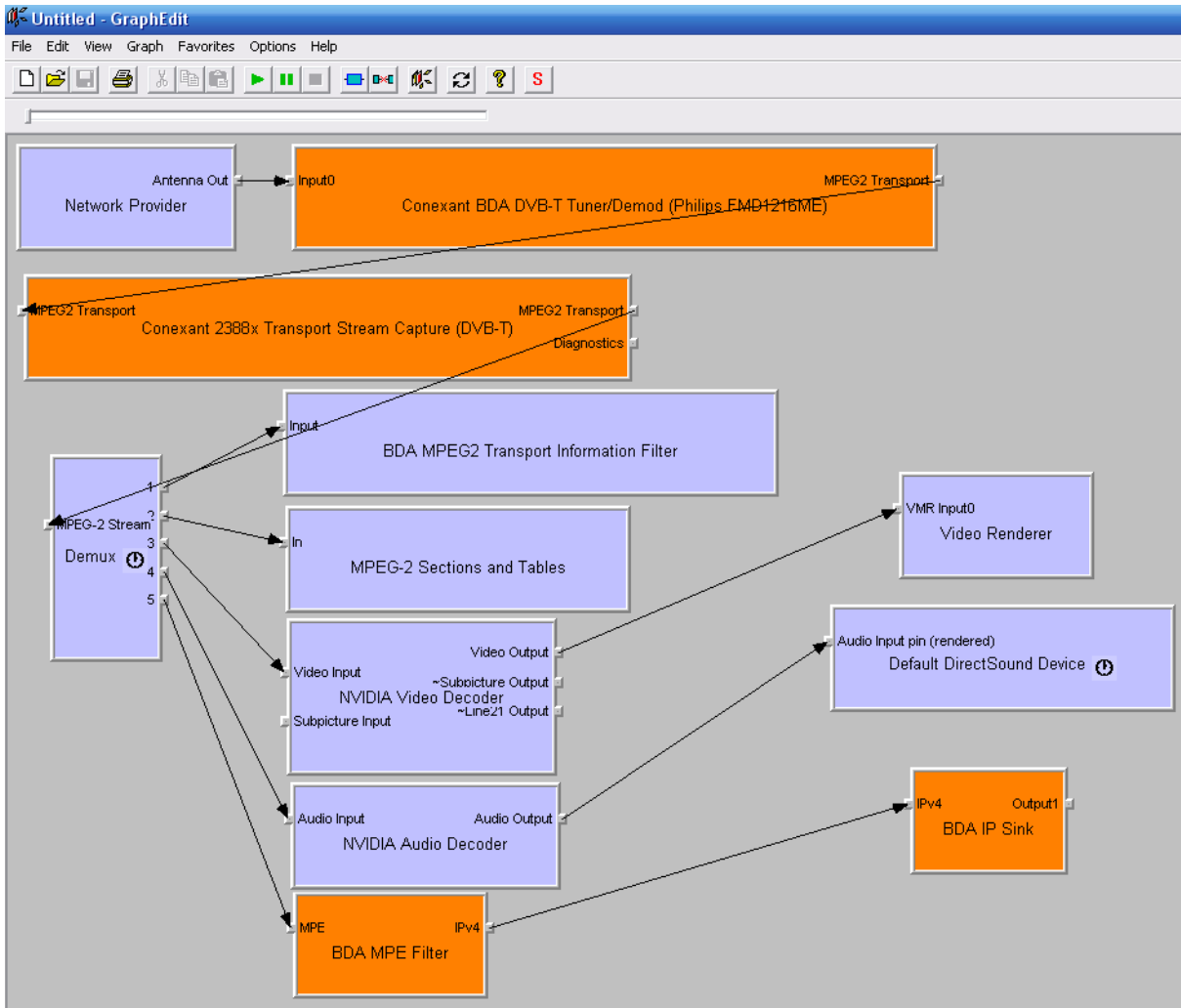


Graphedit Sample Graph

This appendix provides an example of a graph built by the DVB-T Sample Application and then copied using the Graphedit application. In this example, an InterVideo software MPEG decoder was installed on the PC.

Figure 3 shows the sample graph.

Figure 3. DVB-T BDA Sample Application Graph from Graphedit



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