Recording HDTV to ReadyNAS 600

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Introduction

Last few years, the popularity of High Definition Television (HDTV) has increased dramatically. The chicken or the egg dilemma of content availability versus cost of the HDTV hardware is no longer an issue. Currently, a HDTV ready TV can be bought for less than $500 and some available as low as $300. Most, if not all, of the content providers, such as cable and satellite providers, offer HDTV channels in their line up. The FCC mandates that all TV signals be in HDTV by 2006 and most of the stations seem to heading in that direction.

So the content is available but what about ability to record these programs to view at your own time? Currently, there are only a few options available. The ones heading this pack are the satellite providers, namely DirecTV and Dish Network. Each company offers one model of HDTV recorder or Personal Video Recorder (PVR) (DirecTV HD DVR and Dish Player-DVR 921) and both have suggested retail price close to $1,000. For DirecTV, few other companies provide their own HD DVR compatible with DirecTV but the price is in the similar range. DirecTV uses Tivo for content management and Dish Network uses Dish Video-on-Demand Service.

For cable companies, the options are more limited. Currently, Comcast is offering a DVR to limited area for testing and you can only rent the device. Other cable companies are in a similar situation. For Comcast, the rental cost range from $5 to $12 per month depends on which service you are subscribing. One drawback with the current model is that it has a smaller capacity so the number of hours you can record is limited.

There are few independent companies making other models, which are content provider agnostic and records from any HD source. However, the prices tend to be well above $1,000 and not very easy to use.

There is an alternative to all these options, which is to use your personal computer (PC) to record the HDTV signal. Few major advantages you get from this set up include: flexibility, lower cost and security. Since most likely you already own a PC, the majority of the cost is already invested. Secondly, since you can add any storage devices to your PC, you are not limited to the disk drive that comes with enclosed systems. Lastly, you can protect your data by using a RAID configuration, unlike other systems. So, if the hard drive dies in other systems, you will lose all your content.

The major disadvantage of this system is the programming guide. Although the programming guide that comes with most systems are usable, companies like Tivo, who specializes in this field and have been at it for a long time, provides better user interface.

This paper will try to show a step by step instruction on how to set up a HD PVR on your computer using ReadyNAS 600 system for large capacity and data protection.

Requirement

First of all, you will need a PC, ReadyNAS600 system all attached to a local area network via Ethernet.

Following system configuration and network router is minimum requirement to install ReadyNAS 600 and Personal Video Recorder.

System Requirement:
- PC with PIII 333MHz or Faster Processor
- 64 MB RAM Memory
- CD-ROM Drive
- PCI 2.1 Compliant Expansion Slot
- Sound Card
- VGA card (PCI or AGP) which supports video overlay (NVidia, S3, ATI, etc.)
- Internet Explorer 5.5 or higher for Web Viewing and Web-based Configuration
- Active-X 8.0 or higher
- Windows 98SE/ME/2000/XP
- Windows Media Player 7 or higher
- Windows Media Center (Recommended)

Network Router: wired (minimum 100 based Ethernet) or wireless (minimum 802.11b Wi-Fi, 802.11g preferred)

Storage: ReadyNAS 600 (can also be used for general uses like backup)

Personal Video Recorder: Any PVR PCI Card and Optional DVI/DFP Daughter Card.

HDTV signal source: Antenna for direct broadcasts, cable or satellite.

We will make an assumption that you have the PC and the ReadyNAS 600 system already and do not need to purchase them. The Personal Video Recorder can be any PVR PCI Card that can attach to your PC PCI Slot. We also recommended you to purchase PCI DVI/DFP Daughter Card for True High Definition resolution video capturing. We have chosen Digital TV Receiving MyHD Model MPD-120 with DVI Daughter Card Package from Macro Image Technology in our example.

You will need a gateway/DHCP server on the network. Make sure you "Enable" the DHCP setup under your router and all the systems on the network. Otherwise, your network will not recognize the ReadyNAS. Typically, most routers and PCs come with DHCP as a default.

Typical cost to be expected for this project is as follows:

Routers*	$50 to $85
PVR PCI Card	$200 to $350
Total	$250 to $435

* Not needed if you already have a home network set up.

This is a typical price you can expect to find on the web and is not a guaranteed price.

Finally, your storage needs should be base on your video quality requirement. Typically, a 720x480i resolution at 3.5 Megabits per second is good for most home uses. Using that set up, expect to store about 2GB/hour of raw video.

Step by step ReadyNAS Setup

1. Make sure your PC is connected to your LOCAL Network Router and Router is Setup for DHCP.

2. Insert the Setup CD Provided by ReadyNAS 600 in your PC CD-ROM Drive. Run the RAIDar installation program, and the Welcome screen should appear.

3. Follow the RAIDar setup wizard.

4. After completing the RAIDar setup wizard, you will see NAS Device setup screen. This is where you locate your NAS System by MAC ID Address of your system.

5. Select your NAS Device and click *Setup* to setup your Device.

6. Follow the Setup Wizard.

7. Create the Share folder under VOLUME section on your NAS System. For example we have created a shared called VideoData.
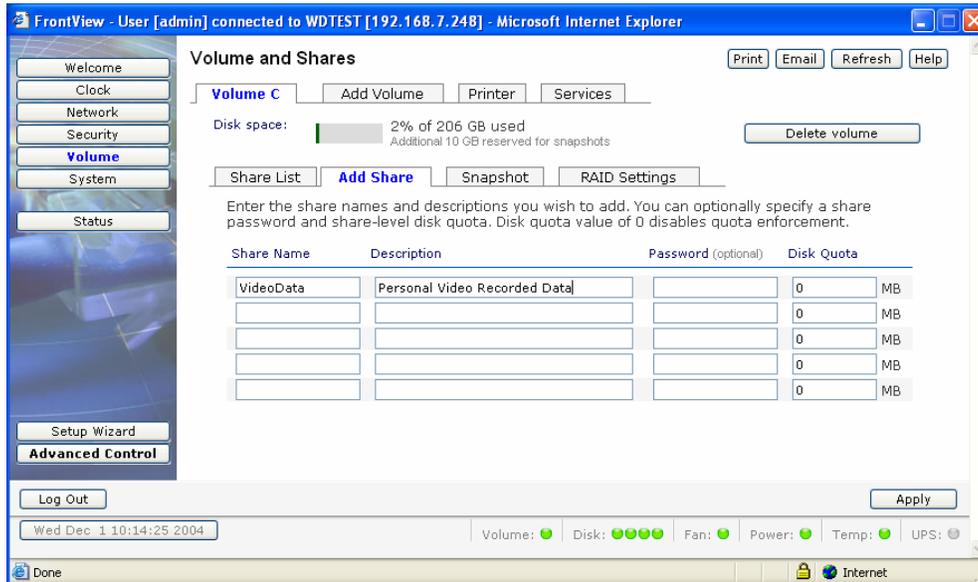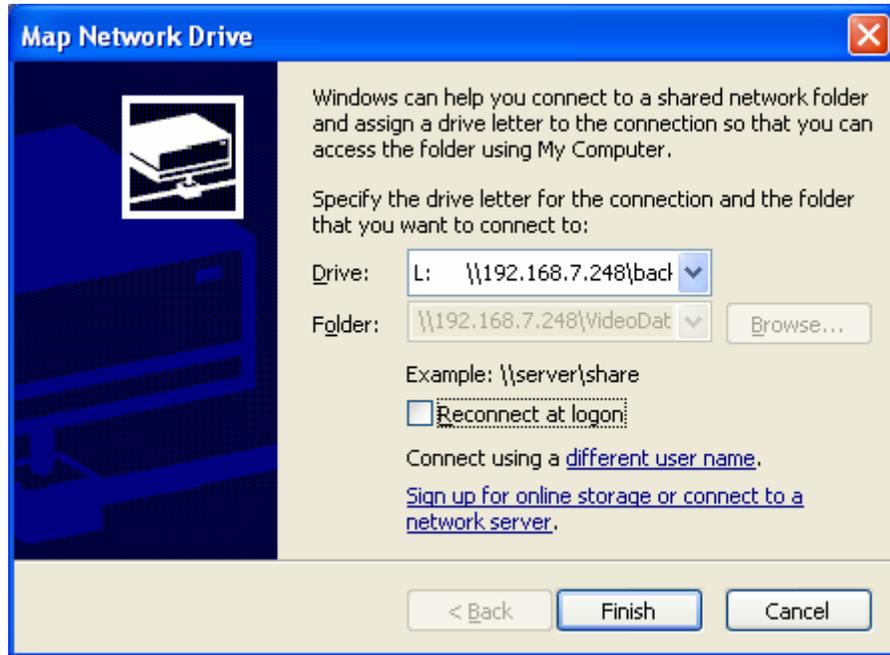
8. Complete the Setup Wizard and Click *Logout*.

9. By now your ReadyNAS 600 device is configured and setup for sharing.

10. Select your NAS from RAIDar and Click on "Browse".
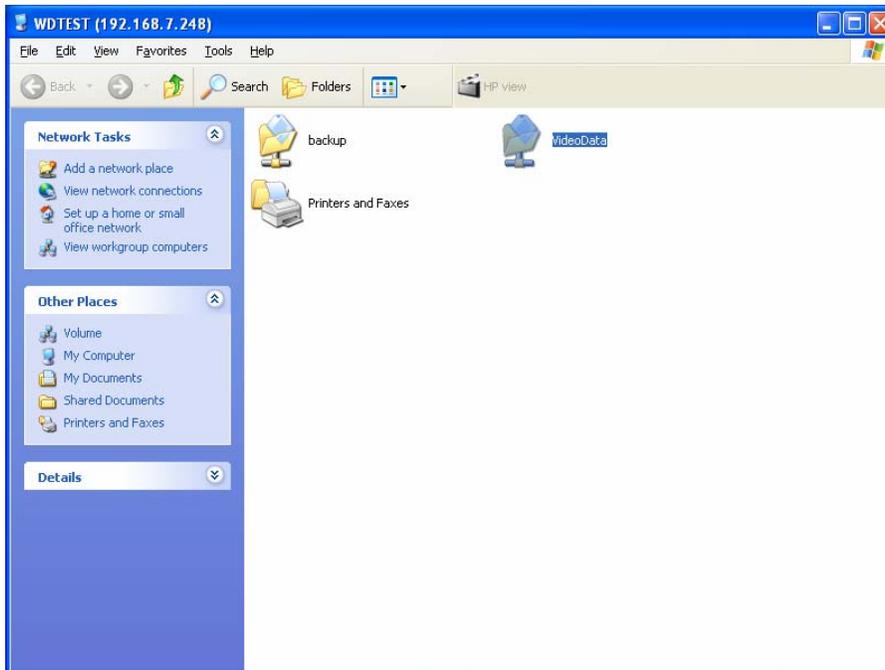
11. Select the folder you created "VideoData", Click on Right Mouse and Choose "Create a Network drive"

12. Drive Letter can be anything you like, but we use "L" in our example.

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13. Check on "Reconnect at Logon"


14. Click Finish

15. By now your Share Folder is configured as Network Drive "L" and you can access into the folder as your Hard Drive from Windows Explore or My Computer.

16. Create a folder call "HDTVData" on your Network Drive "L".

Step by step Hardware installation

To install the **MyHD** board, follow the steps listed below:
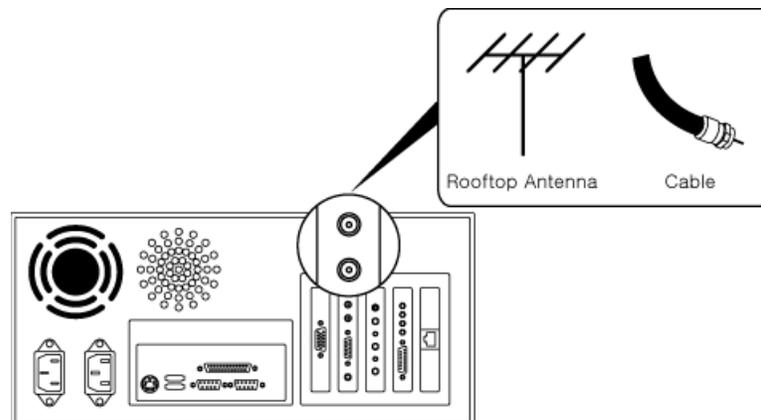1. With the power off, remove your computer cover and locate an available PCI slot
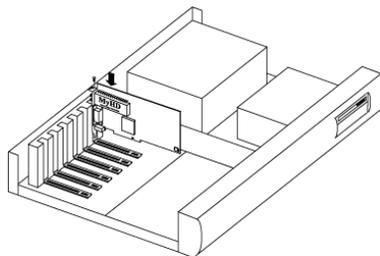
2. Remove the screw attached to the slot cover and remove the slot cover plate.

3. Before handling the MyHD card, ground yourself by touching the power supply box inside your computer

4. Position your card directly above the PCI slot and insert the card firmly into the slot. Care should be taken to press it evenly and snugly into its slot.

5. Use the enclosed jumper cable to connect the audio output of the MyHD card to the LINE IN, AUX or CD input of your PC sound card or motherboard.
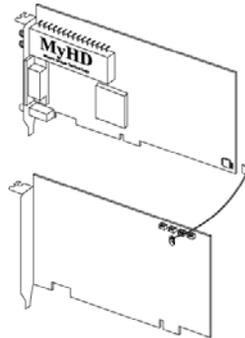

**If the audio output is set by the jumper cable in the MyHD application program, you have to connect the jumper cable between the MyHD card and a sound card. However, you do not need to do it when the audio output is set by wave in the MyHD application program.

6. If you purchased the PCI DVI/DFP Daughter Card Separately, Go ahead and Position your PCI DVI/DFP Daughter card to next available PCI slot and insert the card firmly into the slot. Care should be taken to press it evenly and snugly into its slot.

7. Replace the cover on the computer.

8. Attach the antenna lead from your rooftop antenna or cable system to the antenna input of the MyHD card.

Rooftop Antenna   Cable

How to connect your PC & HDTV:

You will need the following connector connect your PC and HDTV.

Connecting Without DVI Daughter Card:

Configuration #1 - HDTV with RGB inputs or PC monitor. Connect the loop-back cable to your HDTV card, and connect your monitor cable to your monitor or HDTV. Some HDTV sets with RGB inputs often require VGA to RGBHV (5BNC or 5RCA) cable. Please note, when in full screen HDTV mode, you desktop will not be functional.

Component Dongle users: When using a dongle which converts the VGA output of a video card to component signal, the configuration is similar to above, however you will need to convert the connections to accommodate the MyHD octopus cable (shown at the top). We recommend Breakout Pigtail VGA Female to RGBHV 5 BNC Male Plug.
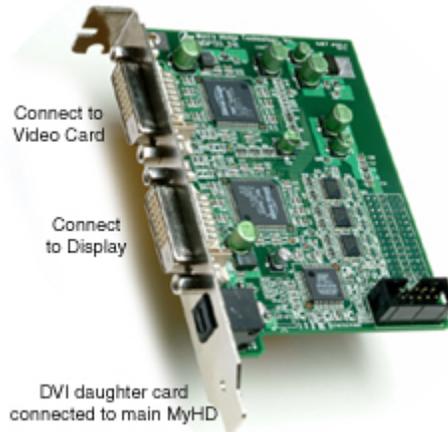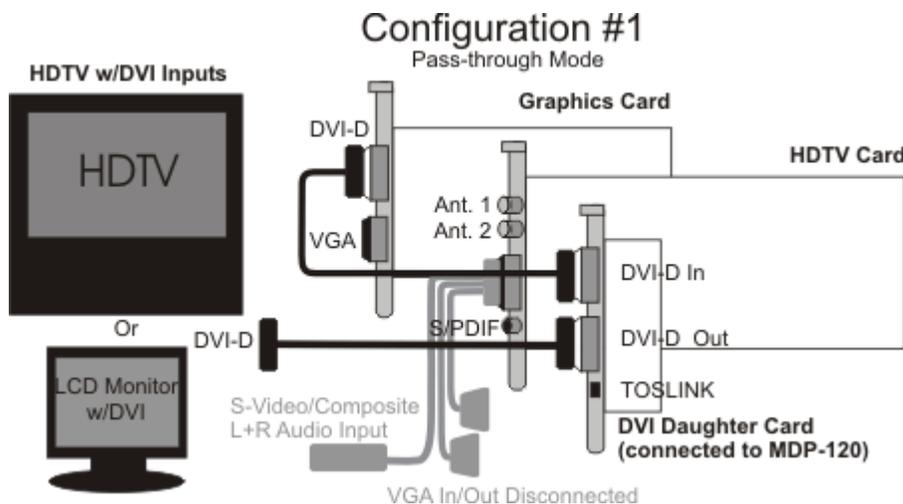
Configuration #2 - HDTV with DTV Component (Y-Pb-Pr) input. Configuration #2 displays separate connections to a computer monitor and HDTV card. In this configuration, the output of the HDTV will be set to Y-Pb-Pr output accessed through the setup menu. VGA to Component breakout cable is required. The PC desktop will be displayed on the monitor, and the HDTV broadcast can be viewed on you HD-Ready TV.
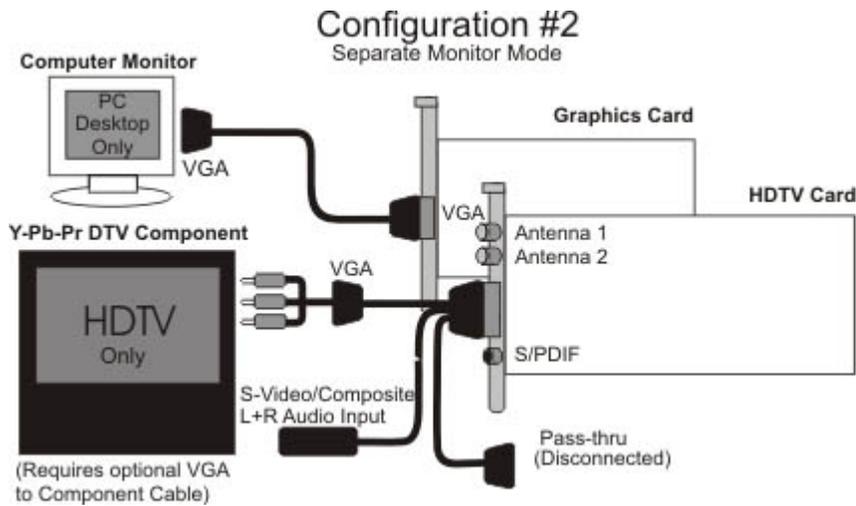
Connecting With DVI Daughter Card:

Connect to
Video Card

Connect
to Display

DVI daughter card
connected to main MyHD

Configuration #1 - HDTV or PC Monitor with DVI inputs. To connect to one display and toggle between the PC desktop/full-screen HDTV, connect the loop-back cable between DVI output of your video card and the MyHD DVI Daughter Card input. Connect another DVI cable from the DVI Daughter Card output to your HDTV or Monitor's DVI input.

Configuration #1
Pass-through Mode

HDTV w/DVI Inputs

HDTV

Or

LCD Monitor
w/DVI

Graphics Card

DVI-D

VGA

DVI-D

Ant. 1
Ant. 2

S/PDIF

HDTV Card

DVI-D In

DVI-D Out

TOSLINK

DVI Daughter Card
(connected to MDP-120)

S-Video/Composite
L+R Audio Input

VGA In/Out Disconnected

Configuration #2 - HDTV and PC Monitor in Separate Monitor Mode. Configuration #2 displays separate connections to a computer monitor and HDTV both with DVI inputs. PC Monitor can also be connected to the VGA but MDP-120's VGA and DVI outputs cannot output full-screen HDTV simultaneously to two different displays in. DVI daughter card also adds TOSLINK audio output feature to the MDP-120.

Configuration #2
Separate Monitor Mode
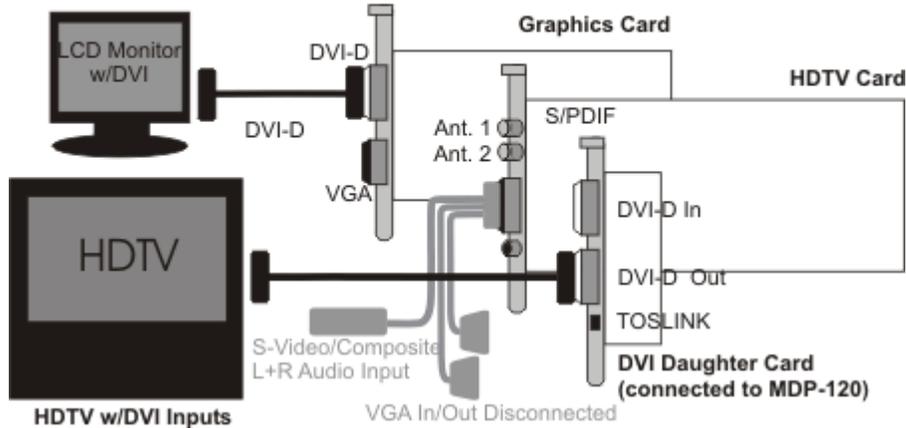
Step by step Software Installation

1. After your hardware installation has completed, turn on your PC and inserts the installation CD. As Windows begins to boot, it will automatically open the "Found New Hardware Wizard" once it detects your addition of the MyHD card Click on "Next >"

2. Choose "Install from a list or specific location (Advanced)" and click on "Next >".

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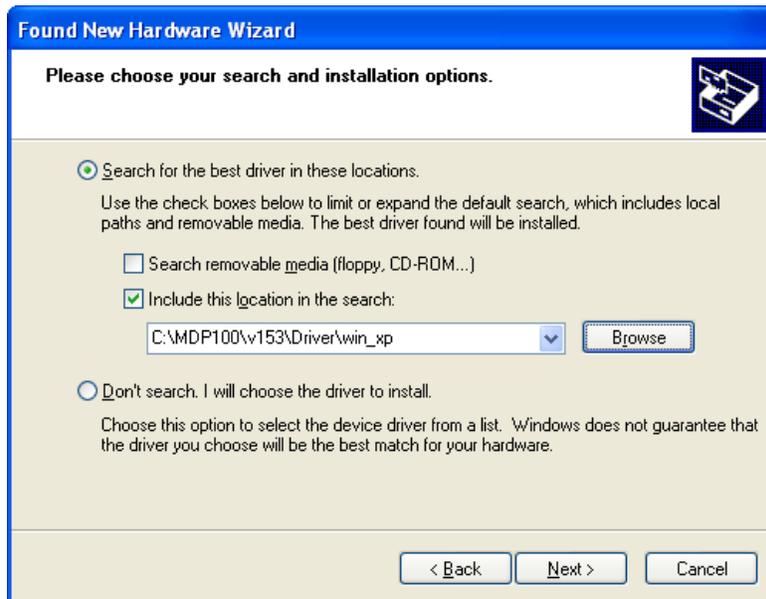
3. Choose "Search for the best driver in these locations" and "Include this location in the search," then click on "Browse" to open the contents of the installation CD, navigate to the DRIVER folder, and choose the subdirectory for the version of Windows currently installed on your computer and click on "Next >".

   Note: you must choose the driver which matches your operating system as software designed for one version of Windows may not operate properly on another
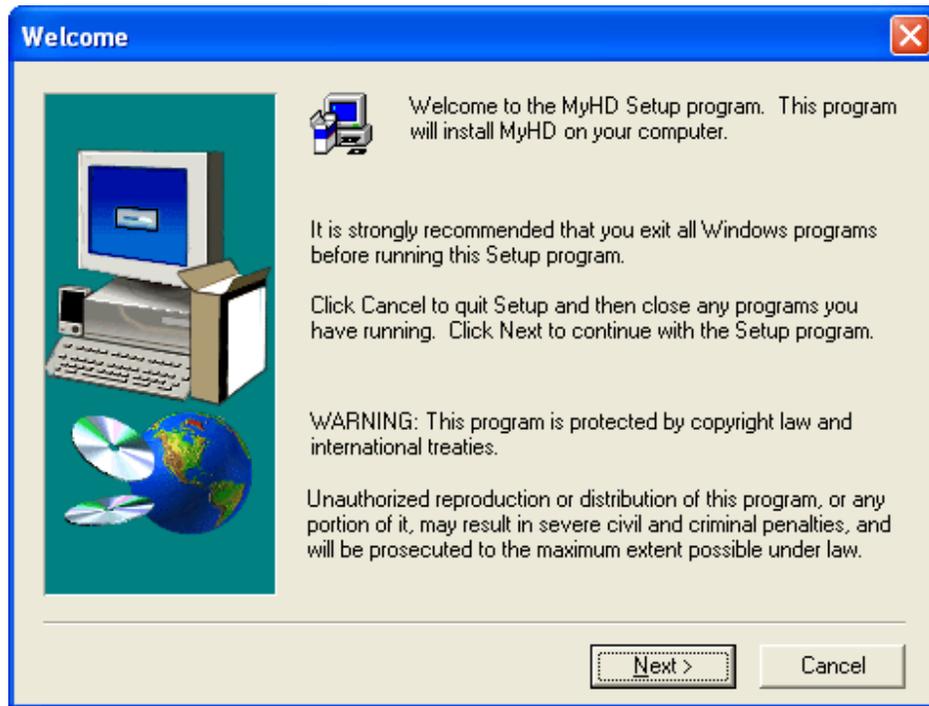
4. Click on "Next >" to install the driver. Next massage box can appear while installing the driver. Since its not a setup error, Press Continue Anyway button.
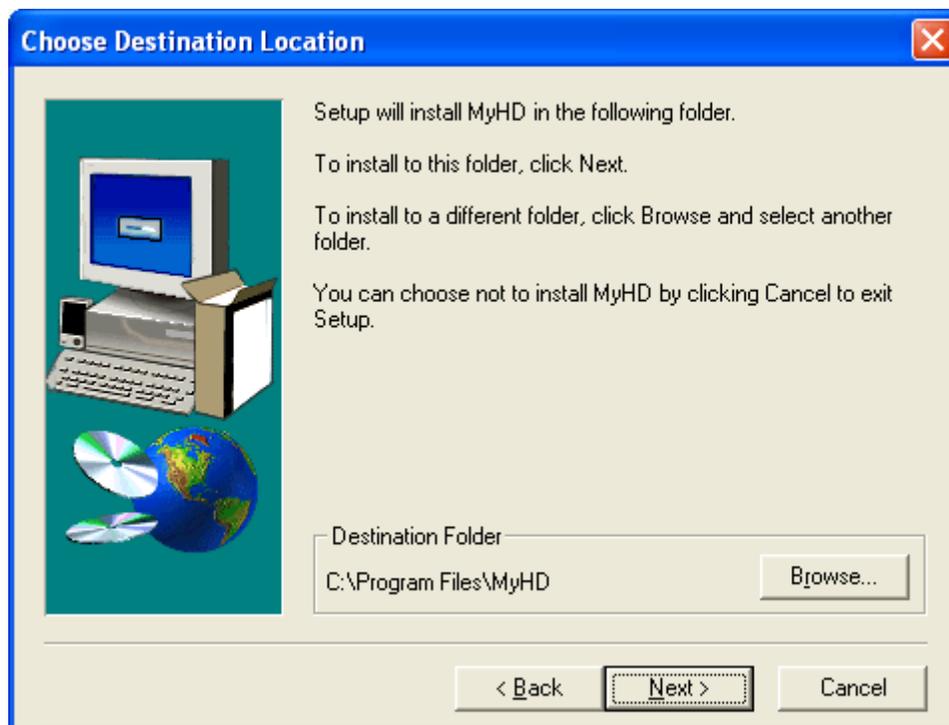

The software you are installing for this hardware:

MDP100 Video Capture

has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)

Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.

5. After the installation has completed, click on "Finish".

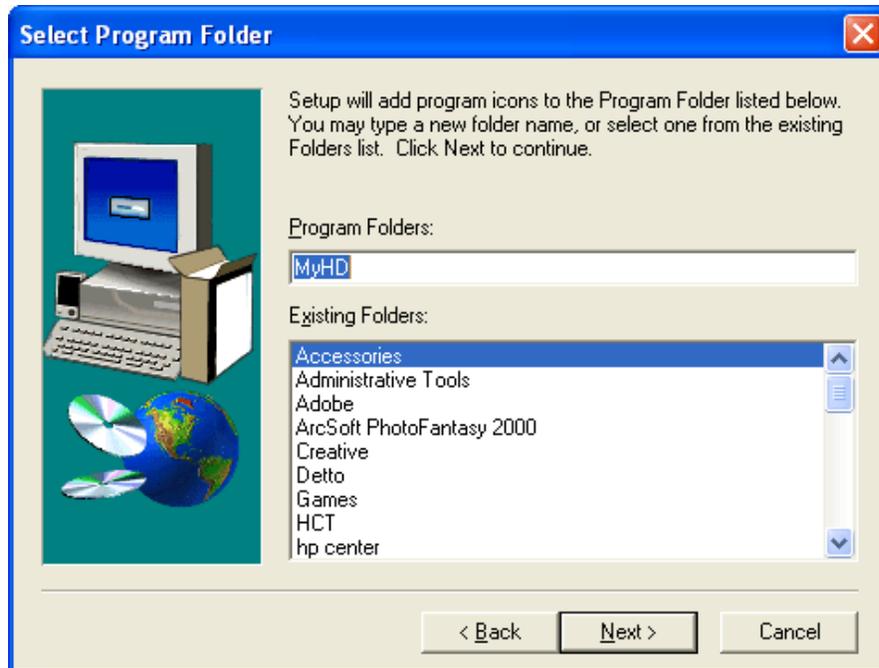**Step by step MyHD Application Software Installation:**

1. With the installation CD still loaded in your PC, open the Windows Explorer, navigate to the APP folder on the CD, and double-click on SETUP.EXE to launch the software installation, following the on-screen prompts until installation is completed.

Welcome

Welcome to the MyHD Setup program. This program will install MyHD on your computer.

It is strongly recommended that you exit all Windows programs before running this Setup program.

Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

Next >   Cancel

2. Click on "Next >".

Choose Destination Location

Setup will install MyHD in the following folder.

To install to this folder, click Next.

To install to a different folder, click Browse and select another folder.

You can choose not to install MyHD by clicking Cancel to exit Setup.

Destination Folder
C:\Program Files\MyHD   Browse...

< Back   Next >   Cancel

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3. Choose Destination Folder, click on "Next >"

4. Choose a program folder, click on "Next >".

5. Installation process starts.
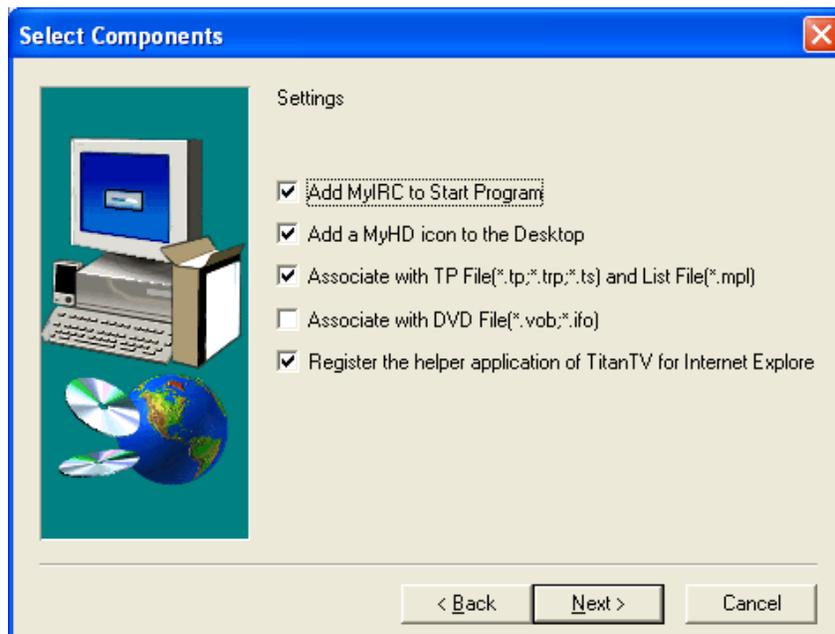
6. Installation of the program is completed, then click on "Next >".

7. After the installation has completed, click on "Finish".

8. To run the MyHD program immediately, check the check box and click on "Finish"

Step by step MyHD Application Software Configuration:
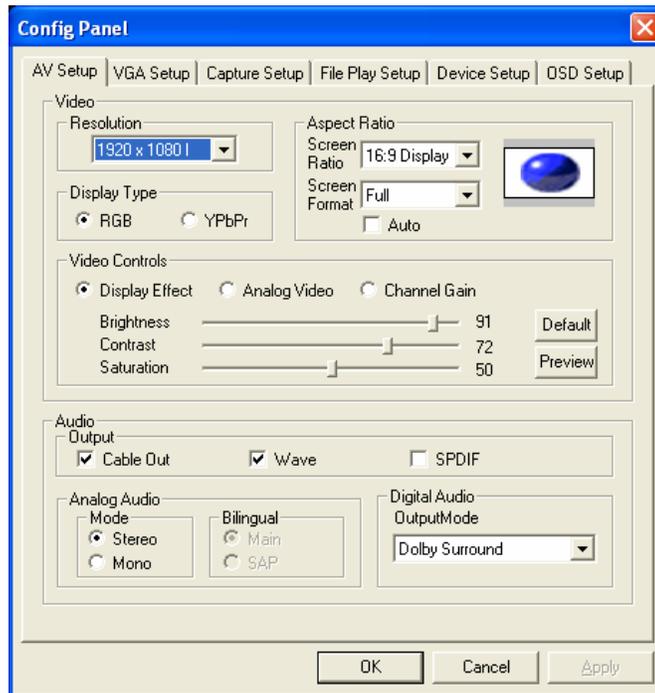
1. Double Click on MyHD Icon from Desktop or Program.

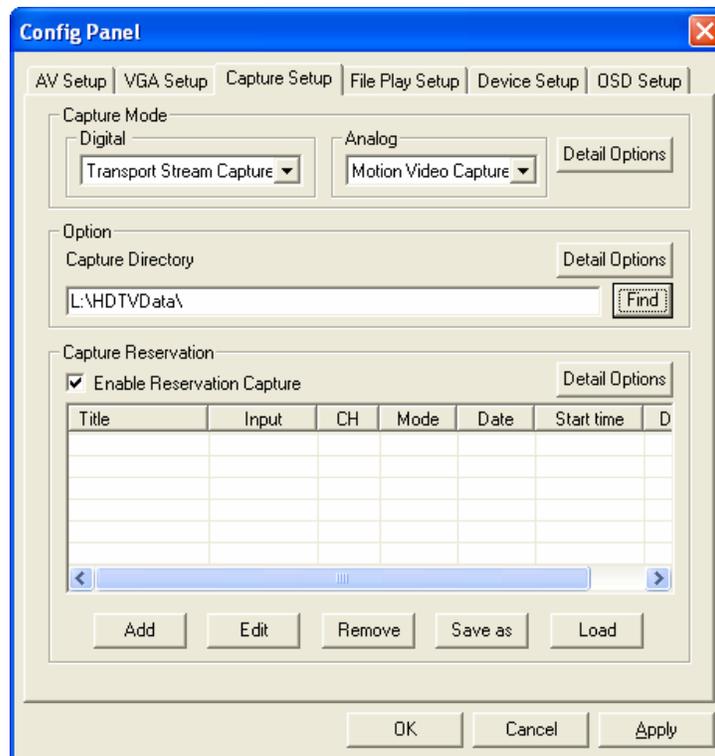2. By now you can see the selected TV/Cable channel showing.
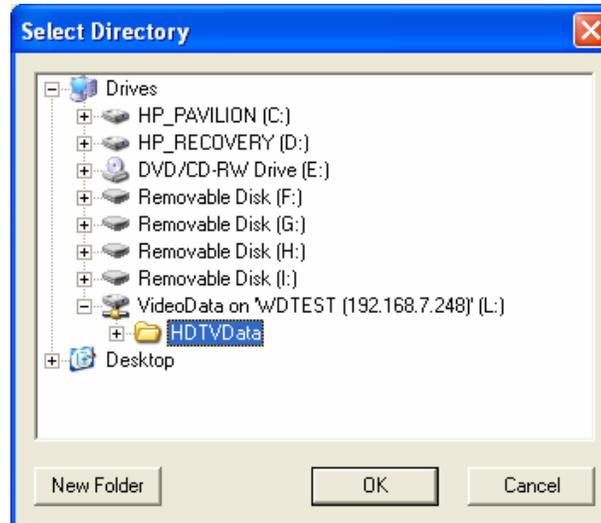
3. Click from your MyHD Main Panel.

4. Select "Config Panel" from side Main Panel. This is where you can setup your Video Resolution, Aspect Ratio, Video Control, Audio Perferences.

5. Select "Capture Setup"

6. Click "Find" from Capture Directory section and Choose the Network Drive "L:"

7. Check Enable Reservation Capture from Capture Reservation. This is where you can scheduled recording.

8. Click "Apply" or "OK" to exit from Config Panel.

9. Now you are done setting up your recording storage location for your Personal Video Recorder Software.

10. If you are using the DVI daughter card for HDTV output, "Enable Digital Flat Panel Mode Output" must be checked in the VGA Setup mode of the MyHD Config Panel as shown below.

READYNAS™
INSTANT STORAGE
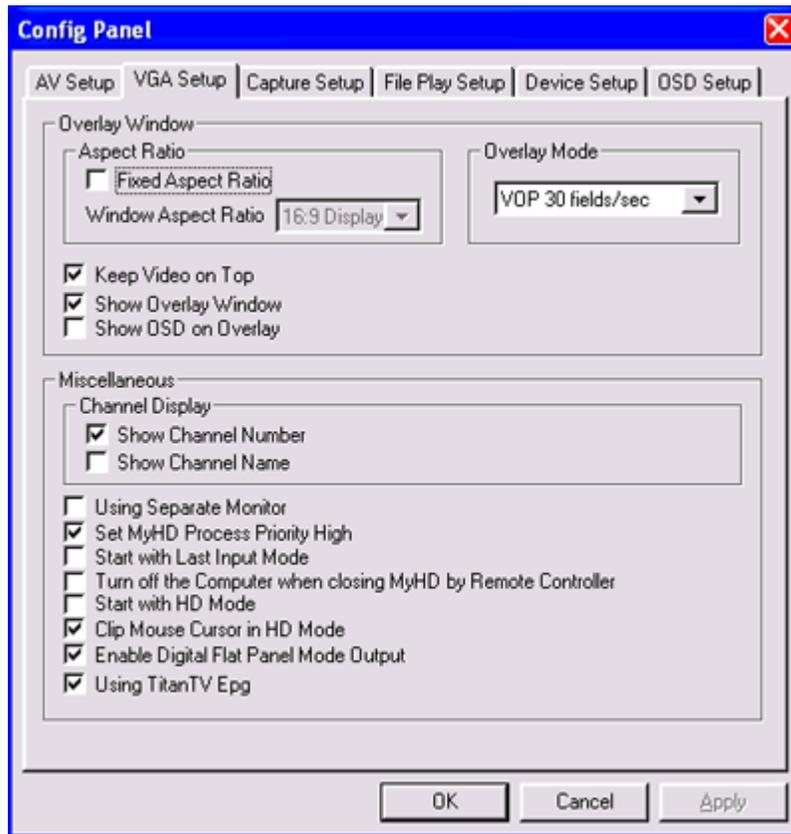
11. From the main panel, Click "Record" button next to "Eject". You should see Red "REC" on left top side of screen while recording.
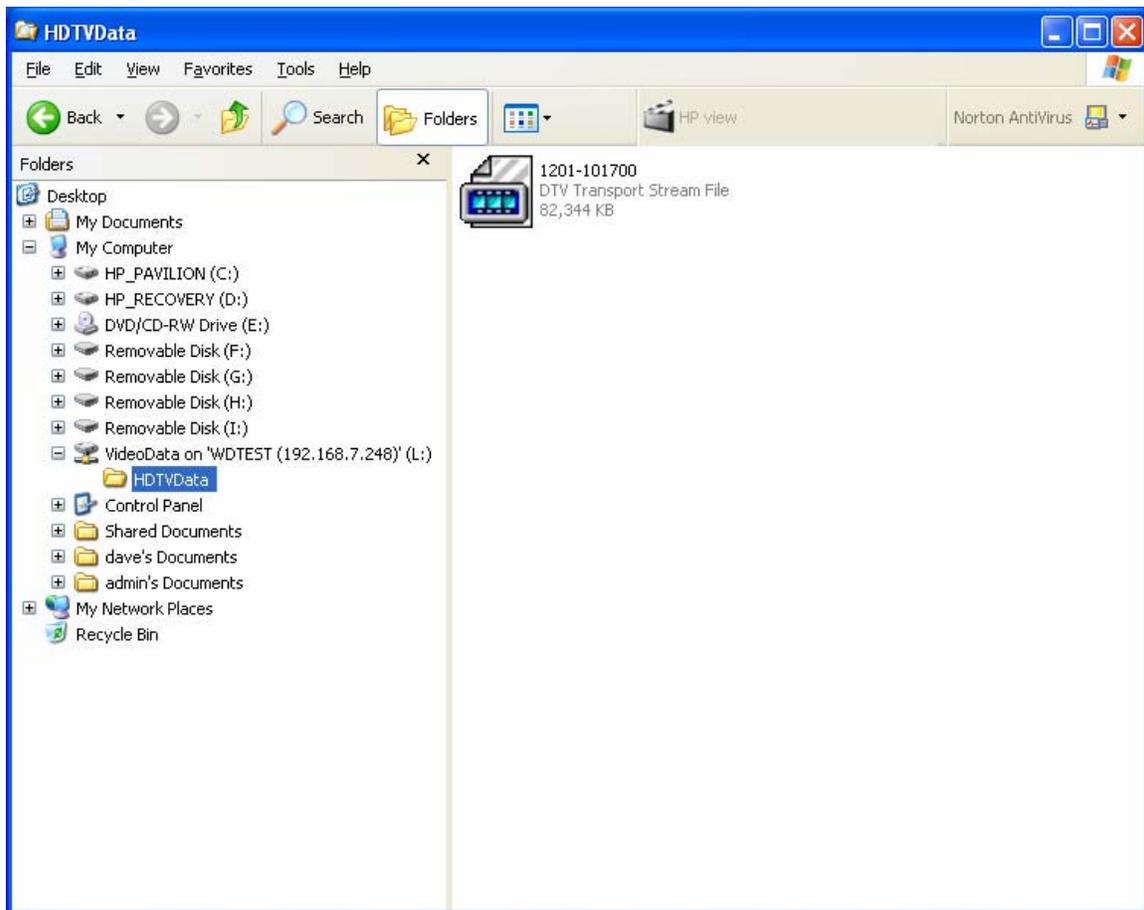
Congratulation! You have completed the setup for your ReadyNAS 600 and Personal Video Recorder on your PC and Local Area Network.

Once you set up the system, you can play back any of the captures files using the MyHD Application any Video Playback Application. We do recommend that you move the images to a folder once in a while to make them more manageable.

Conclusion

Just to illustrate how the quality of the video image effects the storage requirement:

Video Quality Chart:

Data Type	Resolution	Compression Rate	Description
MPEG-2 (2.0 Mbps)	352x408 or 352x288	60 min/GB	Better Than VCD quality-extra long Play
MPEG-2 (3.5 Mbps)	720x480i or 720x576i	35 min/GB	Better than SVCD quality-long play
MPEG-2 (5.0 Mbps)	720x480i or 720x576i	25 min/GB	DVD quality-standard play

Choosing the right image quality and resolution depends on the application. Typically, a 320x240 resolution at a normal quality is ok for most home uses. However, for image critical application, 720x480i resolution at dvd quality may be required. As this illustrates, a large storage solution is a must for this application. ReadyNAS 600 provides a perfect solution with a large capacity, hardware RAID 5 data protection and low power consumption.

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