UV REALTIME

VERSION 1.9.1.0, DAN WILSON, FEBRUARY 2012

INTRODUCTION

**UV Realtime** is a standalone program that can retrieve information from a typical residential installation of the AT&T U-Verse® IPTV system. Some of the information displayed consists of VDSL line analysis, network interface data rates, DVR information, STB channel and stream information, and Internet usage information. This program requires that your U-Verse® Residential Gateway (the 2Wire 3800HGV-B, 3801HGV, i3812V, or 3600HGV) be running firmware version 6.3.7.37 or later only. Previous versions will not work with this program.

INSTALLATION AND SYSTEM REQUIREMENTS

A full Windows installer is used for **UV Realtime**. The installer will ensure that all prerequisite programs required for full functionality of **UV Realtime** will be installed on your computer.

SYSTEM REQUIREMENTS

BASIC SYSTEM REQUIREMENTS

- **UV Realtime** requires a Windows XP, Vista, 7, Server 2003, Server 2008, or Server 2008R2 system to run. **UV Realtime** is an x86 (32-bit) application, but will run on x64 machines with no issues.
- **UV Realtime** requires that the Microsoft .Net Framework v4.0 Full Profile is installed on your system. If it is not, the installer will prompt you to install it. If you want to manually install it, go to Windows Update and look under the Optional updates.
- **UV Realtime** will run on a Windows virtual machine in one of the virtual machine environments available on the Apple Mac. The known working virtual machine environments for the Mac are Virtualbox, Parallels, and VMware Fusion. Note that you will need a copy of Windows XP or higher to install in the virtual machine.

STB CHANNELS/STREAMS FEATURE ADDITIONAL REQUIREMENTS

- To use the STB Channels/Streams feature, a wired Ethernet network interface is recommended. There are some wireless interfaces that will also work, but this is not guaranteed.
• Use of the STB Channels/Streams feature may require that some software firewalls be disabled completely or that the **UV Realtime** executable file be “whitelisted” or “allowed” to access the network directly.

• The STB Channels/Streams feature is turned off by default. If you meet the above system requirements, you can turn it on by checking the “Enable Gathering STB Channel/Stream Data” setting on the Configuration tab.

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### EMBEDDED WEB SERVER FEATURE ADDITIONAL REQUIREMENTS

• To use the embedded web server to view DVR information and Channels/Streams information from a remote location, you will need to meet all requirements above for the Channels/Streams feature.

• You will also need to open a port for inbound communication on your RG (instructions later in this document).

• You may need to allow inbound communication on this port in the Windows Firewall or other software firewall on your computer.

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### STREAM ANALYZER FEATURE ADDITIONAL REQUIREMENTS

• To analyze the streams reaching your DVR/STB unit, your computer must be connected to the same network that the DVR/STB is using, ideally at a connection point near the DVR/STB.

• For coax-connected DVR/STB units, plug your computer into the DVR/STB’s Ethernet port (this may require a crossover Ethernet cable, depending on the type of network card installed in your computer.)

• For Ethernet-connected DVR/STB units, plug the network cable into a 100 Mbps Ethernet switch or 1 Gbps Ethernet switch, and plug both your computer and the DVR/STB unit into the switch using two additional Ethernet cables.

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### INTERNET USAGE METER ADDITIONAL REQUIREMENTS

• The internet usage meter **requires** that your network in your home is connected in one of a few specific ways. The detailed steps to connect your network are discussed later in this document.

• The baseline functionality included with the Internet usage meter includes:
  - Tracking of total uploaded and downloaded data using one of the interfaces on the 2Wire router.
  - Real-time display of uploaded, downloaded, and total data updated every 5 minutes, accuracy to 0.1 GB.
  - Bar meter of total data, color-coded for thresholds of 60%, 90%, and 100%.
  - Ability to see total data use in the past 30 days, or see total data from any given date until today.
  - Show total data using SI units (10^x, where 1GB = 1,000,000,000 bytes), or using Binary units (2^x, where 1GB = 1,073,741,824 bytes).

• There is an optional Premium usage meter available for purchase that includes everything in the baseline functionality plus:
  - Graphical time-based representation of the amount of uploaded, downloaded, and total data transferred in resolutions of 5-minutes, 30-minutes, 2-hours, or 1-day.
  - Ability to see the usage meter statistics (uploaded, downloaded, and total data transferred) as well as the usage graph in the **UV Realtime** embedded web server.
  - Ability to see total data use between two arbitrary dates.
- Metering cycle mode such that the usage statistics automatically reset on a certain day of the month.
- In metering cycle mode, a bar meter of the number of days into the metering cycle is shown next to the bar meter of usage. This allows quick at-a-glance judgment of whether your usage is on track to be under or over for the metering cycle.


### PREREQUISITES AND ADDITIONAL INSTALLED PROGRAMS

**UV Realtime** requires several other programs to be installed on your computer for full functionality. The **UV Realtime** installer will automatically install or update these programs during installation for you. The additional programs are:

- **Microsoft Windows Installer 4.5**: This is a new version of the Windows Installer that is required by the **UV Realtime** installer.
- **Microsoft Visual C++ 10.0 x86 Runtime**: This library is used by RRDtool (see below).
- **Microsoft .Net Framework 4.0 Full Profile**: This is the Microsoft .Net framework, which is the programming environment that **UV Realtime** is written in.
- **WinPcap 4.1.2**: WinPcap is a network packet inspection library that allows other programs to directly access the network cards in your computer. For **UV Realtime** to gather information from the DVR and STB units, a deep inspection of network traffic is required. WinPcap allows **UV Realtime** to capture this data.
- **RRDtool 1.4.5**: RRDtool is a data logging and graphing application that can store and process time-based data. **UV Realtime** uses RRDtool to store and process Internet usage data.

### INSTALLATION

To install **UV Realtime**, double-click on the installer application and follow the wizard prompts. If you are installing on a Vista, Windows 7, Server 2008, or Server 2008R2 machine, you will see a User Account Control (UAC) dialog box at the beginning of the installation. The prerequisites listed above will be installed or updated if necessary, followed by the **UV Realtime** program itself.

### WINDOWS XP USERS

For Windows XP users, **UV Realtime** needs to install Windows Installer 4.5. If your computer needs this component, the **UV Realtime** installer will request a reboot in the middle of the installation. After the reboot, the installer will continue, but will then issue an error. It is safe to ignore this error. Simply launch the installer again, and it will continue where it left off and finish the installation.

This also applies if you are upgrading from **UV Realtime** v1.7.0.0 or earlier using the built-in updater. After the reboot and the error during the installation, just launch **UV Realtime**, and the automatic updater will try the update a second time. The updater will then succeed, and you will be upgraded to **UV Realtime** v1.9.0.0.
**UNINSTALLATION**

To uninstall **UV Realtime**, remove it using the Add/Remove Programs control panel (Windows XP/2003) or the Programs and Features control panel (Windows Vista/7/2008/2008R2). The prerequisite programs (Windows Installer 4.5, Visual C++ x86 Runtime, .Net Framework 4.0 Full Profile, WinPcap, and RRDtool) are not automatically uninstalled. You can leave all of these programs on your system (they will not hurt anything), or if you wish to remove them, do so in the same control panel. Be aware that there are other programs that use these prerequisites (like Wireshark), so if you have one of those programs installed, you should leave the associated prerequisite installed.

Be aware that uninstalling **UV Realtime** will delete any Internet usage data that has been saved, as well as most other program settings.

**MANUAL UNINSTALLATION**

In the rare event that **UV Realtime** will not uninstall on your system, follow these directions to manually uninstall it:

- Quit **UV Realtime**
- Delete the **UV Realtime** program folder:
  - x86 (32-bit) Machines: `C:\Program Files\UV Realtime`
  - x64 (64-bit) Machines: `C:\Program Files (x86)\UV Realtime`
- Delete the program preferences folder:
  - Windows XP: `C:\Documents and Settings\{username}\Application Data\Local Settings\Dan_Wilson\UV_Realtime.exe_xxxxxx`
  - Windows Vista/7: `C:\Users\{username}\AppData\Local\Dan_Wilson\UV_Realtime.exe_xxxxxx`
- Delete the common application data folder:
  - Windows XP: `C:\Documents and Settings\All Users\Application Data\UV Realtime`
  - Windows Vista/7: `C:\ProgramData\UV Realtime`
- Remove the Add/Remove programs entry by deleting the following registry key:
  - x86 (32-bit) Machines:
    - HKeyLocalMachine\Software\Microsoft\Windows\CurrentVersion\Uninstall\{5A4B3F22-A5DF-43D7-89A7-6121F5431F32}
  - x64 (64-bit) Machines:
    - HKeyLocalMachine\Software\Wow6432Node\Microsoft\Windows\CurrentVersion\Uninstall\{5A4B3F22-A5DF-43D7-89A7-6121F5431F32}

**USE OF THE PROGRAM**

Double-click on **UV Realtime.exe** to start the program. As of version 1.7.0.0, **UV Realtime** is no longer required to run as the Administrator, and will no longer show a User Account Control (UAC) dialog box on Windows Vista/7.

When the program starts up, it automatically tries to find your 2Wire router on the network. If your computer is connected to the U-Verse® RG directly with no other intervening router in between, the router will be found and the program will begin to gather statistics.
If you have another router in between your computer and the 2Wire router, the program may not find the 2Wire. In this case you will see the Error light come on, and the status message will say that the program was unable to find the router's IP address. In this case, if you know the IP address of the 2Wire router, you can uncheck the "Automatic" check box, and type in the IP address of the 2Wire router and hit Enter. If the router is found, you will see the "Connected" light come on, you will see the status message say "Connected to 2Wire Router", and the program will begin to gather statistics.

Be aware that if you have an intervening router, the STB Channels/Streams features, and DVR Analysis features will not function.

Statistics based on data rates, like the FEC/CRC errors and the Interface Data Rates will not show a value when the program first starts up. At least two readings of statistics have to be gathered from the RG before these data rates can be calculated. It will take approximately 2 minutes after the program is started up before these data rates are shown.

STATISTICS AND INFORMATION DISPLAY

Statistics are gathered from the router at various intervals. Each time the statistics are gathered, the display is updated with the current values. While the statistics are being gathered, you will see the status message say "Gathering statistics", and the yellow Busy light will come on.

The following statistics are displayed on each tab of the interface.
IP/PROFILE TAB

IP AND GATEWAY INFORMATION

- **Outside IP Address**: This is the outside (publically routable) IP address of the router. All traffic from your location appears to come from this IP address.
- **Subnet Mask**: This is the subnet mask used by the 2Wire router when sending information upstream.
- **Default Gateway**: This is the upstream router at AT&T that the 2Wire router is connected to.
- **DNS 1**: This is the IP address of the primary DNS server that the 2Wire router is using.
- **DNS 2**: This is the IP address of the secondary DNS server that the 2Wire router is using.
- **Outside Mac Address**: This is the media access control (MAC) address of the VDSL interface on the 2Wire router. Note that this MAC address is different from the MAC address used on the LAN side of router.
- **Upstream MTU**: This is the Maximum Transmission Unit (MTU) size currently in use on the VDSL link, in bytes.
- **Firmware Version**: This is the current firmware version in use by the 2Wire router.
- **Hardware Version**: This is the current hardware version of your 2Wire router.

PROFILE AND ERRORS

- **Max Rate**: This is the maximum theoretical VDSL line data rate that would be possible between the router and the VRAD, in Kbps. This is dependent on the line's noise, condition, and distance. Note that this used to be called the "Sync Rate", but I have removed that term because it is not accurate. The RG and the
VRAD do not actually synchronize at this speed -- the actual line rate that they use is the Calculated Raw Line Rate (available in the Bit Allocation Analysis section).

- **Ideal (next to VRAD) value:** 64000 Kbps
- **Typical (1500') value:** 50000 Kbps
- **Service limit (3000') value:** 23000 Kbps

**Profile Rate:** This is the assigned currently usable data rate on the VDSL line in both the downstream and upstream directions. Currently, only 3 profiles are in use for U-Verse TV/Internet/VOIP using the 2Wire 3800HGV-B or 3801HGV routers: 32200/5040, 25208/2040, and 19192/2040. For U-Verse installations using a 2Wire i3812V router, each line uses a special profile, approximately 12800/800, and together the lines should get an aggregate profile of approximately 25208/1528. The individual line profile varies, and is not as relevant as the aggregate profile. For Internet-only U-Verse service using a 2Wire 3600HGV router, there is only one profile in use, 13200/1528.

**FEC Rate:** This is the current rate of Forward Error Correction (FEC) events on the VDSL line, in both the downstream and upstream direction, in errors per minute. This corresponds to the "corrected blocks" statistic in the RG's interface.

- **Ideal (next to VRAD) value:** 0 err/min
- **Typical (1500') value:** 0 err/min
- **Service limit (3000') value:** 100 err/min

**CRC Rate:** This is the current rate of Cyclic Redundancy Check violation (CRC) events on the VDSL line, in both the downstream and upstream direction, in errors per minute. This corresponds to the "uncorrected blocks" statistic in the RG's interface.

- **Ideal (next to VRAD) value:** 0 err/min
- **Typical (1500') value:** 0 err/min
- **Service limit (3000') value:** 0 err/min

**Noise Margin:** This is the current downstream noise margin, in dB. The lower this value, the noisier the VDSL line. This value also depends on the profile rate. Normally, raising the profile by one step (19/2 to 25/2, or 25/2 to 32/5) lowers the noise margin by 4-5 dB.

- **Ideal (next to VRAD) value:** 28.0 dB
- **Typical (1500') value:** 20.0 dB
- **Service limit (3000') value:** 12.0 dB

**Attenuation:** This is the current downstream signal attenuation, in dB. The higher this value, the farther you are from the VRAD.

- **Ideal (next to VRAD) value:** 6.0 dB
- **Typical (1500') value:** 18.0 dB
- **Service limit (3000') value:** 28.0 dB

**Power Level:** This is the current power level of the signal at the RG, in dBm. Downstream power levels should be relatively constant at approximately 13.5 - 14.0 dB. Upstream power levels vary from as follows:

- **Ideal (next to VRAD) value:** -25.0 dBm
- **Typical (1500') value:** -7.0 dBm
- **Service limit (3000') value:** 6.0 dBm

**Line Capacity:** This is the percentage utilization of your VDSL line, computed as downstream profile rate / max rate. Lines over 80% have insufficient headroom to carry the selected profile (see the Bit Allocation Analysis section).
• **Estimated Distance from VRAD:** This is the estimated distance of your line from the VRAD to your RG in feet. This value is determined from the downstream attenuation value and is only an estimate. The value is accurate to +/- 400 feet for 95% of installations.
  - Ideal (next to VRAD) value: 0 ft
  - Typical (1500') value: 1500 ft
  - Service limit (3000') value: 3000 ft

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**BIT ALLOCATION ANALYSIS**

- **Allocated Bits:** This is the number of bits on the line that are currently allocated to carry raw data. Each bit represents 4.3125 Kbps of raw (before error correction) bandwidth.
- **Calculated Raw Line Rate:** This is the calculated line rate, given the bits that are allocated and in use. It represents the raw data speed between the VRAD and the router, before accounting for error correction.
- **FEC Overhead:** This is the ratio between the raw bitrate and the user bitrate. The raw bitrate has some bits used for forward error correction (FEC). The ratio for the downstream FEC for all profiles is 5:4, meaning for every 4 bits of user bandwidth, 5 bits of raw bandwidth need to be used. Upstream FEC ratios are 5:4 for the 13/1 profile, 3:2 for the 19/2 and 25/2 profiles, and 4:3 for the 32/5 profile.
- **Calculated User Line Rate:** This is the calculated line rate, given the bits that are currently allocated and in use, and after taking out the bits used for FEC. This should very closely match the assigned profile rate.
- **Over Allocation:** Unlike the 3800HGV-B and 3600HGV, the 2Wire 3801HGV and i3812V routers assign more bits to the line than is actually required to carry the assigned profile to allow additional room to handle errors. The number of bits over the amount required to carry the assigned profile is referred to as the over-allocated bits and is shown here. 3800HGV-B and 3600HGV routers will normally show 0 here.
- **Max Bits:** This is the maximum theoretical number of bits that could possibly be allocated on the VDSL line, give the line’s noise, condition, and distance. This should always be greater than the allocated bits.
- **Reserve Bits:** This is the number of available bits on the VDSL line that are not required to carry the assigned profile, but could be used if necessary. For a properly functioning line, the reserve bits must be greater than zero, and preferably greater than 5% of the number of allocated bits. If the max bits are less than the allocated bits, then the line is overcommitted, and this value will show “Overcommitted Bits” rather than “Reserve Bits”.
- **Bits In Use:** This is the percentage of the maximum available bits on the line that are currently allocated. This should always be less than 100%, and preferably less than 95%. If the max bits are less than the allocated bits, then the line is overcommitted, and this value will be greater than 100%. The amount over 100% shows how much the line is overcommitted by.
- **Recommended Profile:** This is the profile that is recommended given the line conditions. If this profile matches the currently assigned profile, it is colored green. If a different profile should be used, it is highlighted in red. For i3812V routers (iNID), this is only displayed in aggregate display mode.

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**DISPLAY AND COMMANDS FOR THE 2WIRE I3812V ROUTER (INID)**

AT&T has begun to use a different type of 2Wire router for some installations in order to increase the service distance for the U-Verse® service. This router is the 2Wire i3812V, also known as the iNID.

The i3812V is used where the distance to the VRAD is too far for a normal 3800HGV-B or 3801HGV router. The iNID uses two incoming copper phone lines and logically combines them into one channel. This is known as pair-bonding.
**UV Realtime** as of version 1.4.0.0 can now properly display the statistics from an i3812V router. By default, the aggregate statistics are displayed, which show the max rate, profile rate, etc. from the combined pair of lines. If you want to see the statistics from the individual lines, you can select this on the configuration page using the pull-down menu for the i3812V Stats. You can also use the following keyboard commands anywhere in the program:

- “0” or “A” – Show Aggregate Stats
- “1” – Show Line 1 Stats
- “2” – Show Line 2 Stats
- “5” or “S” – Toggle the stats display to the next view. The order is Aggregate -> Line 1 -> Line 2 -> Aggregate.

In aggregate display mode, the following stats are shown as the combined or sum of both lines:

- Max Rate
- Profile Rate
- FEC Errors
- CRC Errors
- All bit allocation analysis parameters

In aggregate display mode, the following stats show the parameter from the line that has the worst reading:

- Noise Margin
- Attenuation
- Downstream Power Level
- Upstream Power Level
- Line Capacity
- Estimated VRAD Distance
The current display mode is shown on the IP/Profile tab, in the Profile and Errors section, in blue text:

In this screenshot, you can see that the display is in Aggregate display mode. The Max Rate, Profile Rate, FEC Rate, CRC Rate, and all Bit Allocation Analysis stats reflect the combined performance of both line 1 and line 2. The Noise Margin, Attenuation, Power Levels, Line Capacity, and Estimated Distance from the VRAD reflect the reading from the line with the worst quality statistic.
New as of v1.6.0.0 of **UV Realtime** is the Error Table tab. This tab shows the cumulative errors that the 2Wire router has logged since the last reset. For each type of error, a count of how many times that error has occurred is shown, with totals Since Reset, total within the last 24 hours, and total within the last 15 minutes. The length of time that has elapsed since the error last occurred is also shown.

For most of the error types, it is normal for the 2Wire router to log a few of them during startup and during any other time where the connection is being reestablished. Therefore, even on a 100% properly working connection, there may be a few of each error type still logged.

### ERROR TYPES

The following types of errors are logged by the 2Wire router and are shown here.

- **Link Retrains**: Link retrains occur when the VDSL modem and the VRAD need to reestablish their connection. These errors should never occur on a properly working installation.

- **DSL Training Errors**: This error indicates that one or more times during the connection process, the protocol that was being followed to make the connection was interrupted, and the connection process had to start over. These errors should never occur on a properly working installation.

- **Training Timeouts**: This error indicates that during the connection process, the VDSL modem waited for the VRAD to complete the connection but it never did, and the connection process had to start over. These errors should never occur on a properly working installation.
- **Loss of Framing Failures**: This error indicates that the modem lost the connection because it could no longer synchronize with the bitstream. These errors should never occur on a properly working installation.

- **Loss of Signal Failures**: This error indicates that the VDSL modem lost the connection because no signal was being received. These errors should never occur on a properly working installation.

- **Loss of Power Failures**: This error indicates that the VDSL modem lost the connection because input power was lost at the router. This error should only occur on a power failure.

- **Loss of Margin Failures**: This error indicates that the VDSL modem lost the connection because the line noise became too high. These errors should never occur on a properly working installation.

- **Cumulative Seconds with Errors**: This is the number of seconds (cumulative) that the VDSL modem was experiencing Uncorrectable Blocks (see below). A properly working installation should have no more than 10 uncorrectable blocks per minute.

- **Cumulative Seconds with Severe Errors**: This is the number of seconds (cumulative) that the VDSL modem was experiencing errors that required that the connection be reestablished (Link Retrains, DSL Training Errors, Training Timeouts, Loss of Framing, Loss of Signal, Loss of Power, or Loss of Margin).

- **Corrected Blocks**: This is the number of blocks (packets) that the VDSL modem has received that had at least one error, but the error correction algorithm was able to recover the correct data, and the packet was then forwarded. A properly working installation may have some corrected blocks, but the number should not be in excess of 500 per minute.

- **Uncorrectable Blocks**: This is the number of blocks (packets) that the VDSL modem has received that had at least one error, and the error correction algorithm was not able to recover the correct data, and the packet was then dropped. A properly working installation should have zero to very few uncorrectable blocks, and they should not exceed 10 per minute.

- **DSL Unavailable Seconds**: The number of seconds (cumulative) that the DSL signal was not available, but the router was up and running. A properly working installation should accumulate values here only during startup and the connection process.
When viewing this table on an i3812V (iNID) router, you can view either the aggregate stats, line 1 stats, or line 2 stats. Aggregate stats for both lines is a new statistic that is available as of UV Realtime v1.9.0.0.

**ROUTER UPTIME**

The router uptime section shows two times associated with the router’s statistics collection.

- **Time Since Last Boot**: This is the elapsed time since the 2Wire router was restarted.
- **Error Totals Collected for**: This is the elapsed time since the error counts were reset on the 2Wire router. Normally this matches the Time Since Last Boot, but the error totals can be reset independently using the Reset Statistics button in the 2Wire’s interface.
INTERFACES TAB

Each interface available on the 2Wire router is displayed here (VDSL Line or FTTP Line, HPNA/Coax, Wireless, and Ethernet ports 1-4). The current data rate in Kbps is displayed both in the In and Out directions, as well as the total amount of data transferred on that interface since the last time the router’s statistics were reset. This will give you an idea of how much data is flowing through the RG. When watching TV or downloading Internet data, you will see data coming in through the VDSL line, and data leaving the RG through HPNA and Ethernet interfaces.

Typically, an HD stream uses 5610 Kbps, while an SD stream uses 2050 Kbps.

Each interface displays the data rate using two bars. The bar on the left is used for data coming out of the router on that interface. The bar on the right is used for data entering the router on that interface. Each data bar is also color-coded to indicate if that data is coming from the Internet into your home (download direction) or leaving your home (upload direction). Bars that track data in the download direction are color-coded green, bars that track data in the upload direction are color-coded blue.

The bars next to each interface are filled relative to the largest data rate. For example, if the VDSL Line has the largest data rate, the data rates on the other interfaces will show as some percentage of that rate, with the bar the proper relative length.

On the 2Wire 3600HGV, the HPNA Coax interface is not shown, since this router lacks this interface.
On the iNID, the proper interfaces are shown, but they are the interfaces on the i3812V unit (the iNID unit outside), not the i38HG unit (which is inside). These interfaces are the outside Ethernet interface, the Coax/HPNA interface, and the Twisted Pair/HPNA interface, which is usually used to feed the i38HG. Also shown is the Wireless interface from the i38HG. Unfortunately, there is no way to display any information from the i38HG Ethernet interfaces, as the iNID does not track byte counts for those interfaces.

BITLOADING TAB

![BITLOADING GRAPH]

Clicking the Bitloading tab shows the bitloading graph for the VDSL line connected to the router.

The bitloading graph shows the distribution of allocated bits by their frequency on the VDSL line. VDSL transmits data by using discrete multi-tone (DMT) signaling. The entire frequency spectrum available on the line is split into many different subfrequencies (tones), and bits are sent from one station to the other on each subfrequency. Each subfrequency can carry a certain number of bits per time slot. Subfrequencies that are free from noise or interference can carry many bits per time slot, up to 16. Subfrequencies that are too noisy can't be used. Some subfrequencies are noisy, but data can still be carried on them at a reduced bit load per time slot, such as 1 or 2 bits.

The graph shows how many bits have been allocated to each subfrequency. This can give you an idea of how good your line is with respect to noise and interference. A good line will have bits loaded across the spectrum, from
baseband all the way to 8.4 MHz, with the number of bits per subfrequency going down as the frequency goes up. Noisy lines will roll off much sooner, and may not have any bitloading above 5 MHz.

Bits allocated for downstream use (VRAD -> RG) are shown in gold. Bits allocated for upstream use (RG -> VRAD) are highlighted in dark green.

On the top of the graph is a description of the VDSL protocol in use, the VDSL profile in use, and the VDSL band plan that is in use. Currently, AT&T is using mostly only two combinations of these parameters:

- For 3800HGV-B, 3801HGV, and 3600HGV routers:
  - VDSL protocol is VDSL2 (G.993.2)
  - VDSL profile is 8d
  - VDSL band plan is 998, without using the Upstream 0 band
- For i3812V routers:
  - VDSL protocol is VDSL2 (G.993.2)
  - VDSL profile is 8d
  - VDSL band plan is 998, and the Upstream 0 band is in use

There are some i3812V installations that don’t use the Upstream 0 band, but instead use Upstream 1. This happens in i3812V installations that are close enough to the VRAD such that some high frequencies can be carried.

A tell-tale sign of a bridge tap can be seen on a bitloading graph. Bridge taps cause interference on the line that results in noise that attacks the frequencies of the line, usually in a sinusoidal pattern. This reduces the available bitloading on the line in a sine-wave pattern. If you can see a sine-wave oscillation in the tops of the bitloading values, along with very few or no high frequencies in use, this is a good sign of a bridge tap on the line. Removal of the bridge tap will typically drastically increase the line's performance.

For interference analysis, the graph will show you what frequency your mouse pointer is hovering over, as well as display red cross-hairs on the graph to aid in positioning your mouse. If you have a large dip or black line in the graph, you can point to it with your mouse pointer and the frequency will be shown in the upper right corner. The frequency shown is accurate to +/- 10 kHz. The cross-hair display is user-selectable on the Configuration tab.

Known sources of zero bitload are:

- The ADSL pilot tone (0.276 MHz) - This is normally 0 bits on anyone's bitloading graph that has an ADSL user near them
- The VDSL pilot tone (2.484 MHz) - This is normally 0 bits on everyone's bitloading graph
- Upstream normally 0 values (4.071 MHz, 4.192 MHz, 4.308 MHz)

Typically, a common source of interference is AM radio stations (0.520 MHz to 1.610 MHz).

Any other interference may be the result of a bridge tap or other source that may need to be found and eliminated.

For the i3812V (iNID) router, the bitloading tab will display the bitloading for whichever line is currently selected with the i3812V Stats selector. You can toggle back and forth between the two lines using the keyboard commands shown earlier. The currently selected stats (Aggregate / Line 1 / Line 2) will also be shown on the graph in the upper right.
When the display is in aggregate display mode, the bitloading graph will show both lines’ bitloading stacked on top of each other, similar to a stacked bar graph. Line 1 is in dark green and gold, line 2 is in light green and light yellow.

Here you can see the aggregate bitloading display for an i3812V router.

I3812V line profiles usually use a different band plan than normal VDSL lines for the 3800HGV-B and other routers. The upstream block is moved from the 3.7 to 5.1 MHz block (Upstream Band 1) down to low frequencies below 138 kHz. This is the area formerly occupied by ISDN, and is known as Upstream Band 0. Downstream bits are all in Downstream Band 1, below 3.7 MHz. This frequency plan is used specifically to increase the service distance since it does not use high frequencies.
COAX/HPNA TAB

COAX/HPNA STATISTICS

These values show the source station ID (either the RG or a DVR/STB), the source station MAC address, the destination station ID (either the RG or a DVR/STB), the destination station MAC address, the physical data rate that is in use, and the Signal to Noise ratio of that connection. For properly working coax connections, the PHY data rate should always show 112 Mbps (112-128 Mbps for 3801HGV and i3812V routers, and up to 256 Mbps for 3801HGV and i3812V routers connected to 2nd-generation STB units [VIP2250, ISB7500, ISB7005]). Less than that indicates a coax problem. Using this page, the problem can be isolated to the particular coax cable associated with the specific device.

Note that the HPNA interface of the 2Wire 3800HGV-B, i3812V and 3801HGV routers and the HPNA interfaces of the DVR/STB units have their own unique MAC addresses that do not correspond to the MAC addresses printed on the bottom of the units, nor correspond to the MAC addresses visible in the Channels/Streams tab. This can make it difficult to isolate a problem on a particular coax run. The only way to uniquely identify DVR/STB units on this tab is to disconnect them from the coax network one at a time, and see which unit disappears from the list. Be aware that UV Realtime only updates the Coax/HPNA tab once every 5 minutes, so it may take that long for a unit to disappear or appear after it is disconnected from or reconnected to the network.

PROMPT FOR COAX EXTENDED TEST

As of 2Wire firmware version 6.3.7.37, all 2Wire routers do not perform a coax test on startup, but will only do so on demand. For UV Realtime to retrieve the coax statistics, the user must run the “Extended Test” coax/HPNA
option in the router’s Web interface. If you have not yet run the extended test on your 2Wire router, you will see this screen on the Coax/HPNA tab:

You can click the blue hyperlink at the bottom to be brought directly to the proper web page on your router. Click the button that says “Extended Test” under “HPNA Network Performance Management Data”. The router will ask for your password, and then return you to the original web page after the extended test is run.

Once the extended test has been run, UV Realtime will get the coax statistics the next time it updates the coax/HPNA display. Be aware that UV Realtime only updates the Coax/HPNA display once every 5 minutes, so it may take up to 5 minutes before your coax statistics appear here. If you don’t want to wait, you can shut down UV Realtime and start it up again to force the refresh.

### RENAMING AN STB

You can rename an STB that is visible in this tab by double-clicking on its source MAC address. UV Realtime will show you the MAC address of the STB and ask you for a friendly name. Type the name and hit Enter or click Save. UV Realtime will remember the saved STB name across program launches. If you want to clear a name, double-click on it and leave the name field blank and click Save. UV Realtime will go back to referring to the STB by MAC address.
New as of v1.8.0.0 of **UV Realtime** is the Usage tab, which can count internet data usage with a high accuracy. Because AT&T has recently implemented Usage-Based Billing (UBB), which charges customers for exceeding 250GB of data transfer per month, knowing exactly how much Internet data is being used becomes quite important.

The Internet usage meter comes in two versions, the baseline version, which is included free with **UV Realtime**, and a premium version available for purchase.

The baseline usage meter is shown here:

![Baseline Usage Meter](image1)

The baseline usage meter includes the following features:

- Tracking of total uploaded and downloaded data using one of the interfaces on the 2Wire router.
- Real-time display of uploaded, downloaded, and total data updated every 5 minutes, accuracy to 0.1 GB.
- Bar meter of total data, color-coded for thresholds of 60%, 90%, and 100%.
- Ability to see total data use in the past 30 days, or see total data from any given date until today.
- Show total data using SI units (10^x, where 1GB = 1,000,000,000 bytes), or using Binary units (2^x, where 1GB = 1,073,741,824 bytes).

The premium usage meter is shown here:
The premium usage meter does everything that the baseline usage meter does, plus:

- Graphical time-based representation of the amount of uploaded, downloaded, and total data transferred in resolutions of 5-minutes, 30-minutes, 2-hours, or 1-day.
- Ability to see the usage meter statistics (uploaded, downloaded, and total data transferred) as well as the usage graph in the UV Realtime embedded web server.
- Ability to see total data use between two arbitrary dates.
- Metering cycle mode such that the usage statistics automatically reset on a certain day of the month.
- In metering cycle mode, a bar meter of the number of days into the metering cycle is shown next to the bar meter of usage. This allows quick at-a-glance judgment of whether your usage is on track to be under or over for the metering cycle.

INTERNET USAGE SECTION

In the Internet usage section, the following items are displayed

- **Total Internet Data Downloaded**: This shows the total amount of data downloaded (data transfer from the Internet to your computers) in the time period selected in the configuration section. This total is automatically updated as data usage goes on. This figure is accurate to 4 significant figures. It is automatically scaled to be presented in B, KB, MB, or GB as appropriate. (It will also display TB, but if you go that high you may need to look at a different internet service that does not implement Usage-Based Billing.)
- **Total Internet Data Uploaded**: This shows the total amount of data uploaded (data transfer from your computers to the Internet) in the time period selected in the configuration section. This total is automatically updated as data usage goes on. This figure is accurate to 4 significant figures. It is automatically scaled to be presented in B, KB, MB, or GB as appropriate. (It will also display TB, but if you
go that high you may need to look at a different internet service that does not implement Usage-Based Billing.)

- **Total Internet Data Transferred**: This is the sum of the downloaded and uploaded data. This is the final number that your usage will be compared against, and the number you should look at to see if you’ve exceeded the 250GB limit.

- **Total Data Bar Meter**: This vertical bar meter shows you how much total data in a meter format, with 250GB at the top of the bar. The bar’s color will change as you approach several limits, allowing you to quickly see how close you are to the limit:
  - Below 150GB: Green
  - 150GB (60%) to 225GB (90%): Yellow
  - 225GB (90%) to 250GB (100%): Orange
  - Over 250GB (100%): Red

- **Days into Metering Cycle (Premium Version Only)**: This vertical bar meter shows you how far into the current metering cycle you are, based on a 30-day metering cycle. This bar meter only displays when in metering cycle mode (see configuration). The purpose of this meter is so that you can quickly compare it to the Total Data bar meter, which will show you whether you are on track to be under 250GB or over 250GB for the metering cycle. If the Days into Metering cycle meter is higher than the Total Data bar meter, you are on track to be under 250GB for the metering cycle. If the Days into Metering cycle meter is lower than the Total Data bar meter, you are on track to be over 250GB for the metering cycle.

- **Usage Graph (Premium Version Only)**: This graph shows you a high-resolution plot of your Internet data usage over time. The default graph shows approximately a 24 hour period, with 5 minute resolution (meaning each horizontal pixel of the graph represents a 5 minute period).
  - The horizontal (X) axis represents time, with 24 hours ago shown at the left of the graph, and the current time shown at the right.
  - The vertical (Y) axis represents an amount of data. This axis is automatically scaled to be able to show you any amount of usage at the maximum possible resolution.
  - For each time period (horizontal pixel), a vertical line is drawn on the graph, representing the total amount of data transferred in that 5 minute period. The vertical line is divided into two colors; downloaded data is shown in green while uploaded data is shown in blue.
  - Using the “Graph” configuration option, other graph periods and resolutions are available:
    - 24 hour period / 5 minute resolution
    - 1 week period / 30 minute resolution
    - 1 month period / 2 hour resolution
    - 1 year period / 1 day resolution

**CONFIGURATION SECTION**

In the configuration section, the following controls are available:

- **Router Interface Used for Internet**: This selector allows you to choose which router interface is used for counting Internet traffic. As discussed in the next section, you must architect your home network to route all internet traffic through a single interface on the 2Wire Residential Gateway. This selector displays all interfaces available on your particular 2Wire router, allowing you to choose which interface should be used.

- **Collect Internet Usage Data**: This checkbox is the master checkbox for collecting internet data. Internet data is only collected, logged, and stored when this checkbox is checked.
• **Compute Usage Totals using**: This selector tells [UV Realtime](#) how to total the internet data. This selector is completely independent of the data collection process, so you can change this selector at any time to get different totals without disturbing any of the saved data. The following compute modes are supported:
  o **Last 30 Days**: This compute mode computes all totals, meters, and graphs using the last trailing 30 days of Internet data readings. The “From” and “To” dates are automatically managed for you in this mode.
  o **From <Date> To Now**: This compute mode allows you to select a date in the “From” selector, and all totals, meters, and graphs are computed as the total from that selected date until the current date and time. This mode is most useful for seeing your usage since a certain date. The “To” selector is managed for you in this mode, and it always set to the current date (and time, even though the time isn’t shown).
  o **From <Date> To <Date> (Premium Version Only)**: This compute mode allows you to select a date in both the “From” and the “To” selectors, and all totals, meters, and graphs are computed as the total in that selected date range. The time (not shown) is set to midnight for the “From” date, and 11:59:59 for the “To” date, making the totals inclusive for the two dates. This mode is most useful for seeing historical data for your usage.
  o **Metering Cycle (Premium Version Only)**: This compute mode allows you to select a day of the month where your metering cycle begins, and [UV Realtime](#) will automatically count your usage for the metering cycle, resetting the totals to zero on the day that the metering cycle begins each month. The “From” and “To” dates are automatically managed for you in this mode. This mode is the easiest mode to use, as the totals always coincide with how you will be billed.

• **Graph (Premium Version Only)**: This selector allows you to set the time horizon and resolution for the displayed usage graph.

• **Unit Prefixes**: This selector allows you to select how the Kilo, Mega, and Giga prefixes are computed in the usage section. The default is to use System International (SI) units, where the prefixes represent powers of 10 (10^x). In this mode, 1 KB = 1,000 bytes, 1 MB = 1,000,000 bytes, and 1 GB = 1,000,000,000 bytes. To my knowledge, this is the mode which AT&T will use to compute and compare your data total to 250GB. (In other words, according to AT&T, 250GB = 250,000,000,000 bytes). If you would like to use the other mode, it is available, it is binary mode. In binary mode, the prefix represents powers of 2 (2^x), and 1 KB = 1,024 bytes, 1 MB = 1,048,576 bytes, and 1 GB = 1,073,741,824 bytes. Thus, in this mode, 250GB = 268,435,456,000 bytes. Also, in this mode, the prefixes are modified to read “Ki”, “Mi”, and “Gi”, to differentiate them from the SI prefixes of “K”, “M”, and “G”. Internally, [UV Realtime](#) always works in bytes, so the totals can be easily displayed in either mode.

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**ARCHITECTING YOUR NETWORK FOR THE USAGE METER**

[UV Realtime](#) can only accurately count your internet traffic if your network is hooked to the 2Wire Residential Gateway in a certain manner. This section will detail the recommended connection methods.

The idea is that all of your Internet traffic must be routed through one and only one interface on the 2Wire router. This way, [UV Realtime](#) can periodically read the counters from that interface off the 2Wire, log it, and use that to compute the usage totals.
IMPORTANT: You must connect your network to the 2Wire Residential Gateway using one of the methods specified below. If you do not connect your devices as shown, the Internet usage meter will not be anywhere close to accurate. I take no responsibility if you incur usage charges because the meter was inaccurate.

**CASE 1 – WIRED DEVICES ONLY**

This method can be used if all devices on your network are wired. This method consists of adding an Ethernet switch at the RG, and plugging all Internet devices into the switch. All IPTV devices (DVR and Set-Top Boxes) must not be plugged into this switch, but must be connected to the RG via coax or a different Ethernet interface.

In this case, to use the Usage meter once the network is connected as shown above, you can set the “Router Interface Used for Internet” to Ethernet 3, which corresponds to the port on the 2Wire router used for the switch uplink. The Internet usage meter will then count Internet traffic accurately.

You will have to provide your own Ethernet switch in this scenario.

**CASE 2A – WIRED AND WIRELESS DEVICES, ALL ONE NETWORK**

This method is used if you have both wired and wireless devices, but have no need to have your own router in the DMZ, nor any need for using advanced functionality provided by a 3\textsuperscript{rd}-party router such as UPnP, QoS, Dynamic DNS, etc. This method consists of adding a wireless access point and switch to your network, similar to case 1. All IPTV devices (DVR and Set-Top Boxes) must not be plugged into the switch, but must be connected to the RG via coax or a different Ethernet interface.
In this case, to use the Usage meter once the network is connected as shown above, you can set the “Router Interface Used for Internet” to Ethernet 3, which corresponds to the port on the 2Wire router used for the switch uplink. The Internet usage meter will then count Internet traffic accurately.

You will have to provide your own Ethernet switch and your own wireless access point in this scenario. You will also need to configure your wireless access point according to the manufacturer’s directions, and turn off wireless on the 2Wire Residential Gateway.

CASE 2B – WIRED AND WIRELESS DEVICES, ALL ONE NETWORK

This method is used if you have both wired and wireless devices, but have no need to have your own router in the DMZ, nor any need for using advanced functionality provided by a 3rd-party router such as UPnP, QoS, Dynamic DNS, etc. This method consists of using a 3rd-party wireless router, but not using the routing functions. All IPTV devices (DVR and Set-Top Boxes) must not be plugged into the 3rd-party router, but must be connected to the RG via coax or a different Ethernet interface.
In this case, to use the Usage meter once the network is connected as shown above, you can set the “Router Interface Used for Internet” to Ethernet 4, which corresponds to the port on the 2Wire router used for the 3rd-party router uplink. The Internet usage meter will then count Internet traffic accurately.

You will have to provide your own 3rd-party wireless router. You will also need to configure your wireless router as follows:

1. Turn off DHCP on your 3rd-party router. This is required because the 2Wire RG will be handing out IP addresses via DHCP.
2. Link the 3rd-party router to the RG using an Ethernet cable from the LAN port of the RG to one of the LAN ports on the 3rd-party router. Leave the WAN port of the 3rd-party router empty.
3. Change the LAN IP address of your 3rd-party to a static IP on the same subnet as the 2Wire router. For example, if the 2Wire router is using 192.168.1.x, and the DHCP range is 192.168.1.64 - 192.168.1.253, set your router to 192.168.1.10.
4. Configure the wireless portion of your 3rd-party router as you want, selecting a network name (SSID), the encryption type and password, and any MAC filtering you want.

CASE 3 – WIRED AND WIRELESS DEVICES, SEPARATE NETWORK USING DMZ
This method is used if you have both wired and wireless devices, and also have a need for using advanced functionality provided by a 3rd-party router such as UPnP, QoS, Dynamic DNS, etc. This method consists of using a 3rd-party wireless router and the DMZ functionality provided by the 2Wire router. All IPTV devices (DVR and Set-Top Boxes) must not be plugged into the 3rd-party router, but must be connected to the RG via coax or a different Ethernet interface.

In this case, to use the Usage meter once the network is connected as shown above, you can set the “Router Interface Used for Internet” to Ethernet 4, which corresponds to the port on the 2Wire router used for the 3rd-party router uplink. The Internet usage meter will then count Internet traffic accurately.

You will have to provide your own 3rd-party wireless router. You will also need to configure your wireless router as follows:

1. Set your router’s WAN interface to get an IP address via DHCP. This is required at first so that the 2Wire RG recognizes your router.
2. Using an Ethernet cable, plug your router's WAN interface to one of the 2Wire's LAN interfaces.
3. Restart your router, let it get an IP address via DHCP. Log into your router to find out the IP address it got from the RG.
4. Log into the 2Wire router’s interface. (At this point you will need to use a computer that is directly connected to the 2Wire RG. You will not be able to reach the RG through your router’s Ethernet interface.)
interfaces yet.) Once you are logged into the RG, go to Settings -> Firewall -> Applications, Pinholes, and DMZ.

5. Select your router under section (1), identifying it by looking for the IP address you noted in step 3.
6. Click the DMZPlus button under section (2).
7. Click the Save button.
8. Restart your router, when it gets an address via DHCP again, it will be the public outside IP address. At this point, you can leave your router in DHCP mode (make sure the firewall on your router allows the DHCP renewal packets, which will occur every 10 minutes), or you can change your router’s IP address assignment on the WAN interface to static, and use the same settings it received via DHCP.

9. On the 2Wire router, go to Settings -> Firewall -> Advanced Configuration.
10. Uncheck the following: Stealth Mode, Block Ping, Strict UDP Session Control.
11. Check everything under Outbound Protocol Control except NetBIOS.
13. Uncheck all the Attack Detection checkboxes (7 of them).
14. Click Save.
15. Log into your router. Change the LAN IP address to an address that is on a different subnet than the 2Wire RG. For example, if the 2Wire RG is using 192.168.1.x, set your router to use 192.168.2.x.
16. Configure the wireless portion of your 3rd-party router as you want, selecting a network name (SSID), the encryption type and password, and any MAC filtering you want.
17. At this point, both wired and wireless clients connected to your router should be able to reach the Internet.
18. If you want to configure any advanced setup on your router, such as inbound firewall settings, QoS, Dynamic DNS, or UPnP, do it now.

**ACCURACY OF THE USAGE METER**

I have taken great care to ensure that the usage meter in UV Realtime is as accurate as possible. The usage meter gets byte counts directly from the RG, and will be as accurate as those byte counts are. I have been running the usage meter for several weeks, comparing its results to another usage meter I have set up on separate switching hardware using MRTG (the Multi-Router Traffic Grapher, also by Tobias Oetiker, the same author as RRDtool). UV Realtime and MRTG consistently agree within 1% of each other.

There are a few items that can affect the accuracy of UV Realtime’s meter by a miniscule amount. They are:

- **Media Share**: Use of media share means that traffic from your computers crosses the 2Wire’s Ethernet interface that is being monitored, but does not travel across the Internet. Instead, it travels to a DVR or STB on your network. This causes the counter on the monitored Ethernet interface to increment, reflecting an increase in the total Internet data transferred, when such data didn’t actually exist. This will cause UV Realtime to overestimate your usage by a small amount.
  - According to my calculation, using Media Share for 3 hours per day, streaming MP3 music files to your Set-Top Box will result in a monthly inaccuracy of less than 3% when approaching the 250GB limit.
  - This inaccuracy is in the conservative direction, meaning that UV Realtime will report that you have used more data than you actually have.
- **UV Realtime**: UV Realtime itself can affect the accuracy of the meter due to the HTTP requests it initiates to the RG. This again counts some traffic on the monitored Ethernet interface and attributes it to Internet traffic when it should not.
  - Calculations show that the total error over the month is well under 1%, even when UV Realtime is running 24/7.
  - This inaccuracy is in the conservative direction, meaning that UV Realtime will report that you have used more data than you actually have.

Of utmost importance to the accuracy of the usage meter is connecting your network properly. Again, if you don’t use one of the network connection scenarios above that route all internet traffic through one interface of the RG, then the usage meter is not anywhere close to accurate!

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**OUTAGES AND REBOOTS**

Certain outages and reboots can affect the usage meter accuracy.

1. If UV Realtime is shut down, the RG’s counters continue to count traffic. When UV Realtime is started back up, the next readings it takes will bring the usage meter totals up to date, and those totals will be accurate. However, UV Realtime will not have detailed graphical data for the period of time that it was down. You will see this as a constant horizontal line of continuous traffic on the usage graph for the period of time that UV Realtime was down. It is recommended that if you want constantly detailed usage graphs, that you leave UV Realtime running 24/7.

2. If the RG is rebooted, UV Realtime will continue counting internet traffic when it comes back up. The total data numbers will still be accurate.

3. One scenario where UV Realtime will fail to count some data is if the RG reboots while UV Realtime is not running. In this case, any and all Internet data that was transferred between the time that UV Realtime was shut down until the time that it is started back up will be lost. To prevent this scenario, it is recommended that you leave UV Realtime running 24/7, use a UPS on the RG to prevent inadvertent reboots, or both.
STBS AND CHANNELS

This table shows you the current status of all DVR/STB units in your U-Verse® system. For each unit, the STB MAC Address (or assigned name) is shown, along with the live channel(s) that the unit is currently watching or recording. The channel number as well as the channel description is displayed. The resolution of that channel (SD or HD) is also shown, along with indicators showing whether a given channel is being watched or recorded.

In the above view, the first STB (Bedroom STB) is currently off.

The second STB (Office STB) is currently watching channel 1120 (Discovery Channel HD). The HD indicator shows that this is an HD channel.

The third STB (Living Room DVR) is tuned to 2 channels simultaneously, channel 1009 (KRIV-HD-26, the Houston FOX affiliate), and channel 1602 (ESPN HD). This is the DVR unit. The DVR unit’s MAC address or name will always be highlighted in maroon. Both channels that are tuned here are HD channels. The first stream is being recorded, indicated by the red “R”. The second stream is being watched, indicated by the green “W”.

If a unit is not watching live TV, you will see separate descriptions that will show if the STB is off, watching VOD, or watching recorded TV (THDVR).

This chart is always in sorted order by MAC address, so each STB will always stay in the same relative position no matter what channels are being watched or what the assigned name is.
The channel numbers and descriptions are currently in the channel database for approximately 90% of the channels that U-Vers® carries. There are some channels that are not in the database. If you tune to one of these channels, the description will show “Not in Database”, along with the multicast IP address of the channel stream. **UV Realtime** will automatically report channels that aren’t in the database to a central server for inclusion in the next update of the channel database. This behavior can be turned off in the Configuration tab.

**RENAME AN STB**

You can rename an STB by double-clicking on its MAC address. **UV Realtime** will show you the MAC address of the STB and ask you for a friendly name. Type the name and hit Enter or click Save. **UV Realtime** will remember the saved STB name across program launches. If you want to clear a name, double-click on it and leave the name field blank and click Save. **UV Realtime** will go back to referring to the STB by MAC address.

**STREAM ANALYSIS**

The stream analysis section shows the status of the live TV streams coming into your house (WAN streams), as well as the status of streams entering and leaving the DVR unit (DVR Ingress and DVR Egress streams). For each type of stream, the total number of streams and the number of HD streams are shown. The first number (before the slash) is the number of streams in use. The second number (after the slash) is the limit on the number of those types of streams that are allowed, which varies with your assigned profile.

For each stream type, if the number of streams in use equals the number of streams that are allowed (i.e. the maximum number of streams are in use), then the stream numbers will be highlighted in gold. If for some reason the number of streams in use exceeds the number that is allowed, the numbers will be highlighted in red. This may happen if the actual number of streams allowed by your profile doesn’t match what is configured on the Configuration tab.

As of version 1.7.0.0, **UV Realtime** does not assume any particular profile limits. You must configure your actual limits on the Configuration tab. See the Configuration tab section of this document for details.

**DVR SPACE ANALYSIS**

The DVR space analysis section shows you the current space utilization on the U-Verse® DVR. The total space available for storing recorded programs is shown, along with the free space, shown both as the raw value and as a percentage of the total space. The free space is also shown in terms of the hours and minutes of HD programs and SD programs that could be stored.

A red LED recording indicator is also present. This LED lights when the DVR is recording a program.

These statistics will show blanks if there is no DVR on the network, such as with the U100 package.

**SUBMITTING A CHANNEL TO THE CHANNEL DATABASE**

As of version 1.7.0.0, **UV Realtime** submits unknown channels to the channel database automatically. This feature turned on by default, but can be optionally disabled on the Configuration tab.
Submissions to the channel database do not immediately go into a downloadable database update for everyone. They are held in a queue until they are reviewed and verified, so don’t expect that the channel description in the Channels/Streams tab will change immediately.

As of version 1.9.0.0, UV Realtime also will submit channels to the channel database that have a channel number discrepancy (i.e. the channel number declared by the DVR is not the same as the channel number in the database). This helps keep the channel database updated with channel moves.

STREAM ANALYZER TAB

The Stream Analyzer is new to v1.6.0.0 of UV Realtime. The purpose of the stream analyzer is to troubleshoot potential problems with the IPTV stream at the interface of each DVR/STB unit.

Potential reasons to use the Stream Analyzer are:

- If you suspect that the network wiring (either Coax or Ethernet) may be introducing errors while packets are in route to the DVR/STB
- To confirm that a 100% error-free IPTV stream is reaching a DVR/STB unit.
- To further localize the source of picture freezes, pixilation, or poor HD quality.

REQUIRED NETWORK CONNECTIONS FOR THE STREAM ANALYZER

To analyze an IPTV stream, the computer running UV Realtime needs to be connected to the network where the computer can “see” the IPTV packets. This should be done as near to the DVR/STB as possible.
COAX-CONNECTED STB

For a coax-connected STB, you can connect the computer running UV Realtime to the DVR/STB’s Ethernet port. Depending on the type of network card in your computer, this may require a crossover Ethernet cable.

This is an example connection diagram for a coax-connected DVR/STB:
For an Ethernet-connected STB, you will need a 100Mbps or 1Gbps Ethernet switch. You will connect the incoming cable to the switch, and then connect both the STB and the computer running UV Realtime to the switch.

This is an example connection diagram for an Ethernet-connected STB:

Once the computer is properly connected, you can then run the stream analyzer.
The stream analyzer tab has the following interface:

![Stream Analyzer Interface](image)

To run the stream analyzer, follow these steps:

- **The Channels/Streams feature must be running for the stream analyzer to be available.** If the Channels/Streams feature is turned off, you will see a message here. Go to the configuration tab to enable the Channels/Streams feature. The proper network card used for STB communication must be selected from the pull-down menu in the configuration tab.

- **Choose the analysis time in the Analysis Time pull-down menu.** 1 Minute is usually sufficient to uncover obvious problems. However, if you are looking for a very intermittent or subtle problem, 5 minutes or 15 minutes can be selected.

- **Click the Start Analysis button to begin the IPTV stream analysis.** The analysis will run for the length of time you have selected.

- **All streams going to the DVR/STB unit will be detected and will be analyzed.** The streams that are seen will be shown in the Display Stream pull-down menu.

- **If the Stream Analyzer tab shows you “No streams detected”, you should check two things:**
  - Make sure the physical connections are correct as shown in the example connection diagrams above.
  - Make sure the correct network interface card has been selected on the configuration tab for the Channels/Streams feature, as the Stream Analyzer feature uses the same selected NIC.

During and after the stream analysis, the parameters will be displayed in the bar graphs and the numerical counters to the right.

- **Total Packets in Stream:** This is a count of the total number of IPTV packets that were expected to be received during the analysis time window. Note that HD streams will have approximately 3 times as many...
packets as SD streams. The bar on this parameter moves across during the analysis to let you know the progress of the analysis.

- **Good Packets**: This is the number of packets received in the IPTV stream that were good. They were received in order, had valid checksums, and intact data.

- **Out-Of-Order Packets**: This is the number of packets received that were out of order. These packets arrived out of sequence, and it was up to the DVR/STB to put them back in the proper order before the IPTV stream was decoded. The DVR/STB can do this for a small number of out-of-order packets, but a large number of them indicate routing or buffering problems in your network.

- **Corrupted Packets**: This is the number of packets received that were corrupted. These packets had bad checksums or incorrect data. The DVR/STB will discard these packets, resulting in video glitches or other problems. Receiving these types of packets indicates network issues, most likely bad hardware (bad cable, bad switch, etc.)

- **Missing Packets**: This is the number of packets that were not received but were expected to have been received. The missing packets result in video glitches/freezes. This situation indicates network issues, most likely bad hardware (bad cable, bad switch, etc.)

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**CONFIGURATION TAB**

As of v1.7.0.0, **UV Realtime** has additional tabs under the configuration tab to split the configuration options into different groups.

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**GENERAL OPTIONS TAB**
GENERAL OPTIONS

- **Hide Personal Information:** Check this box to hide the outside IP address, outside default gateway, and outside MAC address on the IP/Profile tab, as well as hide the IP addresses shown for the web server in the Config/Additional Features tab and the IP address shown on the Coax/HPNA tab for running the extended test. This is useful prior to taking a screenshot of these tabs so that personal information is not revealed in the screenshot.

- **Use High Contrast Highlighting Scheme:** Check this box to make UV Realtime highlight certain values using a high-contrast scheme. Rather than coloring only the text, the high-contrast scheme will highlight the background behind the value as well.

- **Prompt to Submit Unknown Channels to Database:** When this option is selected, UV Realtime will bring up the Channel Submission dialog box if you tune an STB to a channel that is not in the database. This will allow you to type in the channel number, channel description, and your zip code to submit a channel to the database. Submissions do not take effect immediately, they are held in queue for review and verification.

- **13812V Stats:** This selector tells the program whether to show the aggregate line statistics, line 1 statistics, or line 2 statistics. This selector is only available when the 2Wire router in use is the i3812V (the iNID) using pair-bonding.

- **Minimize:** This selector allows you to choose the behavior of UV Realtime when the minimize button in the window control bar is clicked. The normal (and default) behavior is to minimize the program to the Windows taskbar. You can alternatively select to minimize the program to the system tray, where a small icon will be shown next to the clock. Double click the icon to restore the program window.

UNKNOWN CHANNEL SUBMISSION

- **Automatically Submit Unknown Channels to Database:** When this option is selected, UV Realtime will automatically transmit information to a central server when a channel is seen that is not in the channel database. This information will be used to include the channel in the next update to the channel database. This option is turned on by default.

- **Your Location:** This is your approximate geographic location. The city and state shown here are submitted with channel information when unknown channels are seen. This information is determined using IP Geolocation technology, which uses your outside IP address to estimate your physical location. This information may not be entirely accurate, especially in new U-Verse® markets.

PROFILE SELECTION

As of version 1.7.0.0, UV Realtime no longer makes an assumption of what stream limits you are currently assigned by looking at your VDSL rate statistics. It is up to the user to properly select your TV profiles so that the Stream Analysis shown on the Channels/Streams tab correctly calculates number the streams that are in use and available.

Select your actual stream profiles here by going into your U-Verse® DVR or STB unit using Menu → Options → System Options → System Information → System Resources. You can see a picture of this stream as well as where to locate the profile information by clicking on the “What’s This?” link in this panel.
AUTO START

New in UV Realtime v1.9.0.0 is the ability to automatically start UV Realtime with Windows, and to optionally start the program minimized.

- **Start UV Realtime Automatically with Windows**: When this option is checked, UV Realtime creates a shortcut in the current user’s startup folder. This shortcut will cause UV Realtime to automatically start up when Windows is started up (and logged into, if required on your system). Since the shortcut is created on a per-user basis, the program will auto-start only for the user who was logged in when the checkbox was checked. Unchecking this box will delete the shortcut, and UV Realtime will no longer automatically start with Windows.

- **Start Minimized**: When this option is checked, UV Realtime will automatically start minimized, with no main window shown. It will be minimized either to the Windows taskbar or to the system tray, depending on the “Minimize” setting under General Options. This setting only affects the auto-start from the shortcut; launching UV Realtime in any other manner, including from a desktop shortcut or from the start menu will never start the program minimized.

ADDITIONAL FEATURES TAB

- **Network Interface for STB Communication**: For the STB channels and streams functionality, this is the network interface that will be used to look for STB channel and stream information. You may use a different network interface here than the one your computer is using for its normal network connection.
This interface should be a wired Ethernet connection. Some wireless connections will work, this depends on whether then can emulate an Ethernet card in promiscuous mode. Operation with wireless network cards is not guaranteed. You cannot change this selection while the STB channel/stream data is being gathered (see next configuration item).

- **Enable Gathering STB Channel/Stream Data**: Check this box to enable the gathering of STB channel and stream information. Information will be displayed on the Channels/Streams tab.

### MANUALLY SPECIFY RRDTOOL.EXE PATH

As of version 1.9.0.0, **UV Realtime** allows you to manually specify the path to RRDTool.exe. This allows you to install RRDTool on a different drive or in a non-standard location, and **UV Realtime** will be able to use the tool from there. Click the Browse button and find the RRDTool.exe file, and double-click on it to specify the path.

If RRDTool is installed in one of the default locations:

- C:\Program Files\RRDTool\RRDTool.exe
- C:\Program Files (x86)\RRDTool\RRDTool.exe

then it is not necessary to specify the path. **UV Realtime** will find the tool automatically if it is in one of these locations.

### WEB SERVER OPTIONS

**UV Realtime** as of version 1.5.0.0 contains an embedded Web (HTTP) server which can be used to view the DVR space information and the Channels/Streams information from a remote computer using any web browser. The web page layouts that display this information are specifically designed for easy use on mobile devices, but any web browser on any computer can view them.

Note that the web server will not show any information in the web pages unless the Channels/Streams feature is also running.

The web server is controlled by the following options:

- **Run Embedded Web Server**: Check this box to turn on the embedded web server. Uncheck it to stop the server (web pages will no longer be served).
- **Change Settings**: Click this button to change the settings associated with running the web server, including the port and the password. This button is only available when the web server is stopped. If necessary, stop running the web server by unchecking the “Run Embedded Web Server” option. Clicking the button will bring up the following dialog box:
The web server options are as follows:

- **Web Server Port**: Type the port number that you want the web server to listen on. The default is port 8080, an alternate port used by HTTP. If you would like to run the server on a different port for security reasons, type that port number here. Valid ports are 1 through 65535. If you enter a port outside this range, the check-mark icon will change to a red X and an error message will be displayed telling you to change the port number to this range. As of version 1.7.0.0, **UV Realtime** takes inventory of the services and programs that are running on your computer and will not let you type in a port number that is already in use by another program.

- **Web Server Password**: The first web page that is brought up when you browse to the **UV Realtime** computer is a login page. It requires you to type in a password to access the DVR Information, Channel Information, and Internet Usage pages. The password that is given on the login web page must match what is typed here, otherwise access is denied. Initially, the password is not set. The password must be at least 4 characters long.
  - **Note on password security**: When you type your password into the web page to gain access, this password is transmitted over the Internet in clear text. In other words, network packet analyzer devices can see the password, and it is therefore not to be considered high security. This is a limitation of the small embedded web server – it does not support encrypted SSL connections. The purpose of the password is to prevent casual abuse of the information available from **UV Realtime** to anyone who is not authorized.

- **Confirm Password**: You must re-type the password here and it must match the Web Server Password to be accepted.

Additionally displayed in the Web Server panel are:

- **Outside URL**: This URL is displayed if the web server is running. This will be the URL you will use to access the web server from the Internet. You must open the proper ports on your firewall, both on the computer running **UV Realtime** and on the U-Verse® 2Wire Residential Gateway for this to work. Instructions on how to configure the firewall are in the next section of this document. Clicking this link will also bring up the **UV Realtime** web pages on your local computer for testing. This URL hides your outside IP address if the “Hide Personal Information in Screenshots” checkbox in the General Options is checked.
- **Inside URL**: This URL is displayed if the web server is running. This will be the URL you will use to access the web server from another computer in your home. You must open the proper ports on your computer’s firewall for this to work. Instructions on how to configure the firewall are in the next section of this document. Clicking this link will also bring up the **UV Realtime** web pages on your local computer for testing. This URL hides your outside IP address if the “Hide Personal Information in Screenshots” checkbox in the General Options is checked.

- **QR Code**: New in version 1.9.0.0 of **UV Realtime** is a QR Code that can be configured to display either the Outside URL or the Inside URL. The QR Code makes it easy to bring up your **UV Realtime** web interface on your mobile phone. Simply start an appropriate QR Code reading application on your smartphone, and scan the QR Code using the phone’s camera. Your phone will automatically launch its mobile web browser and load the **UV Realtime** web page. You can then bookmark the page on your smartphone for easily coming back to it later.
  - Be aware that you will need to use the appropriate URL. If, when you scan the QR Code, you have your mobile phone on your in-home wireless network, you will need to use the Inside URL. If your mobile phone is connected to your carrier’s data network, you will need to use the Outside URL.
  - Use one of the following recommended QR Code reading applications on your smartphone:
    - Android: Barcode Scanner
    - iPhone/iPad: Qrafter QR Code Reader

To browse to the **UV Realtime** web server without going through the 2Wire Residential Gateway, click the Inside URL link.
You will get the login page:

![U-Verse Realtime Login Page](image-url)
Type in your password as given in the configuration options. You will then get the DVR Information page:

![UV Realtime](image)

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVR Total Space</td>
<td>207.2 GB</td>
</tr>
<tr>
<td>DVR Free Space</td>
<td>118.0 GB (56.9 %)</td>
</tr>
<tr>
<td>DVR HD Time</td>
<td>46:44</td>
</tr>
<tr>
<td>DVR SD Time</td>
<td>127:53</td>
</tr>
<tr>
<td>DVR Recording</td>
<td>Idle</td>
</tr>
</tbody>
</table>

The information shown on the DVR Information page is the same as is shown at the bottom of the UV Realtime Channels/Streams tab.
Click the Channel Info link button at the top (on mobile devices with a touch-sensitive screen, the entire button area is active as a link so that you can use your finger) to get the Channel Information page:

The channel information page shows the same channel and stream data as shown in the UV Realtime Channels/Streams tab. STB units are separated using a thick navy line. If the DVR is tuning in multiple streams for recording, additional streams on the DVR will be separated with a thinner, dashed line.

The HD, watching, and recording indicators are shown on the left underneath the STB name, the channel number and channel description are shown on the right. The STBs here will have the same names as you have given them in the UV Realtime application.

Click the Usage link button at the top (on mobile devices with a touch-sensitive screen, the entire button area is active as a link so that you can use your finger) to get the Internet Usage page:
The Internet usage page shows the same information as what is shown in the UV Realtime Usage tab. The Internet Usage page is only available with the Premium Usage meter. If you have not purchased the Premium Usage meter, you will see the following in the Internet usage page:
The DVR Information, Channel Information, and Internet Usage pages are programmed to automatically refresh every 60 seconds. Most web browsers will honor this behavior, but some mobile web browsers may not in order to conserve wireless bandwidth and conserve battery life on the mobile device. In that case, you can refresh the page manually by clicking the links in the navigation buttons.

**ALLOWING THE WEB SERVER THROUGH WINDOWS FIREWALL**

If you want to run the web server but you are also running Windows Firewall, you will need to create an exception to allow UV Realtime to serve the web pages. This applies in all cases, whether using the Inside URL or the Outside URL.

Microsoft has directions on how to make an exception for a program. Use these directions to make an exception for the UV Realtime executable file, located by default in:

- x86 (32-bit) Machines: `C:\Program Files\UV Realtime\UV Realtime.exe`
- x64 (64-bit) Machines: `C:\Program Files (x86)\UV Realtime\UV Realtime.exe`

The directions for Windows XP are here:

http://www.microsoft.com/windowsxp/using/networking/security/winfirewall.mspx

The directions for Windows 7 (mostly also applies to Windows Vista) are here:
THIRD-PARTY FIREWALLS

If you have a 3rd-party firewall such as ZoneAlarm or one of the combined anti-virus and security packages like Norton or McAfee, you must configure their firewall to allow inbound connections to UV Realtime. Consult with the manufacturer’s documentation.

ALLOWING THE WEB SERVER THROUGH THE U-VERSE® RESIDENTIAL GATEWAY

If you want to access the web server from another physical location other than your house using the Outside URL, you will also need to configure the U-Verse® 2Wire Residential Gateway to allow incoming connections to the web server through its firewall. Use the following directions to open the port:

2. Click the Settings tab at the top.
3. Click the Firewall label in the second row of tabs.
4. Click the Applications, Pinholes, and DMZ label in the third row of tabs.
5. Click on the computer that is running UV Realtime under section (1).
6. Click the Allow Individual Applications button under section (2).
7. If you have configured UV Realtime to use a custom port other than port 80, skip to step 12. If you have configured UV Realtime to use the default port (port 80), continue with the next step.
8. Click Web Server in the Application list.
9. Click the Add button. The Web Server will now be listed in the Hosted Applications list.
10. Click the Save button at the bottom.
11. You are finished with the configuration. The following steps after this one are only used for running the web server on a custom port.
12. For running the web server on a custom port, click the Add a New User-Defined Application button.
13. For the Application Profile Name, type “UVRT”.
14. For the protocol, select TCP.
15. Type your custom web server port (the same one you used in UV Realtime) in both the Port From and To fields.
16. Leave the Protocol Timeout and Map to Host Port fields blank. Leave the Application Type pull-down menu set to the default (none selected).
17. Click the Add To List button. Your custom port entry will appear in the Definition List below.
18. Click the Back button.
19. Re-select the computer that is running UV Realtime under section (1).
20. Click the Allow Individual Applications button under section (2).
21. Click UVRT in the Application list.
22. Click the Add button. The UVRT custom application will now be listed in the Hosted Applications list.
23. Click the Save button at the bottom.
24. You are finished with the configuration.

You can now access the UV Realtime web server from the Internet using the URL displayed in the configuration tab under “Outside URL”.

Reminder, to access the web server from the Internet:

- **UV Realtime** must be started up and running.
- The Channels/Streams feature must be turned on.
- The Web Server must be running.
- Your firewall on the computer (if you have one) must be configured to allow **UV Realtime** to receive inbound connections.
- Your firewall on the U-Verse® 2Wire Residential Gateway must be configured to allow inbound connections on the web server port.

### VERSION/UPDATES TAB

As of version 1.7.0.0, **UV Realtime** uses a completely new auto-update mechanism to keep the channel database and the program itself updated. This tab is the control center for the automatic updater.

Prior to version 1.7.0.0, updates for both the channel database and the program were downloaded into the Program Files\UV Realtime folder. Some anti-virus programs flagged this as improper behavior and either didn’t allow it or warned the user of possible virus activity. As of version 1.7.0.0, **UV Realtime** now downloads all updates to both the channel database and the program into the common application data folder, which is:

Windows XP: `C:\Documents and Settings\All Users\Application Data\UV Realtime`

Windows Vista/7: `C:\Program Data\UV Realtime`

This should no longer cause problems with anti-virus programs when updates are downloaded.
PROGRAM VERSION

Shown in the Program Version panel are the following:

- **Program Version:** This is the current version of **UV Realtime** that is running.
- **Latest Version on Server:** This is the version of **UV Realtime** that is available for download on the **UV Realtime** website (www.uvrealtime.com).
- **Status:** This shows the status of the auto-updater. Normally, when you are running the latest version of **UV Realtime**, this will show “Current”, with a green check mark. If the status is other than “Current”, a yellow warning triangle will be shown. The status line may show the following:
  - **Current:** You are running the latest version of **UV Realtime**.
  - **Checking for New Version:** This will be briefly shown when **UV Realtime** is checking the server for updates. **UV Realtime** checks for program updates 60 seconds after the program first starts up, and every 24 hours afterwards.
  - **Downloading Update:** This will be shown when **UV Realtime** is downloading a new version from the **UV Realtime** website. A percentage is also shown to show the progress of the download.
  - **Update Ready:** This is shown when **UV Realtime** has completed downloading an update and has staged it, making it ready for installation. **UV Realtime** will show a dialog box asking the user if they want to apply the downloaded update once the automatic update process reached this stage. **UV Realtime** also now validates the integrity of the downloaded file before declaring that the update is ready.
  - **Update Available:** If the user has unchecked the “Enable Auto Update of Program”, **UV Realtime** will show this message if there is an update available on the **UV Realtime** website, but will not download it and will not attempt to apply it.
  - **Error Communicating with Server:** **UV Realtime** will show this message if there was an error during checking for a new update or if there was an error downloading a new update. **UV Realtime** will try again on the next restart or in 24 hours.
  - **Special Instructions:** **UV Realtime** will show this message if there is a special message that needs to be displayed to the user regarding the update. The special message will appear in a pop-up message box.
  - **Not Checked:** **UV Realtime** will show this message when it has first started up. The next update check will occur within 60 seconds.
- **Enable Auto Update of Program:** When this check box is checked, **UV Realtime** automatically checks for new updates, downloads them if available, and asks the user to apply the update when it has been successfully downloaded. If unchecked, **UV Realtime** will check the server to see if an update is available, but will not download or attempt to apply any update.
- **Check for Updates Now:** If the user clicks this button, **UV Realtime** will initiate a check for new updates immediately, without waiting for the next update check time.

CHANNEL DATABASE VERSION

Shown in the Channel Database Version panel are the following:

- **Channel DB Version:** This is the current version of the channel database that **UV Realtime** is using.
- **Latest Version on Server:** This is the current revision of the channel database that is available for download.
- **Status**: This shows the status of the auto-updater. Normally, when you are running the latest version of the channel database, this will show “Current”, with a green check mark. If the status is other than “Current”, a yellow warning triangle will be shown. The status line may show the following:
  - **Current**: You are running the latest version of the channel database.
  - **Checking for New Version**: This will be briefly shown when UV Realtime is checking the server for channel database updates. UV Realtime checks for channel database updates 60 seconds after the program first starts up, and every hour afterwards.
  - **Downloading Update**: This will be shown when UV Realtime is downloading a new version of the channel database.
  - **Update Ready**: This is shown when UV Realtime has completed downloading a channel database update. Channel database updates will be automatically applied without restarting the program and without any user interaction as soon as the download is completed.
  - **Update Available**: If the user has unchecked the “Enable Auto Update of Channel DB”, UV Realtime will show this message if there is a channel database update available, but will not download it and will not attempt to apply it.
  - **Error Communicating with Server**: UV Realtime will show this message if there was an error during checking for a new update or if there was an error downloading a new update. UV Realtime will try again on the next restart or in one hour.
  - **Not Checked**: UV Realtime will show this message when it has first started up. The next update check will occur within 60 seconds.

- **Enable Auto Update of Channel DB**: When this check box is checked, UV Realtime automatically checks for new channel database updates, downloads them if available, and automatically applies them without restarting the program and without any user interaction. If unchecked, UV Realtime will check the server to see if an update is available, but will not download or attempt to apply any update.

- **Check for Updates Now**: If the user clicks this button, UV Realtime will initiate a check for new channel database updates immediately, without waiting for the next update check time.

- **Number of Channels in DB**: This value shows the number of channels that the current database has descriptions for. Whenever a channel database update is downloaded and applied, this number will normally increase. On occasion, a channel database update contains only changes to existing channels and does not contain any new channels, so this number may not increase each time.
ABOUT TAB

LICENSING

This tab shows information about the program, including the version, title, author, and description. Licensing information for UV Realtime as well as the all 3rd-party software used (including WinPcap, PCap.Net, Red Corona HTTP Server, Progress Bar Plus, Vertical Label Control, and RRDtool) can be seen by clicking either of the two buttons in the Licensing tab.

Version 1.6.0.0 and higher of UV Realtime contains a video message from the author. You can play it by clicking on the View Author Message button.

PRODUCT ACTIVATION

As of v1.8.0.0, UV Realtime implements a product activation mechanism to allow purchase of various premium features. The summary of the activated and available premium features can be seen in the Product Activation tab.
To activate a premium feature, click the Activate Premium Feature button, which will display the following:

In this window, you can activate a 15-day trial of any premium feature, or activate a premium feature you have purchased by entering the activation code. If you need to purchase a code, you can click the link to be taken to the UV Realtime web site purchase page. Purchasing a code is immediate – you will be immediately sent the
activation code to your e-mail as soon as you complete the purchase. Copy and paste the activation code into the boxes and click the Activate button. You will see a message that the activation was successful, and you will need to restart **UV Realtime** to use the activated premium feature.

**It is highly recommended that you activate the 15-day trial of any premium feature and try it out prior to purchasing to make sure that the feature works as you expect. No refunds will be given for purchased premium features!**

### Activation Mechanism

**UV Realtime** premium feature activations are tied to your U-Verse® Residential Gateway. This implies a few things:

- You do not need to purchase a premium feature for each installation of **UV Realtime**. Once a premium feature is activated, it becomes activated for all installations of **UV Realtime** that get statistics from your Residential Gateway.
- You are allowed up to 3 RG changes per year. The number of RG changes allowed and the date until which the number is reset to 3 are shown at the bottom of the activated features window. If you have your RG changed for any reason, **UV Realtime** will automatically reactivate on the next startup if there are changes remaining on your account.

### Donations

To further development of **UV Realtime**, I have added the ability in the program to accept donations. **UV Realtime** remains free, but if you find it a useful utility, please consider donating towards future development. Click the Donate button and you will be brought to a PayPal web page where you can donate any amount you like (the page lets you type in the amount you’d like to donate). Thank you very much for any donation of any amount! If you’d like to donate now, click the following button:

![Donate Button](image)

### In-Application Messaging

New in **UV Realtime** as of version 1.9.0.0 is an in-application messaging pane located at the bottom of the main window. This area is used to deliver messages to the end user to help them use **UV Realtime**.

Various messages can appear here depending on what features **UV Realtime** you are using. Some of these include tips on how to use **UV Realtime’s** features, what features are new in this version, and where to get support/assistance with **UV Realtime**. Some messages relate to the Premium Usage meter, including reminders to renew your subscription or to try the free trial.
No 3rd-party advertising is presented in the in-application messaging window, only messages that are associated with the **UV Realtime** program and **UV Realtime’s** author.

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**CRASH REPORTING**

New in **UV Realtime** as of version 1.9.0.0 is a crash reporting feature. Program crashes (also known by the technical term “exceptions”) occur because of programming bugs or unexpected conditions. In previous versions, if a program crash occurred, there was not a good way to determine why that happened.

In version 1.9.0.0 and later, if a program crash occurs, you will see a window where you can report the crash to a central server. The window will be similar to the following:

![UV Realtime Automatic Error Reporting](image)

This feature reports all information to the program’s author about why the program crashed, including internal variables and other parameters.

No personal data is transmitted with this report, only information about the state of the **UV Realtime** program when the crash occurred.

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**STATISTICS GATHERING INTERVALS**

**UV Realtime** gathers statistics continuously and updates them in the user interface. The following are the update intervals for each set of information:

- VDSL Line Statistics, VDSL Errors – Every 60 seconds
- RG VDSL, HPNA, Wireless, and Ethernet Interface Data Rates – Every 60 Seconds
• RG IP Addressing Information – Every 5 minutes
• Coax/HPNA Phy/SNR Information – Every 5 minutes
• VDSL Bitloading – Every 5 minutes
• DVR Analysis Information – Every 5 seconds
• STB Channel/Stream Information – Every 5 seconds
• Internet Usage Data – Every 5 minutes
• Web Page information from embedded web server – Every 60 seconds
• Check for Program Update – 60 seconds after startup and every 24 hours afterwards
• Check for Channel DB Update – 60 seconds after startup and every hour afterwards

STATISTICS AND INFORMATION HIGHLIGHTING

Several statistics that are shown in the program will be highlighted in various colors to call attention to a condition. The various fields that may be highlighted under certain conditions are:

**IP/PROFILE TAB**

- **FEC Rate**: This value will highlight in yellow or red to indicate a high number of Forward Error Correction (corrected block) events that are occurring on the VDSL line. Continuously high values indicate a VDSL line problem.
- **CRC Rate**: This value will highlight in yellow or red to indicate a high number of Cyclical Redundancy Check (uncorrected block) events that are occurring on the VDSL line. Continuously high values indicate a VDSL line problem.
- **Noise Margin**: Values of noise margin that are too low usually indicate that the assigned line profile is too high for the line to support. You probably need to have the line conditioned or have the profile rate reduced.
- **Attenuation**: Values of attenuation that are high indicate that you are very far away from the VRAD. This does not necessarily indicate bad service, but that higher profiles may not be possible.
- **Power Level**: Values of power level that are low (downstream) or high (upstream) indicate that you are very far away from the VRAD. This does not necessarily indicate bad service, but that higher profiles may not be possible.
- **Line Capacity**: Values of line capacity over 80% indicate that the line is trying to carry a data rate that is beyond its capability. Line conditioning or a lower profile may be required.
- **Estimated Distance from the VRAD**: Distances that are nearing 3000 feet approach the limit at which U-Verse® can operate. This does not necessarily indicate bad service, but that higher profiles may not be possible.
- **Reserve Bits**: Values of reserve bits approaching zero indicate that there is very little overhead left for the line to handle errors. Values of 0 correspond to a Line Capacity of 80%, and indicate that the line is trying to carry a data rate that is beyond its capability. Line conditioning or a lower profile may be required.
- **Bits In Use**: Values of bits in use approaching 100% indicate that there is very little overhead left for the line to handle errors. Values of 100% correspond to a Line Capacity of 80%, and indicate that the line is trying to carry a data rate that is beyond its capability. Line conditioning or a lower profile may be required.
- **Recommended Profile**: The recommended profile is the line rate selection that best matches your line’s capabilities. If this doesn’t match the currently assigned line profile, it will be highlighted in red.

In addition to these items, many items here are specific to VDSL installations. If your installation is a Fiber to the Premises (FTTP), many values on the IP/Profile tab will be blank, and instead will have a blue-highlighted “FTTP” displayed.

The thresholds that are used for highlighting are different for the i3812V router (iNID). The expected parameters for these customers are different because of the distance from the VRAD. i3812V support is a work-in-progress, and these highlighting thresholds may change in future versions.

**ERROR TABLE TAB**

- **Link Retrains**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **DSL Training Errors**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **Training Timeouts**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **Loss of Framing Failures**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **Loss of Signal Failures**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **Loss of Power Failures**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **Loss of Margin Failures**: These values will highlight in the warning color when they exceed 1, and the error color when they exceed 3.
- **Cumulative Seconds with Errors**: These values will highlight in the warning color when they exceed 30 per day, and the error color when they exceed 60 per day.
- **Cumulative Seconds with Severe Errors**: These values will highlight in the warning color when they exceed 10 per day, and the error color when they exceed 20 per day.
- **Corrected Blocks**: These values will highlight in the warning color when they exceed 500 per minute, and the error color when they exceed 2500 per minute.
- **Uncorrectable Blocks**: These values will highlight in the warning color when they exceed 10 per minute, and the error color when they exceed 50 per minute.
- **Cumulative Seconds with Severe Errors**: These values will highlight in the warning color when they exceed 60, and the error color when they exceed 180.

**COAX/HPNA TAB**

- **PHY Rate (Mbps)**: Coax data rates should always run at 112 Mbps (112-128 Mbps for 3801HGV and i3812V routers, and up to 256 Mbps for 3801HGV and i3812V routers connected to 2nd-generation STB units [VIP2250, ISB7500, ISB7005]). Anything less will be highlighted, indicating a possible problem with the coax runs in your home. Use this chart to determine the MAC address of the STB that is having the problem.
USAGE TAB

- Internet usage is logged every 1 minute, and averages/aggregate stats are computed every 5 minutes. Note that depending on your compute mode and date settings, it may take up to 30-45 minutes for internet data use to appear in the totals, especially when the feature is first turned on.

CHANNELS/STREAMS TAB

- **STB Mac Address/Name:** This will be highlighted in maroon if the unit is the DVR.
- **Resolution:** This will be highlighted in blue for HD streams.
- **In Use Streams:** If the streams in use are at a limit, it will be highlighted in gold.
- **DVR Free Space:** If the DVR free space is less than 15%, it will be highlighted in gold.

OTHER FUNCTIONALITY

SAVE SCREENSHOT

The Save Screenshot button in the upper right corner allows you to save a screenshot of the currently selected tab in the program. Clicking on the button will bring up a save dialog box, asking you to choose a filename to save the screenshot. The filename is pre-selected for you, and any previous directory that was used is remembered. The screenshot can be saved in .png (recommended), .gif, .bmp, or .jpg formats.

Screenshots are useful for uploading to a public forum to get advice on the state of your line. Use the "Hide Personal Information" checkbox on the Configuration tab to hide your public information like the outside IP address prior to taking a screenshot to ensure your privacy.

As of version 1.6.0.0, the current date and time is added to the filename when screenshots are saved.

ANONYMOUS DATA COLLECTION

Starting with version 1.4.0.0 of UV Realtime, the program anonymously submits some of your line statistics to a central database. This was put into the program to allow me to improve the accuracy of the calculations, and to improve the understanding of AT&T's new technology surrounding the i3812V router when using pair-bonding. By analyzing these line stats as a whole, I expect to be able to release future versions of the program with improved functionality.

Your privacy is important. UV Realtime submits these line statistics using 128-bit SSL security, so that no one can see the statistical values. No personal information is transmitted to the database server, only the line stats themselves and a randomly generated ID to make sure that your stats are only submitted to the database one time.

The database server is my personal server, which is solely under my control, no one else’s.
BUG REPORTS

If you discover a bug with the tool, please post a thread at the AT&T U-Verse® Community forum at http://forums.att.com/t5/AT-T-U-verse-Community/ct-p/attuverse. I will see the thread and respond.

KNOWN BUGS

At this time, the following bugs are known to exist in the program:

- If the user has his localization settings set to use the "." as the grouping separator and ",," as the radix mark, several calculations and value highlights do not work as expected. This will be fixed in a future release.
- **UV Realtime** is designed to lay out the user interface when the Windows display size selection is set to 100% or 96DPI. Some computers from some manufacturers (notably Dell) usually ship with this setting set to 125% or 120DPI. This setting causes the bitloading graph and the in-app messaging window in **UV Realtime** to be displayed at the wrong size. It is recommended to switch your display size selection back to 100% or 96DPI. This can be done as follows:
  - Windows Vista/7: Start Menu → Control Panel → Appearance and Personalization → Display. Change the setting to “Smaller – 100% (Default)”.
  - Windows XP: Start Menu → Control Panel → Display → Settings tab → Advanced button → General tab → DPI Setting. Change the setting to “Normal Size (96 DPI)”.

REPORTING AN ADDITION TO THE CHANNEL DATABASE

If a channel shows “Not in Database” in the Channels/Streams tab and you do not want to use the built-in channel submission mechanism, please do the following to report an addition to the channel database:

- Make a post in the High-Speed Internet forum at U-Talk (http://utalk.att.com). Include:
  - The multicast IP address of the channel (given in the channel description field, the IP address will be 239.x.x.x).
  - The channel number.
  - The channel name.
  - Your zip code. (This is important if the channel is a local channel. It will enable me to get the proper Kxxx/Wxxx call signs for all of those local channels).

I will add channels to the database in groups, and **UV Realtime** will auto-update the channel database periodically if you have the “Enable Auto Update of Channel DB” checkbox checked on the configuration tab.

VERSION HISTORY

1.9.1.0

- Fix 2 causes of crashes when closing program due to multithreading bugs.
• Fix crash when attempting to use a network adapter for Channels/Streams that doesn't support promiscuous mode.
• Fix crash if attempting to close the program immediately after it starts up.
• Fix crash if usage meter was enabled on last run, but on next startup UV Realtime cannot connect to the RG.
• Fix crash if connection to RG is made, but no bitloading can be retrieved from the RG (such as during line training).
• Fix crash if the in-app messaging window cannot completely load the HTML for the message.
• Fix crash if IP address typed into the Router IP field is not a valid IP address.
• Fix crash if user clicked an in-program link (PayPal Donate, embedded Web Server, Coax Extended Test) and UV Realtime was unable to launch the default web browser on the user's system.
• Fix crash if the data retrieved from the 2Wire router is corrupted such that the interface byte counts are out of range.
• Fix crash if the computer does not have any active networking stack (DNS failure).
• Fix crash when attempting to do stream analysis using the Stream Analyzer when the selected network interface card is either non-existent or otherwise not a valid selection.
• Fix crash if the program is unable to connect to the web service to get premium feature activation status.
• Fix crash if RRDTool was unable to generate the usage graph for the premium usage meter.
• Fix crash if Arial font is corrupted on the user's system.
• Fix crash if user tries to bring up the Activation window when UV Realtime has not yet connected to the 2Wire router.
• Fix crash if user disables channels/stream gathering at the exact time that a captured network packet is being processed.
• Fix crash if 2Wire router returns a non-parsable value for various line parameters.
• Fix crash if user moves the mouse pointer over the bitloading graph if the graph is still displayed when not connected to the 2Wire router and Show Crosshairs on bitloading graph is selected.
• Fix bug with font specification when generating usage graphs using RRDTool.
• Disable Internet Explorer navigation sound when in-app messaging pane changes messages.
• If user has purchased premium usage meter, Donation in-app message is no longer shown in rotation.

1.9.0.0

• Fix egress stream count for Phase 3 THDVR
• Fix installer to require/pre-install Windows Installer 4.5
• Fix bug with cmd-line tool launch -- C:\Program Files vs. C:\Program Files (x86) (affects RRDTool)
• Fix IP geolocation - Now using web service call to determine location vice InfoSniper.net
• Fix Coax/HPNA for 3800HGV-B new firmware
• Fix free space calculation to be consistent with Phase 3 THDVR / TV2 Client 2.1.2295.10
• Fix STBNames.txt gets saved into screenshot folder if STB is renamed after a screenshot is saved
• Fix web interface to be full-screen on mobile browser
• Fix date/time bug with premium usage meter -- program crashes if set to Billing Cycle metering mode and current month is January
• Fix grammatical error (missing space) in RRDTool warning dialog
• Fix program crash when run on unsupported 2Wire models (e.g. 2701HGV)
- Change channel submission code to now submit channels with channel number discrepancies in addition to new channels
- Change screenshot save routines to save only form contents, not form and border, add UVRealtime.com URL to top of saved graphics
- The user can now manually specify the RRDtool executable path so that it can be installed in a non-standard location
- Program now displays QR Code for inside or outside URL to web server so mobile phone can easily bring up the website
- Internal change so that premium features can only be activated by an appropriate version of the program
- For re-activation of 1-year subscriptions to the premium usage meter, the purchase will now add time onto the end of the existing term (i.e. if the feature is not yet expired, purchasing another 1-year subscription adds 1 year onto the existing expiration date)
- Program now auto-reports crashes/errors to central server
- Change copyright dates to 2010-2012 on website, documentation, and several other locations
- Add Start with Windows option / Start minimized
- Add error table aggregate statistics for i3812V
- Add in-app messaging engine to display messages to the user in the main window
- Author video is now played as an in-app message using HTML/Flash instead of separate window with Windows Media Player
- What's New now displayed as an in-app message using HTML instead of separate window
- Add Flowplayer links, copyrights, and licensing to licensing window and documentation
- Add ThoughtWorks QR Code library links, copyrights, and licensing to licensing window and documentation
- Remove author video from installer
- Remove all dependencies on Windows Media Player from installer and project

1.8.1.0

- Fix uninstall section of installer to prevent removing user’s Internet usage data during upgrade
- Modify automatic update behavior to properly sequence multiple updates

1.8.0.0

- Fix Egress stream count (not yet updated for Phase 3 of THDVR)
- Fix flash/flicker of ListPanel controls when values are updated
- Fix crash when quitting program immediately after startup (graceful shut down of auto-update threads)
- Fix Line1/Line2/Aggregate indicator text label anchors on bitloading graph
- Fix iNID interface meter and graphic
- Fix one cause of program crash when unable to send IP multicast group join packet
- Fix no spacing with "Days" label in Error Table Last Event column
- Fix IP Geolocation due to change in API for www.infosniper.net
- Fix several misc items related to properly clearing the display when the 2Wire router is disconnected.
- Apply certain optimizations to embedded web server for better performance
- Change channel submission to only submit channels with a declared channel number
- Change form style to non-resizable
- Change thresholds for highlighting noise margin to <= 12.0 dB
- Change self-extractor to WinZip SE to avoid problems with some anti-virus programs
- Change program name to **UV Realtime** on web site, documentation, program
- Change program web site to [http://www.uvrealtime.com](http://www.uvrealtime.com)
- Change copyright dates to 2010-2011 on web site, documentation, and several other locations
- Change About tab to reorganize, move libraries and other software licensing to its own separate window
- Change **UV Realtime** licensing specifics - license is now full EULA, proprietary closed-source license
- Change to .Net Framework 4.0
- Upgrade to WinPcap 4.1.2
- Upgrade to PCap.Net 0.8
- Change installer from Visual Studio built-in Installer to WiX Installer to handle prerequisites
- Add manual removal instructions to documentation
- Add run on Mac using VM to system requirements on web site and in documentation
- Add premium feature product activation mechanism
- Add premium feature: Internet Usage Calculator
  - Get periodic data totals, log to RRDtool
  - Show total data for intervals: 5 min, 30 min, 2 hours, 1 day
  - Add usage counter info to web server
  - Graphs in windows form and in web server
- Add .Net code obfuscation/protection

### 1.7.0.0

- Fix 3801HGV & i3812V bit allocation analysis, add Over-Allocated bits category
- Fix lag on typing IP address into 2Wire router field
- Change "router uptime" label on Error Table tab to "error totals collected for"
- Change highlight color for error table values to be consistent with other highlighting
- Change/Redesign Interfaces tab with new Total Data indicators and flow graphics
- Change/Redesign bitloading X-axis with better delineation of frequencies
- Change/Redesign auto-updater, can now apply channel database update without restart
- Change/Redesign auto-updater, program updates download in background and are verified for integrity
- Change location of saved application data to common application data folder to avoid problems with some anti-virus programs
- Change unknown channel submission process to a fully automatic method - no user input required
- User no longer needs to enter zip code to submit channels to database, zip code now determined automatically using IP Geolocation
- Change Manufacturer URL in Add/Remove Programs (Programs and Features) to [www.uverserealtime.com](http://www.uverserealtime.com)
- Add download progress indicator for program updates on Config/Versions tab
- Add verification dialog box for web server port/password parameters, prevents starting web server on a port already in use
- Add actual router uptime on Error Table tab
- Add cross-hairs to Bitloading graph to assist with pinpointing frequency interference, user-selectable
• Add right-click context menu to system tray icon with Restore and Exit options
• Add highlighting of additional errors to error table
• Add update summary to new configuration tab, with Check for Updates Now button
• Add "What's This?" link to Profile Selection area of configuration, with explanation window
• Remove requirement to run as Administrator
• Remove "Auto" from profile overrides, change profile overrides to profile selection, simplify selections
• Remove 13/1.5 profile recommendation for 3600HGV, 3600HGV can now be used for up to 32/5 profile if the line can handle it
• Remove highlighting of incorrectly provisioned line on Bitloading graph based on Upstream 0 band, US0 can now be used in a variety of installations

1.6.0.0

• Fix bug with interface data rates and error rates computing incorrect rates on configuration changes (Hide Personal Information, High Contrast Highlighting)
• Fix "NaN" in DVR space display when no DVR is detected (U100 users)
• Fix coax stats on i3812V and 3801HGV routers, user now is prompted to run Extended Test in 2Wire router interface
• Changed default port for web server to 8080 to prevent starting web server on a port that may be in use (port 80)
• Changed default number of WAN HD and SD streams for each profile (32/5 - 0SD/4HD, 25/2 - 2SD/2HD, 19/2 - 3SD/1HD)
• Changed default number of Ingress HD and SD streams for each profile (32/5 - 1SD/3HD, 25/2 - 2SD/2HD, 19/2 - 3SD/1HD)
• Changed default number of Egress HD and SD streams for each profile (32/5 - 1SD/2HD, 25/2 - 1SD/2HD, 19/2 - 1SD/2HD)
• Add new tab with Error Table from 2Wire router, add highlighting for Corrected Blocks and Uncorrectable Blocks
• Add new tab with Stream Analyzer to detect local network problems with coax or Ethernet
• Add minimize to system tray option
• Add highlight of upstream power level when level < -29.0 dB, this indicates an attenuator is probably needed in NID
• Add VDSL profile and band plan information to Bitloading graph, highlights in red if US0 band is improperly used
• Add date/time to screenshot filename
• Add statement in installer that WinPcap will be installed, add UVRT icon and custom banner
• Add video from author

1.5.0.0

• UV Realtime now contains an embedded web server to remotely view DVR and Channels/Streams data. See the documentation for configuration instructions.
• Fix bug introduced in v1.4.1.0 concerning highlighting color of the recommended profile. In some cases, the profile would be highlighted green even when that didn’t match the user’s actual line profile.
Fix bug in recommended profile for 3600HGV (Internet only) installations. From line stats database, nominal profile for 3600HGV Internet-only installation should be 13200/1528 on single-line standard frequency plan (same as 3800HGV-B).

Recommended profile was computed with a 5% margin of reserve bits required. This is no longer the case, and the recommended profile now allows down to 0 reserve bits. This allows higher recommended profiles for some people whose line is only barely able to carry a given profile.

Channel database and channel descriptions are now Unicode compliant, allowing them to hold non-ASCII characters such as "ñ"

Misc documentation updates
Channel database updates - Add 3 national channels, add 15 local channels, fix multicast IP addresses and descriptions for 4 existing channels

1.4.1.0

Fix crash when user's line had a recommended profile of "No Svc"
Add Paypal Donate button to About tab (and thank you for your support!)
Add Aggregate / Line 1 / Line 2 stats label to bitloading graph for iNID (2Wire i3812V router)
Misc documentation updates
Channel database updates - Add 3 national channels, add 15 local channels, fix multicast IP addresses and descriptions for 4 existing channels

1.4.0.0

Add initial support for iNID (2Wire i3812V router)
Display Line 1, Line 2, and Aggregate stats using pulldown menu in Configuration tab or using keyboard commands (0/A = Display Aggregate Stats, 1 = Display Line 1 Stats, 2 = Display Line 2 Stats, 5/S = Toggle to next stats display)
Remove 13/1 user profile indications and analysis -- this profile is used only for individual lines of a pair-bonded installation, not as a final user profile
Program settings are now migrated across versions
Program window position is now saved between launches
Reconnect interval changed to 30 seconds vice 10 seconds
Program no longer attempts to reconnect to the router when typing in the IP address field
Added code to clear hardware version and VRAD distance when router is disconnected
High contrast checkbox now changes highlighting immediately instead of at the next update interval
Added ability to submit channel to channel database directly from program
Added anonymous data collection to assist with analyzing data in order to improve program in future versions

1.3.1.0

Internal change to support different 2Wire router models
Now supports 3800HGV-B, 3801HGV, and 3600HGV routers
Fix block style of HPNA/Coax Out of Router data rate bar on Windows XP
Add support of 13/1 profile for internet-only installs using 3600HGV
• Change DVR space warning to 15% free space remaining vice 10% -- DVR begins to auto-delete at 10% free
• If profile rate is too high for the line, Bit Allocation Analysis now shows overcommitted bits instead of reserve bits = 0.
• Reorganize About tab, program version and channel DB version is now more prominent.
• Add WinPcap and PCap.Net licensing information to About tab and ReadMe file/documentation.
• Update documentation reflecting that some wireless cards may work for streams/channels functionality.

1.3.0.0

• Change STB streams detection method to use the pseudo-SSDP packets instead of IGMP. This removes the requirement for direct connection to the RG, and removes the high bandwidth traffic to the computer running UV Realtime.
• Remove IGMP query packet generation, no longer necessary. This restores IGMP snooping functionality to the RG’s switch port, preventing the high bandwidth traffic to the UV Realtime computer.
• Streams Analysis now tracks WAN streams, DVR Ingress streams, and DVR Egress streams.
• STBs and Channels now tracks which streams are being watched and recorded.
• STBs and Channels now tracks if an STB is Off, watching VOD, or watching Recorded TV separately.
• Decoupled stream information gathering thread from STB channels information display thread to remove multithreading bug.
• STBs and Channels now updates more quickly, reflecting stream changes in less than 5 seconds.
• Improve accuracy of time left for recording on the DVR for both HD and SD.
• Add profile override for WAN, DVR Ingress, and DVR Egress streams.
• Update channel database, add Chicago, IL locals, fix QVC and HSN channel numbers.
• Fix crash when selecting invalid NIC, add user-friendly error message.
• Fix date/time not locked onto Windows form when window resized.
• Add renaming of STBs on Coax/HPNA tab.
• Remove warning dialog box before enabling STB Channels/Streams gathering, no longer required.
• Remember selected tab on program startup.
• Add better graceful shutdown code for background threads.
• Tweak highlighting colors for errors from Indian red to Fire Brick red for higher contrast on Windows XP.
• Update main documentation (ReadMe) with new features and screenshots.
• Update technical documentation with U-Verse® pseudo-SSDP packet analysis.

1.2.2.0

• Fix STB packet query detection (again).
• Fix NIC selection of invalid NIC results in crash.
• Add channel count to About tab
• Minor changes to ReadMe documentation
• Add Technical documentation
- Update included channel database to version 2010-06-20-1556-001 (488 channels).
- Modify auto-update code to be able to auto-update with installer
- Modify installer to ask user if they want to launch program at end of installation

### 1.2.1.0

- Fix STB packet query detection.
- Fix intermittent multithreading deadlock bug when closing program.

### 1.2.0.0

- Program renamed to **U-Verse Realtime** to better reflect the scope of functionality.
- Fix last digit of coax station MAC addresses
- Add date/time to panel so it appears in screenshots
- Add comma & significant figures to FEC/CRC rates
- Fix Bits in use highlighting - yellow vice red @ 100%
- Add Hardware version to IP and Gateway information
- Change to ListView control for coax/HPNA reporting for better line-up of information
- Add STB channels tab with current channels being watched, stream totals, and DVR space analysis.
- Change ReadMe to PDF vice .txt file to be able to hold graphics.
- Change to MSI installer to allow user to install WinPcap.

### 1.1.2.0

- Clean up IP/Profile page for better alignment of text and values.
- Fix recommended profile highlighting to highlight in forest green to show correctly selected profile.
- Fix profile highlighting - was highlighting downstream value but not upstream value.
- Fix FTTP connections (again).
- Fix Bitloading graph to show message if connection is FTTP.
- Fix bug in getting proper upstream/downstream profile rates when there had been a retrain (again).
- Fix FEC/CRC data rates and associated calculations (again). Upstream FEC/CRC removed because it isn't updated by the RG often enough.
- Fix highlighting for values that can be highlighted more than one way depending on conditions.
- Tweak VRAD distance calculation, should improve accuracy for those very close (<700') to VRAD.
- Tweak highlighting thresholds for better consistency between parameters.
- Add page-based HTML caching to speed up data collection. IP addressing information, bitloading, and bit allocation analysis are now only updated once every 5 minutes. FEC/CRC rates and interface data rates are still updated once every 60 seconds.
- Add Coax/HPNA analysis and highlighting of errant Phy rates.
- Add warning about saving personal information in a screenshot.

### 1.1.1.0

- Fix bug in recommended profile calculation. Program was always reporting 32/5 profile as recommended even when the line would not handle it.
- Fix bug in FEC overhead ratio - was reporting value for 32/5 profile even when actual profile was 19/2 or 25/2.
- Added high-contrast highlighting user preference.
- Add Ideal/Typical/Service Limit values for profile parameters in ReadMe.txt.
- Add estimated VRAD distance calculation to Profile and Errors section.
- Add frequency display for mouse pointer hover on Bitloading graph.
- Improve accuracy of data rates on Interfaces page.

### 1.1.0.0

- Changed form size to accommodate smaller screens, such as 1024x600 on Netbooks.
- Changed to tabbed interface. Moved bitloading graph into tab, moved about information into tab. Moved interface data rates into separate tab.
- Changed font color for warning-type highlighting to gold to increase contrast on Windows Vista/7 background.
- Added Bit Allocation Analysis section.
- Add hide personal information configuration item.
- Add automatic update and auto-update preference configuration item.
- Add save screenshot functionality.
- Change data collection to multithreaded call so that user interface doesn't freeze during data collection.

### 1.0.5.0

- Fixed bug that was causing VDSL lines that had undergone a retrain or line reset to not report the correct number of FEC and CRC errors.
- FEC and CRC error rates are now reported with an accuracy of tenths of an error per minute. Error rates as low as 6 errors per minute will now show up in the interface.
- Added bitloading graph.
- Added about box.
1.0.4.0
- Added many additional data checks to handle unexpected situations, especially relating to being unable to reach the router on the network
- Now compatible with FTTP connections
- Now able to handle the situation where the 2Wire router reboots or loses the VDSL/broadband connection
- If the program is unable to connect to the 2Wire router, the program automatically attempts to reconnect to it at 10 second intervals

1.0.3.0
- Add additional data checks when computing data rates to prevent attempting to report invalid values
- Program now saves the setting of the Automatic checkbox and the router IP address between program launchings

1.0.2.0
- Fix another bug with negative upstream power levels

1.0.1.0
- Fix bug with negative upstream power levels

1.0.0.0
- Initial Release

**LICENSING**

*UV Realtime* is Copyrighted software © 2010-2012, by Dan Wilson. All rights are reserved.

See the separate licensing document (Start Menu -> Programs -> UV Realtime -> License) for the full *UV Realtime* license. This license is a proprietary, closed-source end-user license agreement -- *UV Realtime* is not freeware, public domain, or open-source.

**JUSTIFICATION FOR THE USE OF RRDTOL**
**UV Realtime** uses RRDtool, a logging and graphing program by Tobias Oetiker, released under the GNU General Public License (GPL). The GPL is intended to make sure that software that is distributed is free from restrictions on the end user – in other words, to make sure that the end user can do whatever they want to do with the software, within the bounds of the GPL.

A caveat of this license is that in many cases, when a non-GPL program incorporates GPL software, the entire work becomes bound by the GPL. This usually means that the resultant work must be distributed under the same conditions of the GPL as the original GPL’d work, including requiring distribution of source code and the freedom for end users to modify the software.

This goal of the GPL is incompatible with the proprietary, closed-source license for **UV Realtime**. Thus, only under a very specific set of conditions can **UV Realtime** make use of a GPL program like RRDtool.

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**SITUATION WHERE USE OF GPL SOFTWARE IS ALLOWED BY PROPRIETARY SOFTWARE**

In general, the GPL forbids the incorporation of GPL-covered software in a proprietary program. However, it is permitted to distribute GPL-covered software alongside a proprietary program. From the GPL web site FAQ:

“However, in many cases you can distribute the GPL-covered software alongside your proprietary system. To do this validly, you must make sure that the free and non-free programs communicate at arm’s length, that they are not combined in a way that would make them effectively a single program.

The difference between this and “incorporating” the GPL-covered software is partly a matter of substance and partly form. The substantive part is this: if the two programs are combined so that they become effectively two parts of one program, then you can’t treat them as two separate programs. So the GPL has to cover the whole thing.

If the two programs remain well separated, like the compiler and the kernel, or like an editor and a shell, then you can treat them as two separate programs—but you have to do it properly. The issue is simply one of form: how you describe what you are doing. Why do we care about this? Because we want to make sure the users clearly understand the free status of the GPL-covered software in the collection.

If people were to distribute GPL-covered software calling it “part of” a system that users know is partly proprietary, users might be uncertain of their rights regarding the GPL-covered software. But if they know that what they have received is a free program plus another program, side by side, their rights will be clear. “ (Reference).

**UV Realtime** meets this requirement in several ways:

1. The version of RRDtool that is distributed with **UV Realtime** is unmodified. It was compiled for Windows using Visual Studio 2010, and is a direct copy of the v1.4.5 source. This source code is downloadable from Tobias Oetiker’s website at [http://oss.oetiker.ch/rrdtool/](http://oss.oetiker.ch/rrdtool/).
2. RRDtool was built for Windows with its own separate installer. This installer is separately launched during the **UV Realtime** installation, and clearly displays RRDtool’s logos and Tobias Oetiker’s name. This makes it clear to the end user that they are receiving a separate program from **UV Realtime**.
3. **UV Realtime** and RRDtool communicate at “arm’s length”. **UV Realtime** does not dynamically or statically link to the RRDtool library. **UV Realtime** calls RRDtool’s command-line executable via the Windows
command shell, passing command-line arguments to it, and then parsing its output from stdout. This is equivalent to Linux’s fork()/exec() mechanism or BASH command-shell methods.

4. The output from RRDtool is not covered by the GPL. From the GPL web site FAQ:

“In general this [protecting a program’s output with a copyright] is legally impossible; copyright law does not give you any say in the use of the output people make from their data using your program. If the user uses your program to enter or convert his own data, the copyright on the output belongs to him, not you. More generally, when a program translates its input into some other form, the copyright status of the output inherits that of the input it was generated from.

So the only way you have a say in the use of the output is if substantial parts of the output are copied (more or less) from text in your program. For instance, part of the output of Bison (see above) would be covered by the GNU GPL, if we had not made an exception in this specific case.

You could artificially make a program copy certain text into its output even if there is no technical reason to do so. But if that copied text serves no practical purpose, the user could simply delete that text from the output and use only the rest. Then he would not have to obey the conditions on redistribution of the copied text. “ (Reference).

UV Realtime takes the output from RRDtool both by parsing from stdout (for arithmetic data) as well as by using the .png graphs that are saved by the tool. This output is not covered by the GPL (since it is a derivation of the input data), and can be used by UV Realtime.

5. UV Realtime prominently displays the author, license, and web site of all 3rd-party software used in the About tab of the program, including RRDtool. This further makes it clear to the user that a separate program is being used alongside UV Realtime.

6. The RRDtool installer is run during UV Realtime’s installation in preparation for the user to have full functionality of UV Realtime. However, UV Realtime will start up and run with all features except the Internet usage meter even if RRDtool is uninstalled. This emphasizes the lack of dependence of UV Realtime on RRDtool.

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