# Antenna Rotator Plug-in For MediaPortal TV Server

Introduction

This TV Server plug-in for Windows enables TV Server clients (whether XMBC, ForTheRecord or MediaPortal) to send antenna rotator commands to an antenna rotator controller whenever the channel is changed or whenever a scheduled recording starts. The plug-in has the following features:

1) Supports multiple TV tuners (and therefore multiple active channels).
2) Will attempt to optimize the antenna position for all active channels. Recordings take top priority, followed by actively-viewed channels on a first-come first-serve basis.
3) Supports multiple TV Server clients.
4) Supports rotators that will accept absolute positions.
5) Supports rotators that will only accept preset positions.
6) Supports rotating the antenna for EPG when TV Server is idle.
7) Supports rotators that can rotate up to 450 degrees.
8) Supports multiple TV Server clients.
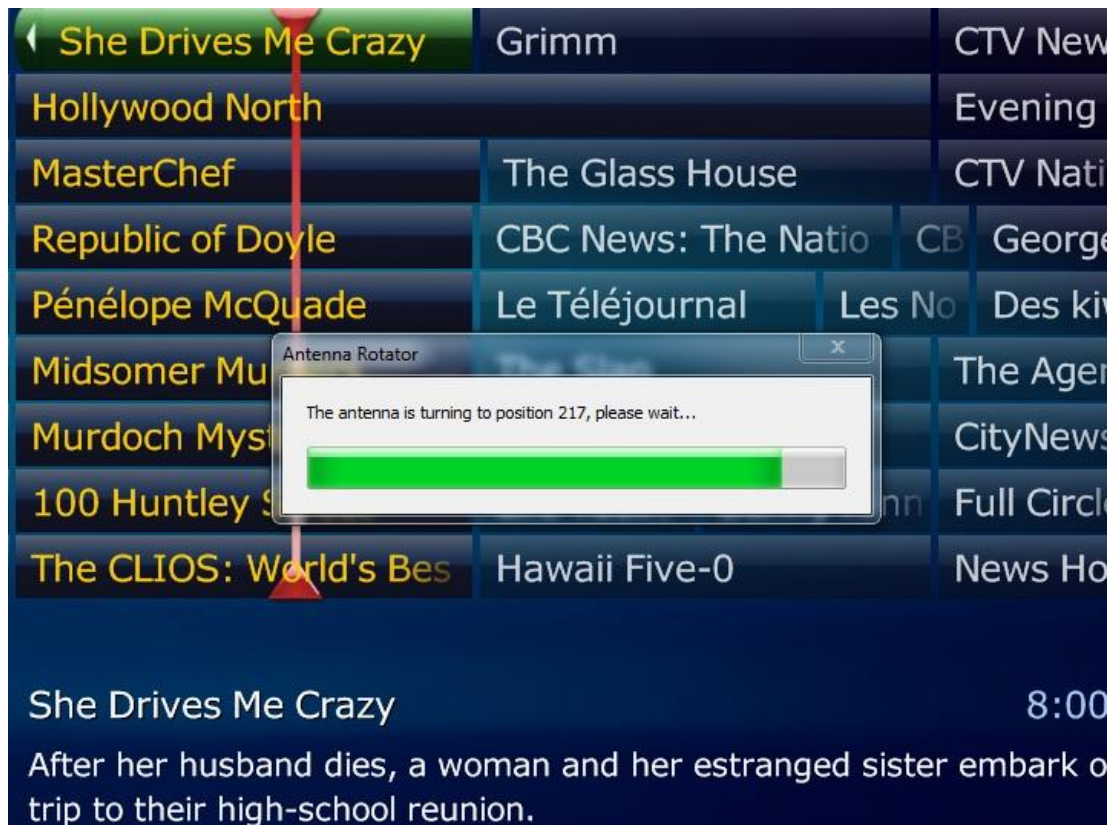
The Package

The approach taken for this plug-in is to be flexible enough that you may customize the solution to meet your needs to any level of sophistication.

To provide a non-programmer with something of a turn-key solution, this installation package contains a setup file for a free GNU software package called "EventGhost". EventGhost is a powerful package that allows one to automate their entire home, not just a home theatre PC. You can download it [here](#).

Rather than having the plug-in re-invent the wheel to learn and transmit your remote control's infrared (IR) commands, EventGhost is used to handle all that. The AntennaRotatorPlugin simply calls a batch file which relays a network event to EventGhost. This event triggers a python script in EventGhost that sends IR commands to your rotator's controller box while displaying an "Antenna is rotating..." message.

This is only a turn-key solution if:

a) you are using either a Channel Master or Eagle Aspen antenna rotator and
b) you install EventGhost and
c) you use the USB-UIRT IR blaster to send the IR to your antenna rotator controller.

If you don't have USB-UIRT, don't worry, EventGhost supports a number of common blasters. You'll only need to modify the python script to replace references to USB_UIRT with the name of the IR blaster that you are using (but it must be supported by EventGhost). Similarly, if you have a different rotator, you'll need to use EventGhost to capture the IR codes for the rotator and to place those codes in the python script (more on this in the [Appendix](#)).

Here's what's installed:

1) AntennaRotatorPlugin.dll in your TV Server/plugins folder.
2) AntennaRotatorEventGhostConfig.xml which contains a minimal EventGhost configuration (including the python script) that you can load into EventGhost. This file is saved in your %ALLUSERSPROFILE% folder (typically C:\Program Data).
3) RotateAntenna.bat in your %ALLUSERSPROFILE% folder. This contains a sample EventGhost command to send a network event to EventGhost.

Note that you don't have to use EventGhost. The plug-in will pass all the information you need to a batch file and you are free to do whatever you want after that.

Installation

To install the plug-in, simply run the AntennaRotatorPlugin.mpe1 file. The installation screen will show you where all files have been copied.

TV Server Setup

Once installed, start the TV Server Configuration program. Go to Plugins and click on AntennaRotatorPlugin. You'll see the following screen (the station list will be empty the first time):
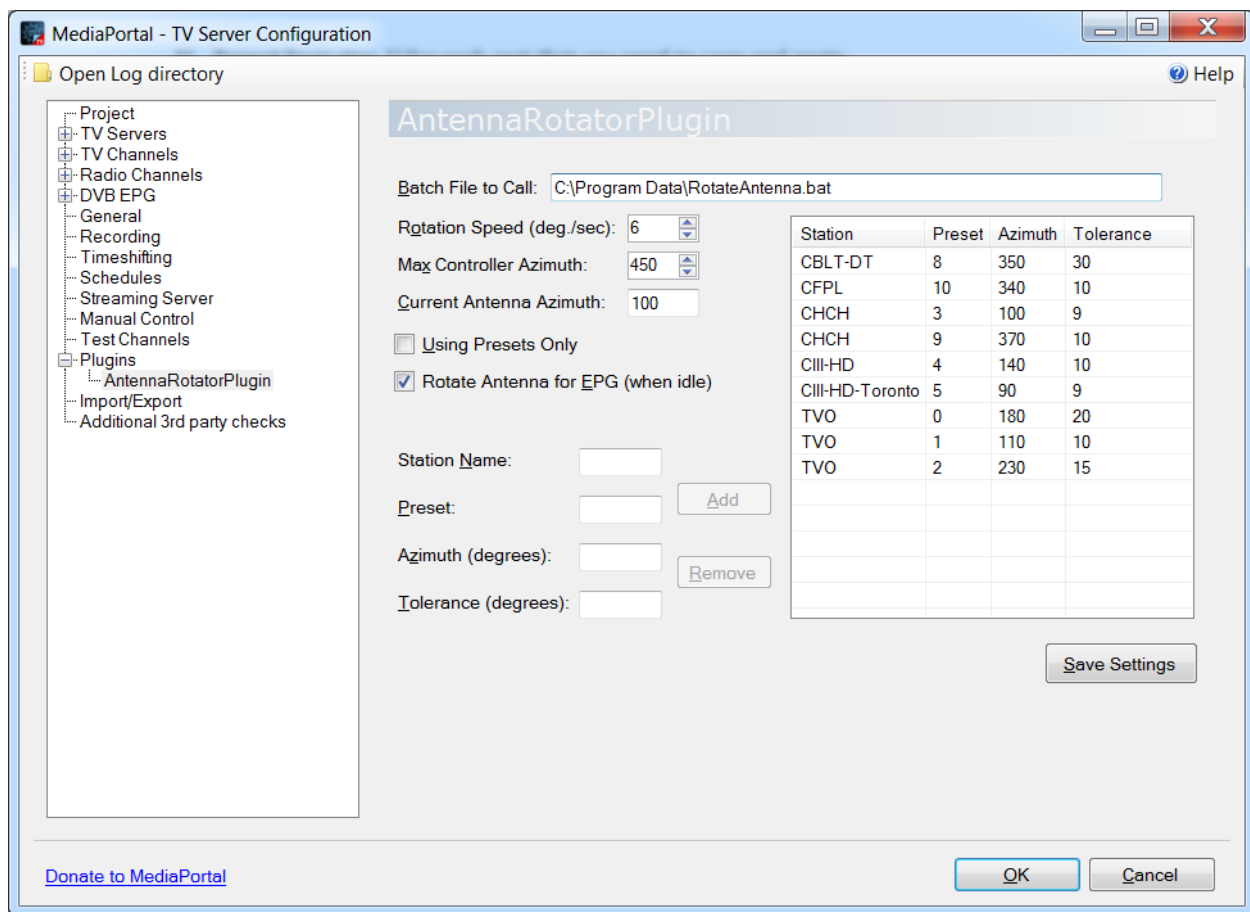
The fields are:

Batch File to Call — a full path to the batch file that will be called whenever a rotator command is required. Note that this file will also be called whenever an error is detected when trying to rotate to a station.

Rotation Speed   - this is the speed at which your rotator turns. If your manual doesn't tell you the speed, then use the default of 6 degrees per second. This value is only used to determine the amount of time to pause before tuning to a station to allow the antenna to get into position.

Max Controller Azimuth – this is the maximum absolute azimuth that your rotator controller will accept. Some rotators will only accept values from 0 – 360 degrees. In this case, set the Max Controller Azimuth to 360. Other rotators will allow a bit of additional rotation to help with stations that are almost due north (the Eagle Aspen Rotr 100 will allow you to go from 0 – 450 degrees).

Current Antenna Azimuth – this is the current position of your antenna as shown on your controller box. This is provided mainly to help with cases where a rotator command got somehow "lost" between mediaportal and the controller box (IR command didn't get received, controller box is reset due to a power glitch, etc.). To get the plug-in and the controller back in synch, you can set this value. This is most important if you use the "change in azimuth" value passed to the batch file.

Using Presets Only   – check this box if your controller will only accept preset numbers to change the antenna position. The plug-in will try to optimize your antenna position to the nearest preset that satisfies all the active channels. If it can't then no rotator command will be sent and you'll get an error message either asking you to add another preset (antenna ranges overlap but no preset falls in the overlap region), or an error that the channel simply can't be accommodated. Avoid using presets if you can, absolute azimuth positions give the most flexibility in determining the optimum antenna position.

Rotate Antenna for EPG (when idle) – if you don't mind having your antenna move around when no one is watching TV, then check this box. It will allow you to collect EPG from all your stations.

Station Name   - this is the station identifier that TV Server detected when you scanned for channels. If this identifier is wrong, you'll get a warning message that the channel is not in the antenna rotator database.

NOTE: You want to click on TV Channels in the TV Server Configuration and then edit each channel (double-click will do) to see the real station name that will be sent to this plug-in; don't just blindly use the name shown in the list of TV Channels. If you have any duplicated channel names then you'll have to export all your channels to an xml file, edit the real channel names to something unique, clear your channel list, and import the xml file. More detail on this in the Appendix.

Preset   - this is the preset number assigned to the station. If you are going to use absolute azimuth values (highly recommended), then you still need to assign presets anyway (even if you don't create any on your controller). The presets are used to set the priority of azimuths for a station that has multiple acceptable azimuth values.

Azimuth (degrees)   - this is the center point of a range of azimuth values that will provide acceptable reception of a station. Normally this value will point the antenna directly at the station. You may enter any value between 0 and 450 degrees. If your rotator is maxed out at 360 degrees, enter a value between 0 and 450 degrees anyway. This will help with optimizing the antenna position and the Maximum Controller Azimuth setting will account for the 360 degree limit when determining the rotator command to send.

Tolerance (degrees)   - this is the maximum number of degrees away from the Azimuth value that will still provide <u>reliable</u> reception of the station. You should determine this value at around 1 pm local time on a clear day when you'll have the least "enhancement" of signals due to temperature differences between the ground and the air. The more tolerance you can give, the better chance that you won't be arguing with family members about where the antenna is pointed.

To set-up your station list, you'll want to prepare a list of <u>real</u> station identifiers (as described above for the Station Name) and you'll need to spend a bit of time with your rotator controller to determine the correct Azimuth and Tolerance values for each station.

For each station:

1) Enter the <u>real</u> station name in the Station Name field.
2) Start the software that came with your TV card that will display signal strength & signal quality for a station.
3) Tune to the station.
4) Using your rotator remote, turn your antenna to point at the station approximately.
5) Jog the antenna to the right and then to the left until you find maximum signal quality. The value will bounce around, but you'll soon get a feel for the optimum spot. I tune to the right until the quality drops to, say, 60% and note the value, then back to the left until it also drops to 60% and note the value, then take the midpoint between the two azimuth values as my optimum position.
6) Enter the optimum position as your azimuth value for the station. Don't worry about the number of digits your controller expects, that's handled by the python script (leading zeroes will be ignored here).

7) Enter the difference between one of the extreme positions and the optimum position as your tolerance. (ex. Right extreme is 150 degrees, left extreme is 120 degrees, so optimum azimuth is 120 + (150-120)/2 = 135 degrees and tolerance is 150 - 135 = 15 degrees.)
8) Assign a preset value. If you're not using presets on your controller, then just start at zero and add one to each preset value as you add azimuth positions. The preset values will be used to prioritize your azimuth positions where the lowest value will be your "best" azimuth for the station. Each new station may start at zero again if you wish, or you can keep adding one to your preset values. If you are going to send preset values to your controller, then you need to make sure that your presets correspond to the azimuth values that you enter.
9) Click on the Add button.
10) You're not done with this station yet!
11) Now, starting at 0 degrees, rotate the antenna to see if there are any other azimuth values that will bring in the station with acceptable strength. Repeat steps 4 to 9 for each azimuth that you find. MORE IS BETTER, but make sure that the signal quality has some headroom to allow for poor weather conditions.

If you make a mistake, you can double-click on a cell in the table to edit its value. Easy as cake...

When you've finished adding all your stations, press the Save Settings button. This will remind you to restart the TV Service for your settings to take effect. Go to Manual Control to stop and restart the TV Service, then exit the configuration program.

EventGhost Setup

If you don't have EventGhost installed on your machine, then download it and follow its instructions for installation. Load AntennaRotatorEventGhostConfig.xml using File->Open.

If you already have EventGhost installed and configured, you can merge the antenna rotator configuration with your existing configuration as follows:

1) Save your current configuration to some easily recognizable name using File->Save As.
2) Load AntennaRotatorEventGhostConfig.xml using File->Open.
3) Now you can right click on any folder or macro, select Copy.
4) Use File->Open to load your original configuration tree back into EventGhost.
5) Use the Paste function to merge configuration parts into your existing configuration.
6) Repeat from step 1) for each part that you need to copy and paste.

Once you have the EventGhost configuration loaded, you'll want to set a few values in the python script to customize the script for your rotator controller. Open EventGhost (you can right-click on its icon in

the quick launch list and select "Show EventGhost") and double-click on the python script under AntennaRotator/RotateEventFromNetwrk. This will open a python editor window.

There are only 4 lines that you need to review under the TODO comment. You need to indicate:

a) which brand of rotator you are using (either "EagleAspen" or "ChannelMaster"),
b) whether you intend to send preset values to the controller (True or False),
c) how many digits the controller expects for each value (ex. If you have 82 as an azimuth value for a station but your controller requires 3 digits, then enter 3 for the minDigitsToSend value. The controller will receive 082.)
d) the name of your media software as shown in its title bar ("MediaPortal", "XBMC", etc.). This is used to reset input focus after a rotation message has been displayed. A partial name should work.

If you're really keen, you can look further down the script and modify the messages that it will display for your own language.

Note that the script was tested by the author only for the EagleAspen controller, but other users have reported success with the ChannelMaster 9537. If your particular rotator model doesn't work, then you'll need to see the documentation in the [Appendix](#) to enter the actual codes for your controller in the script.

Click on Apply (bottom-right of the editor window), then OK. In EventGhost click on File | Save to save the script to disk.

Now we'll verify the set up of the Network Event Receiver plug-in. Right-click on the plug-in name in the EventGhost tree and select Configure. Verify that the TCP/IP value is 1024, the password is xxx and the prefix is TCP. Click on OK. You can change the TCP/IP value and password later once you've reviewed the sample batch file.

Click on File | Options. Make sure that you have at least the two checkboxes checked that will "autostart EventGhost on system startup" and will "minimize to system tray on close". Click OK. Now click on File | Save and click on the 'X' at the top-right to close the EventGhost window (don't use File | Exit as it will shut down EventGhost).

Batch File Setup

You shouldn't need to change the batch file if you are using the EventGhost configuration provided. If you decide to change the TCP/IP value and/or password for the EventGhost Network Event Receiver plug-in, then you'll need to change the values in the batch file to match your new settings.

If you wish, you can add more network event commands to the batch file to notify other EventGhosts on other machines that the antenna is rotating.

For those programmers that simply wish to use the batch file to control their rotators in other wild and wonderful ways, the parameters that are passed to the file are:

%1 – status. One of:

   a) SUCCESS – antenna can rotate to a position that satisfies all active channels
   b) LOW_PRIORITY – channel can't be accommodated because of higher-priority active channels
   c) NEED_PRESET – station azimuth ranges overlap, but no preset has been defined that falls within the overlap. Another preset should be defined at the azimuth in argument %3.
   d) UNKNOWN_CHANNEL – the station name is not in the plug-in's list of channels
   e) UNKNOWN_ERROR – can't rotate the antenna (check tv.log and error.log for more details)

%2 – station name in quotation marks

%3 – azimuth to send to controller

%4 – station preset (will always be -1 if the Using Presets Only checkbox is not checked in the AntennaRotatorPlugin configuration)

%5 – change in azimuth from last antenna position.

%6 – time (in seconds) to rotate to next antenna position (used for clearing display messages). This is the time that the plug-in will wait before tuning to the channel. You can't adjust the time that the plug-in will wait other than adjusting the rotation speed in the AntennaRotatorPlugin configuration screen.

TroubleShooting

If you are seeing behaviour that you think is a little strange, then the tv.log and error.log files may contain the detail you need to understand out is going on. The logs are under the Team MediaPortal/MediaPortal TV Server/log folder. Log entries all start with "AntennaRotatorPlugin". These logs will be required if you report a possible bug in the plug-in.

EventGhost also keeps a running log (in the left pane) that shows the progress of the python script and echoes its command arguments. This will indicate if it got the event and if it received valid values. You can safely ignore the warning that it gives about "...self.timer.start..." whenever the rotator event is issued.

A common problem is that the rotator controller box doesn't get all the digits from the IR blaster. It ends up with a partial command that doesn't do anything or sends the rotator off to some undesired location. Make sure that your IR blaster has a good clean shot at your controller. Also, for the Eagle Aspen controller this is generally avoided by sending the ESC command to clear the controller first (the python script does this for this brand). If there is an equivalent for your brand of rotator, you may wish to add this to the python script. Look for the word "ESC" in the script for guidance.

Rotator controllers can also reset themselves on a power failure. You may wish to consider placing your controller on an uninterruptible power supply (UPS).

If you are seeing the "Antenna is rotating..." message for too short or too long of an interval, then it's possible that the plug-in's memory of the antenna position is out of sync with the actual antenna position. If you are using absolute azimuth commands then this should clear up for the next rotation, or you can adjust the Current Antenna Azimuth setting. If it doesn't clear up, then it's possible that EventGhost and/or TV Server needs to be shut down and restarted.

If your "Antenna is rotating..." or other message doesn't go away, then the EventGhost script probably encountered an exception and orphaned the message window. You may need to restart EventGhost to get rid of the message.

When all else fails, shut down your media application, shut down and restart EventGhost and restart TV Server.

Appendix

How to Capture EventGhost IR Codes for the Python Script

1) Right-click on AntennaRotator/RotateEventFromNetwrk and select "Add Action..."
2) In the Add Action screen open the USB_UIRT link (or the link for your device) and select Transmit IR (or equivalent for your device).
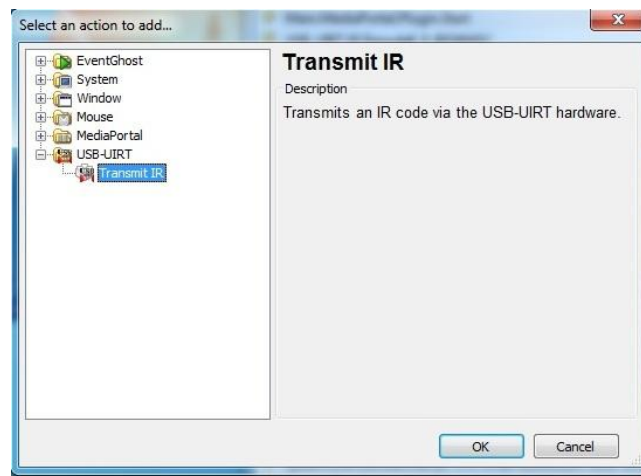
3) Click on "Learn an IR Code..."
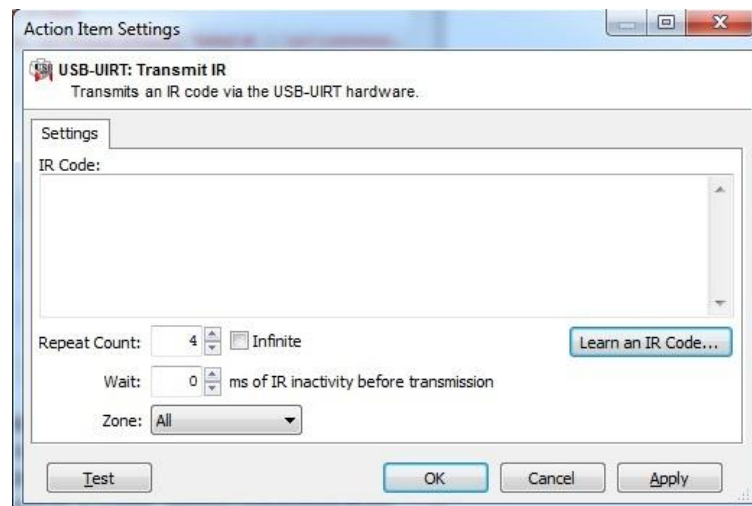
4) Check the "Force Raw-Mode Learning" checkbox, aim your remote at your device (in this case the USB_UIRT) and press the button you wish to learn.

5) Press Accept Burst. (Note: Sometimes EventGhost will crash at this point. If this happens just restart and try again, it usually works the second time).

6) You'll see the raw IR codes in the Action Items Settings screen. Select the text and press Ctrl-C to copy the text.

7) Now press Cancel as you don't wish to save this action to your EventGhost tree, we only wanted to get the IR code copied to the clipboard to paste later into the python script.
   TIP: If you want to see what your device is called in the python script, go ahead and press OK instead of Cancel, then drag and drop the action into the python script editor. You can always delete the action from the EventGhost tree afterwards.

8) Double-click on the python script.

9) In the python script editor, you can replace an IR code by pasting into the purple text between the single quotation marks (following the u', see the figure below for the ChannelMasterRemoteCtrl class).

You should generally only need to replace IR codes. Don't worry if you have a different brand of rotator, just use the ChannelMasterRemoteCtrl class and replace its codes. Modify the TODO lines at the top of the script to specify "ChannelMaster".

More advanced users can add an IR button by first temporarily pasting your IR codes somewhere nearby and then copying everything starting from, for example, "def Zero(self):" to "print "0"" and pasting it back into the class. Now cut the IR codes you temporarily pasted and replace the IR for the new command you just created. Rename the word "Zero" with the name of the command you want. You'll now need to go to the bottom of the script and use the command before or after the loop that sends the IR digits.
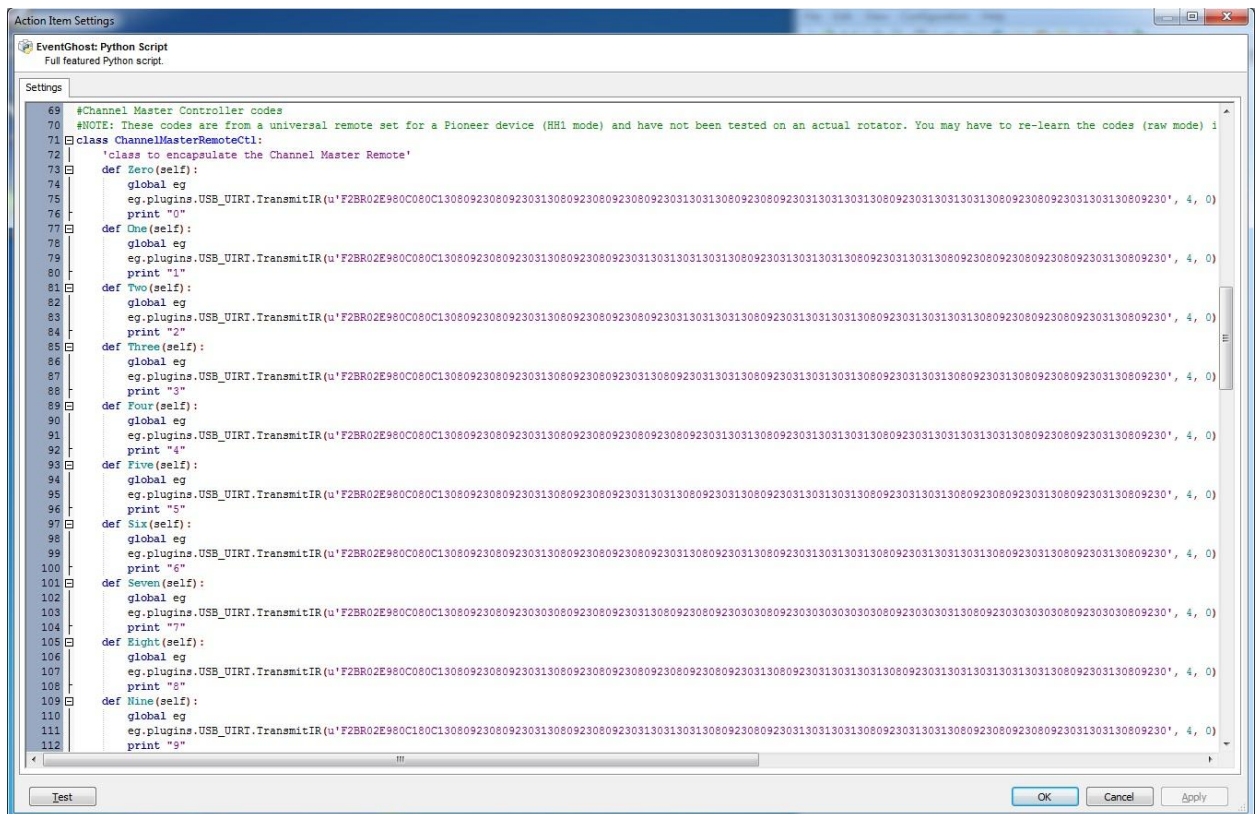
How to Make Duplicate Channels Unique

1) In MediaPortal TV Server Configuration, click on Import/Export.
2) Check the TV Channels and TV Groups boxes and clear all the other boxes.
3) Click on Export Now and select a file name that will receive the xml.
4) Using Notepad, edit the file you just exported.
5) Search for the channel name that is duplicated. You will find it in a block of xml called <channel>:

```
<channel GrabEpg="True" IdChannel="117" IsRadio="False" IsTv="True" LastGrabTime="2000-1-1 0:0:0" SortOrder="15"
TimesWatched="0" TotalTimeWatched="2000-1-1 0:0:0" VisibleInGuide="True" DisplayName="Citytv">
  <mappings>
    <map IdCard="3" IdChannel="117" IdChannelMap="214" />
    <map IdCard="2" IdChannel="117" IdChannelMap="215" />
  </mappings>
  <TuningDetails>
    <tune IdChannel="117" IdTuning="154" Bandwidth="8" ChannelNumber="31" ChannelType="1" CountryId="31" Diseqc="0"
FreeToAir="True" Frequency="-1" MajorChannel="31" MinorChannel="1" Modulation="23" Name="Citytv" NetworkId="0"
PmtPid="32" Polarisation="0" Provider="unknown" ServiceId="2" SwitchingFrequency="0" Symbolrate="0" TransportId="17355"
TuningSource="0" VideoSource="0" AudioSource="0" IsVCRSignal="False" SatIndex="-1" InnerFecRate="-1" Band="0" Pilot="-1"
RollOff="-1" Url="" Bitrate="0" />
  </TuningDetails>
</channel>
```

6) In the <TuningDetails> block, change the Name="(channel name)" to be <u>unique</u> (you can use spaces), this is the "real" channel name that the AntennaRotatorPlugin will need. You can also change the DisplayName="(channel name)" to be more descriptive (such as "Citytv Toronto").
7) Once you've made all your duplicate channel names unique, save the file and exit Notepad.
8) In MediaPortal TV Server Configuration, click on TV Channels.
9) In the Channels region (near the bottom of the screen), click on Clear. This will delete your list of channels. If you don't do this, you'll get a double set of channels after you import.
10) In MediaPortal TV Server Configuration, click on Import/Export.
11) Click on the Import tab.
12) Check the TV Channels and TV Groups boxes and clear all the other boxes.
13) Select Import Now and select the file name you just updated.
14) Click on TV Channels again and verify that all your channels have been re-instated. Double-click on one of your duplicate channels and verify that your changes are there.