

## Synergy Guide

Raven's *Synergy Action Rules Manager* product is a flexible package for building custom applications for the Raven M4x Blade. *Action Rules* puts the power of the event-driven M4x Blade into the hands of the user, allowing anyone to create, save, and run custom M4x Blade applications. Raven's *Synergy Action Rules Manager* software application provides the platform to build custom Action Rules applications.

An *Action Rule Set* is a collection of Action Rules, executed in the same order that they're created. Many Action Rules can be combined to perform a specific function on the M4x Blade. After creating an Action Rules Set, the Action Rules Set can be flashed to the Blade (the Action Rule Set is activated after the next Blade reset).

A single Action Rule is a combination of "events", "conditions", and "actions". An *event* can occur on the Blade itself, or on any one of the M4x modules attached to the Blade. A *condition* is a state that can be optionally checked before performing some action. Finally, an *action* is ultimately the function that is performed by the Blade (or module) based on the event and optional condition.

When creating an Action Rule, think about what you want the Raven M4x Blade to do in terms of a given event. Also, think about where that event will be occurring- on the Blade, or on one of the modules. For instance, one of the most basic events that occurs is the "Blade Start-up" event. This event occurs directly after the Blade is powered on or reset, and allows the user to perform any pre-configuration that might be required before the other Action Rules go into effect. Such pre-configuration might include:

- setting a variable to a known value
- starting a timer
- enabling a tone on a given port
- setting up bridging between port

Other examples of events are:

- a tone went active on port 1
- a tone went active on port 1
- COR went active on port 3

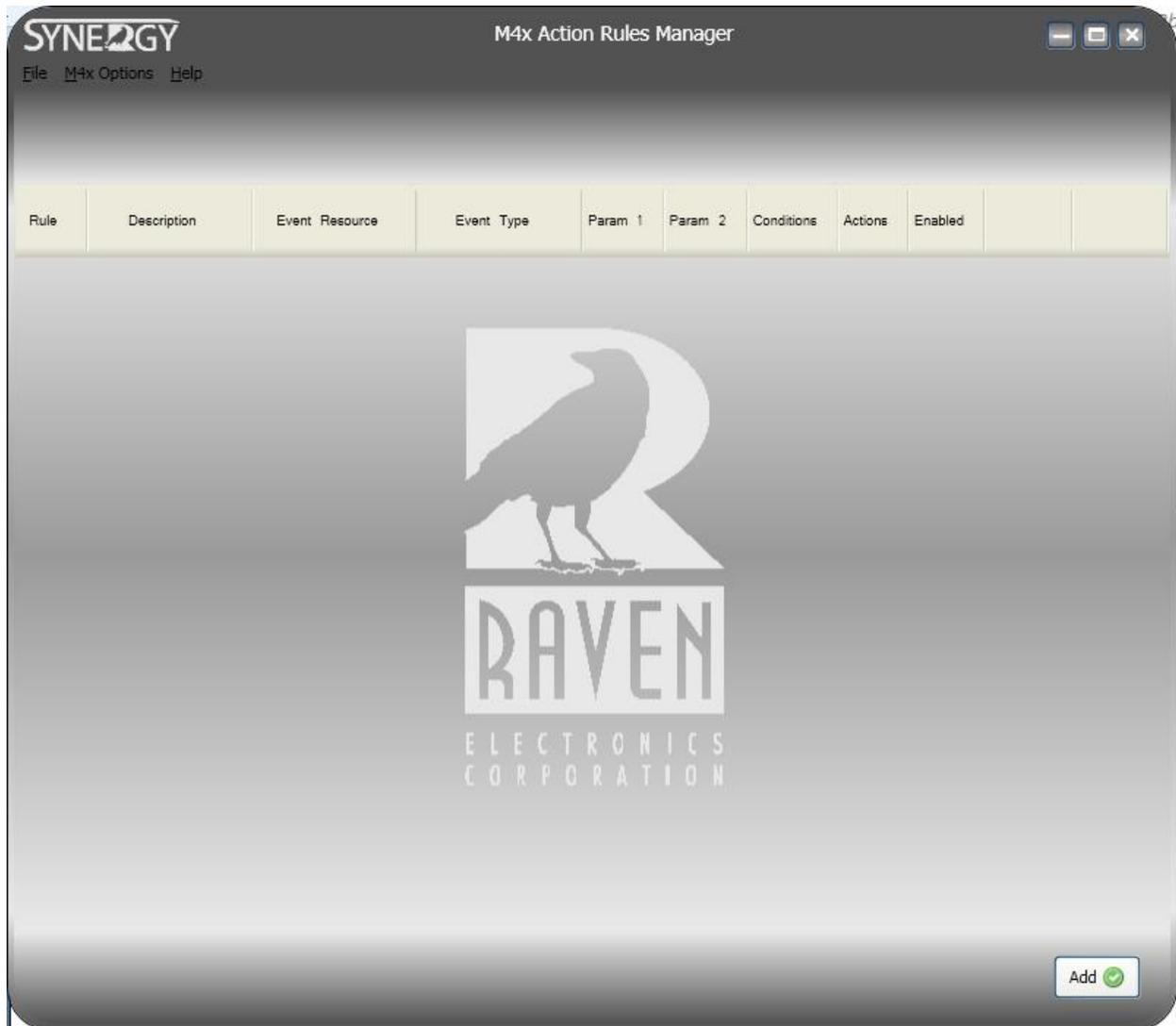
After selecting an event to act upon, "conditions" can be selected to further qualify any action that might be taken. For instance, if an event occurs, we might want to set PTT on port 1- but maybe only if, say, the port 4 COR is active. A condition lets us check whether or not COR is active on port 4. Further, multiple conditions can be selected for a single Action Rule; in that case, the conditions are logically ANDed together when the Blade is deciding whether or not to perform an action.

Finally, after the event and optional conditions are set up, the "action" to perform is selected. Just like an event, the action may be taken upon the Blade, or upon any one of the modules in the Blade. An "action" might be:

- start a timer
- set PTT on a port
- send a tone out a port
- send a DTMF string out a port
- turn on all of the green LEDs on the front of the Blade
- mute the receive side of a port
- bridge from one port to another port

Also, several actions can be selected to be performed; you're not limited to just one action per event.

Launch the Synergy software from the desktop shortcut or from the start menu. When the software launches, your screen should look like the one below. Before continuing, it is recommended that you close and disconnect from the M4x user application software, as having the Blade connected to both at the same time can cause problems.

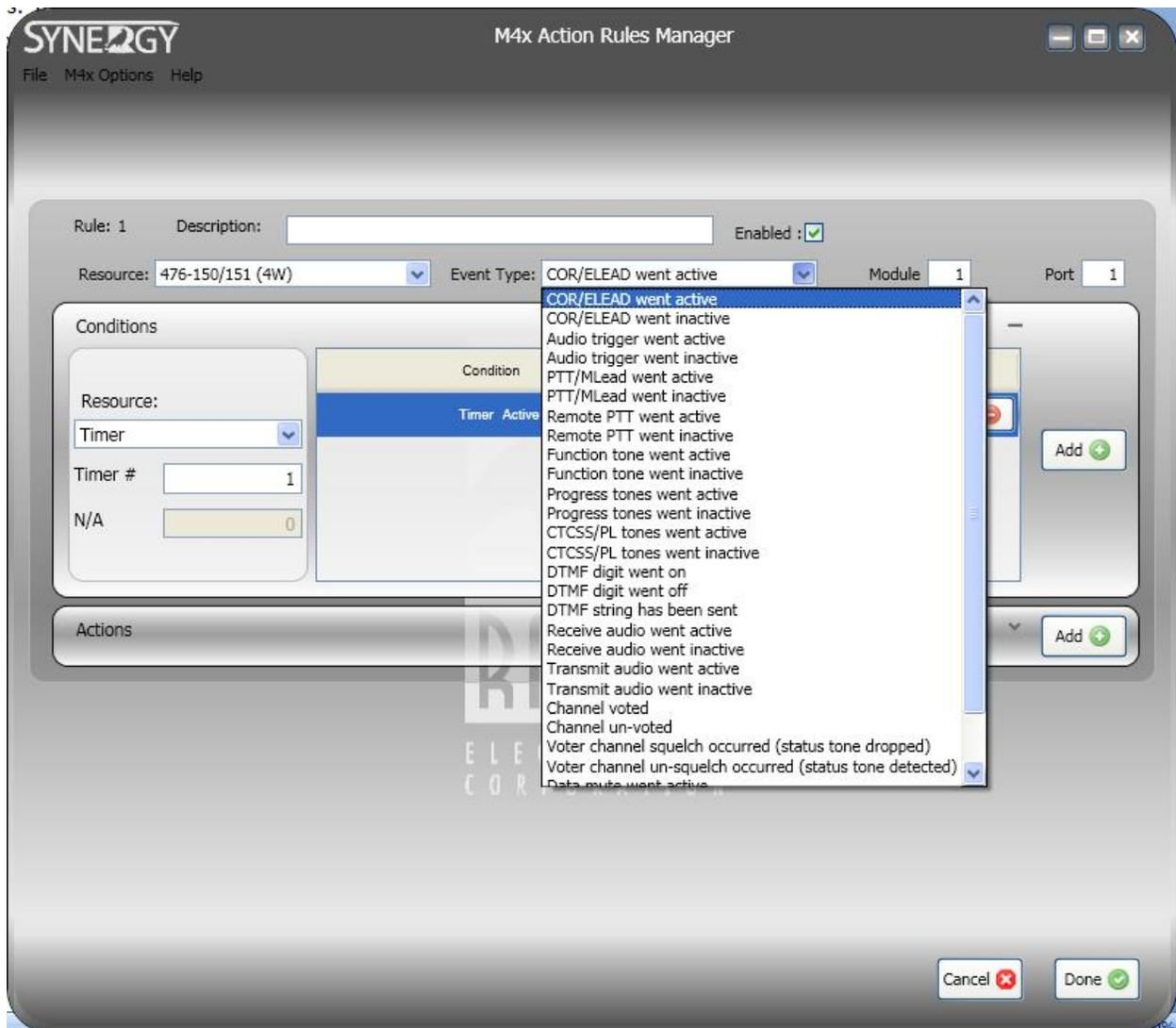


Before beginning to write your rule set, it is a good idea to outline what it is you want your rule set to accomplish. Base your outline on events, conditions (if any), and the actions you want taken as result of your events and conditions. Individual rules are based on Resources and Events. Resources include the items in the list below:

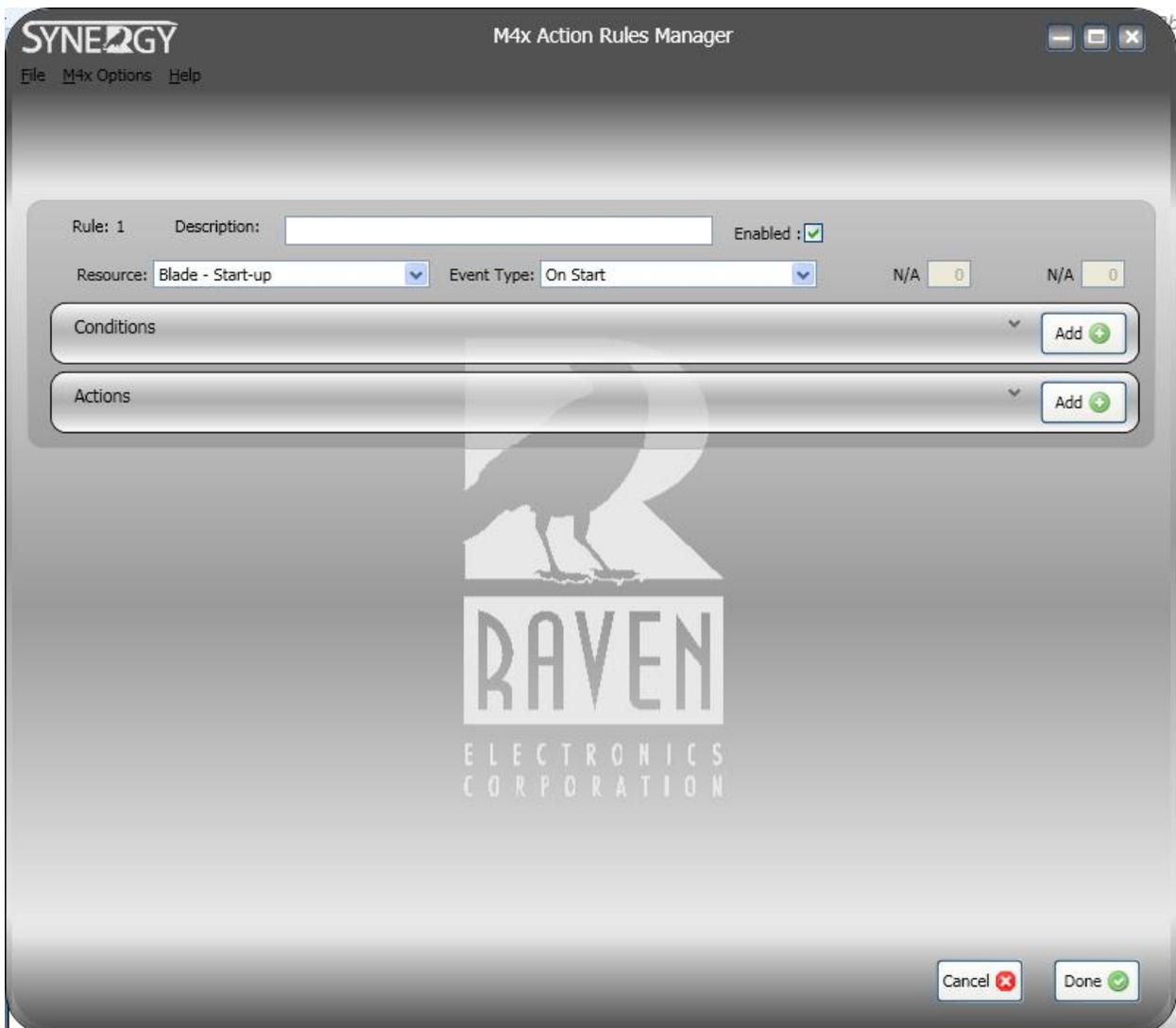
- Blade Startup. Rules associated with Blade startup are executed when the Blade is powered on, or after a power cycle.
- Blade Variables. Variables are used to track the status of other events and execute rules based on the status of a variable or when a variable state changes. They can also be used as a Condition requiring a variable to be in a particular state before the rule is executed.
- Blade Timers. Timers are used to execute a rule following the expiration of the timer, or the state of a timer can be named as a Condition before executing a rule.
- Individual Module Types. Individual module resources are used to name Conditions and write rules associated with specific modules and ports installed in the Blade.

Event types vary depending on the resource selected. The events associated with the resources are listed below:

- Blade Startup. On Start is the only event associated with Blade Startup. It simply is the rule set that will execute when the Blade is first powered on. It is not necessary to create a startup event; it depends on your requirements.
- Blade Variables. Variable changed is the only event associated with Blade Variables.
- Blade Timers. Timer expired is the only event associated with Blade Timers.
- Individual Module Types. See screen shot below for a list of event types associated with a module.



To begin, click on the “Add” button in the lower right. You will see a screen like the one below. At the top in the box labeled “Description” type the name of the Event, any conditions, and associated action(s). For example, this might be, “Blade Startup, mute port 1 Input.” Note that this is a startup condition and the rule will execute whenever the Blade is started such as following a power cycle. It is not necessary to have a startup action; instead, you can have a rule associated with an event that occurs after start up.

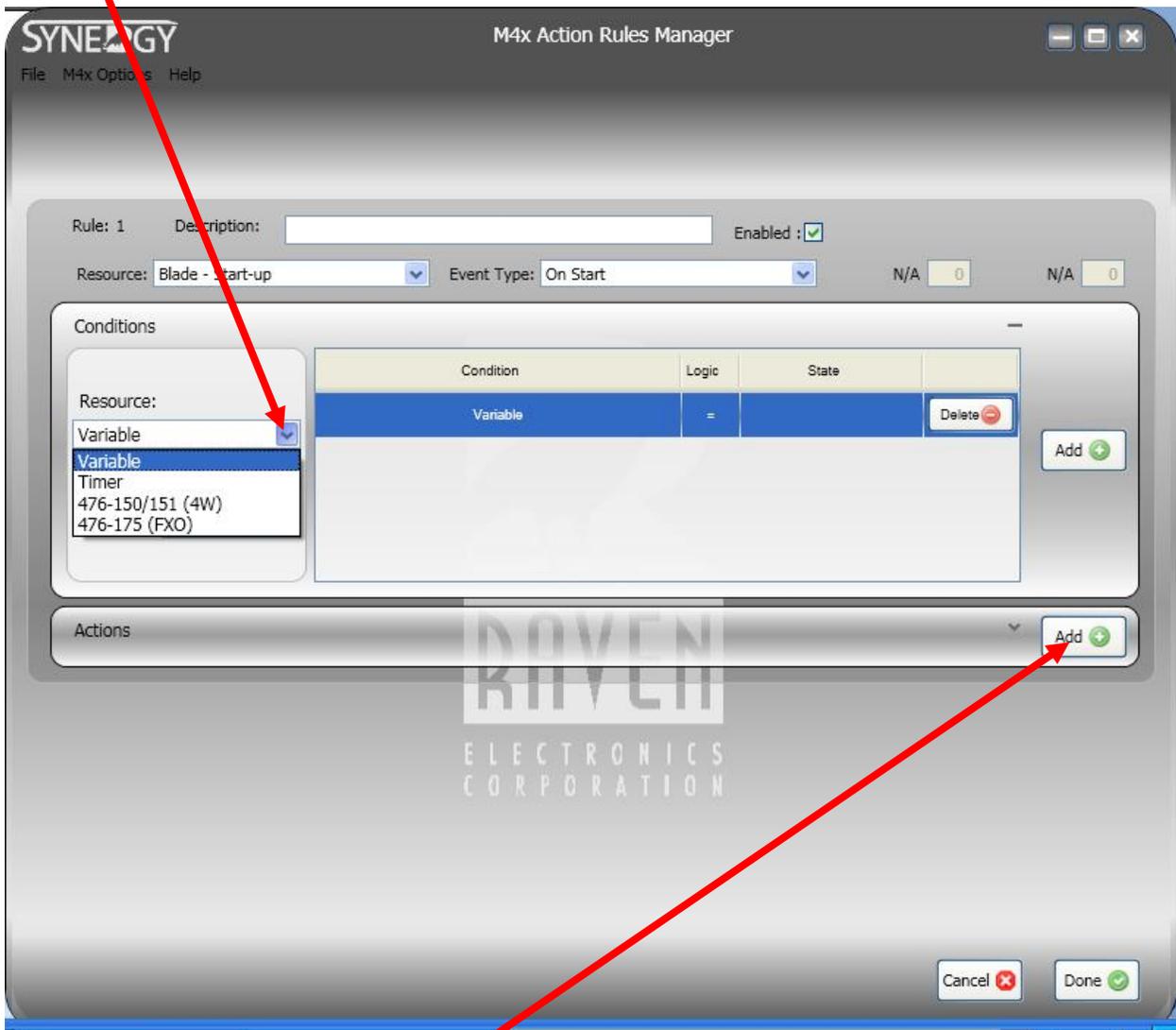


After you have named your rule, select the resource from the drop down menu in the upper left for which your rule will apply. Resources, as described previously, include Blade Start Up, Blade Variables, Blade Timers, and choices for individual modules that might be installed in your Blade.

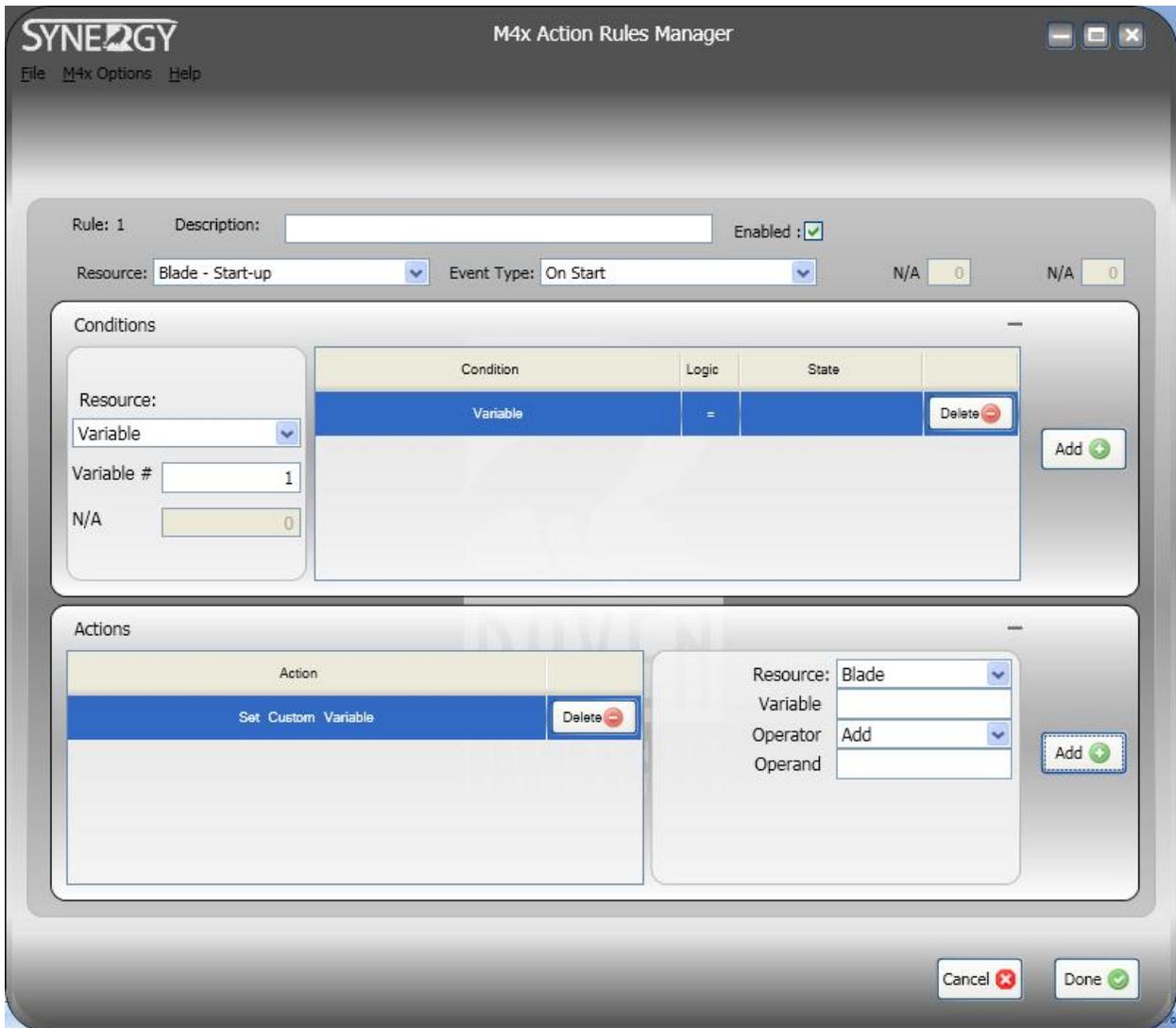
Once you have selected your resource, select your event type from the drop down menu in the upper center. **Remember, your event choices will be different depending on the resource you choose.**

If applicable, select any conditions which must be met before the action(s) associated with this rule will be executed. **Select a condition, if any, by clicking on the Add button in the Condition area. Next, you must select a resource associated with your condition. The drop down Resource menu is available to the left as shown in the diagram below. Note that the choices of conditions are different depending on which resource you select. You can specify as many conditions as you want to be met before the action(s) associated with the event will be executed. Note that for multiple conditions, all events must be met or else the action(s) will not be executed.**

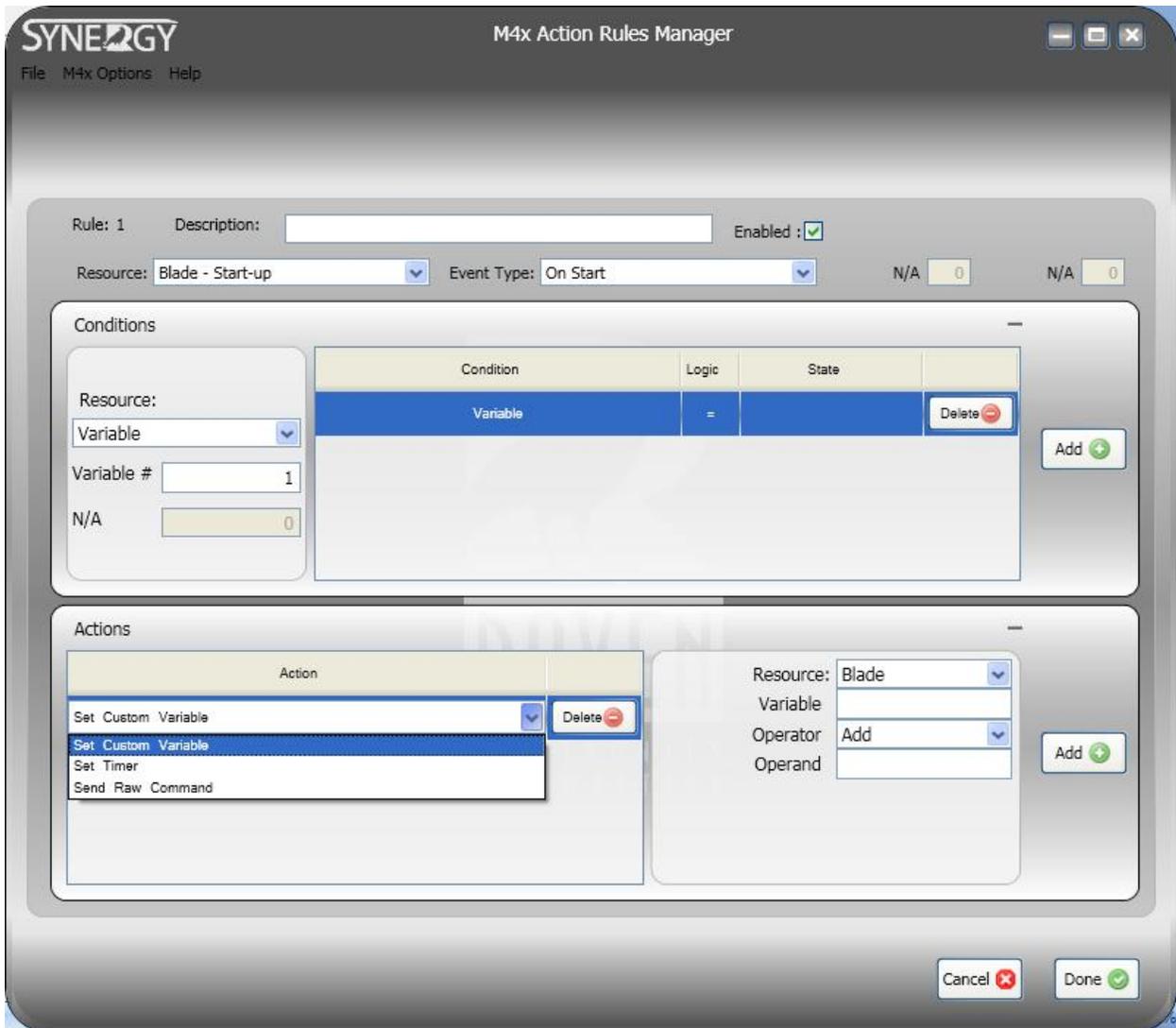
Click here to pull down this menu.



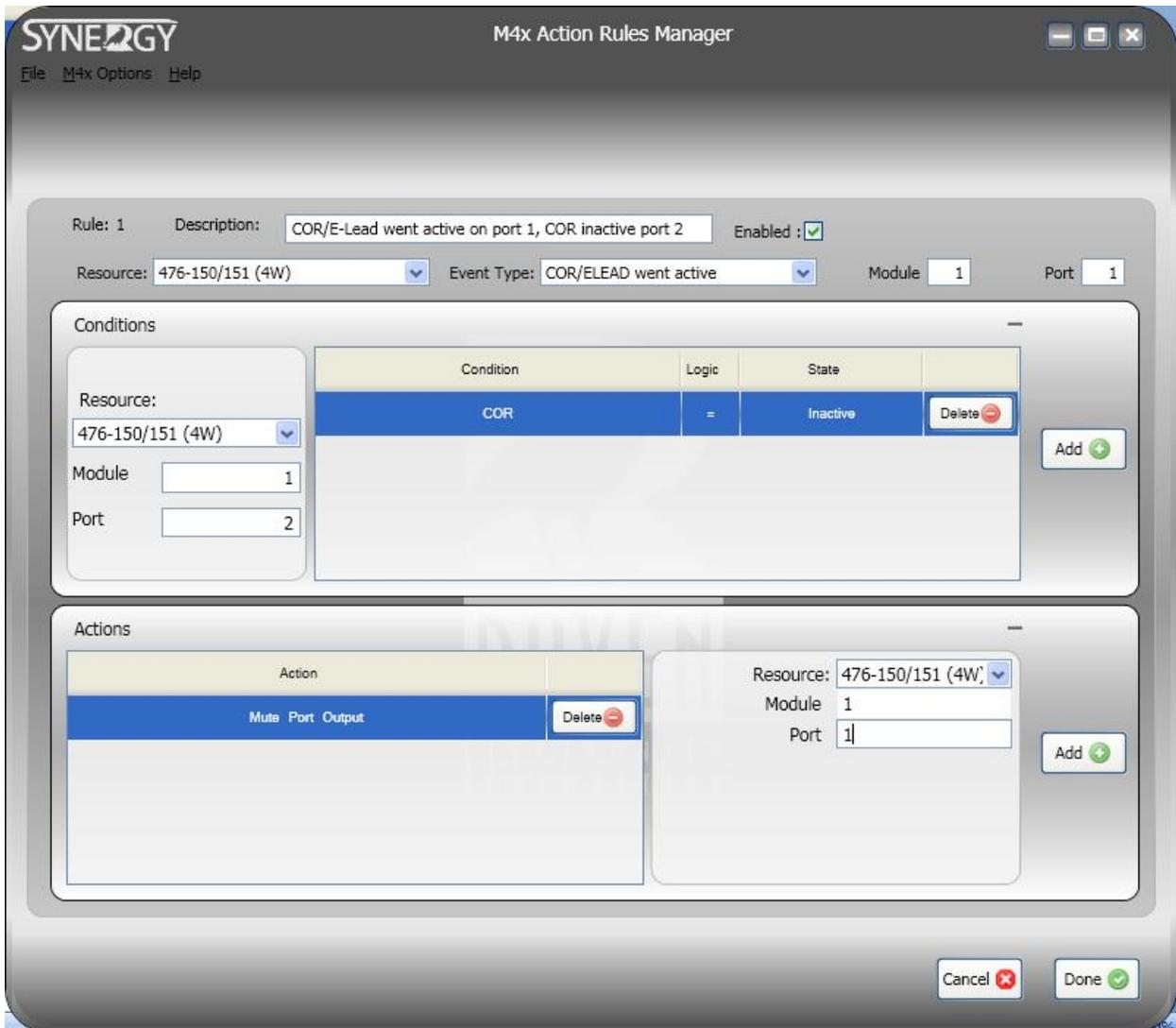
To specify your Action, click on the Add button in the Actions section. You will then see the screen shot below.



After the Actions section appears, you must select an action and an associated resource. See screen shot below for a menu of available actions. Note that these actions are associated with the Blade Resource as shown in the screen shot. If you don't see the Action you require, you might have to choose the resource first in order to find the action you require. Depending on the type of action you choose, the choice of associated resources will vary. Likewise, the type of resource you choose will determine which actions are available with that resource.



A sample rule is shown on the following page. The resource is a module installed in the Blade. The event is COR/E-Lead went active on port 1. The condition is COR is inactive on port 2 and the action is mute port 1 output. For this rule to execute the action of muting the output of port 1, both the event must take place and condition met before the action executes.



The above rule is just an example and would require another rule to un-mute the port.

Rule sets can consist of as few as two rules to many rules. The following pages show a rule set consisting of two rules and one consisting of eighteen rules. The 2-Rule set while very simple, solved a customer's problem of cross connecting a conventional radio with a trunked radio.

The 18-Rule set provided a solution to a customer for a priority audio bridge. Ports were arranged in a hierarchy with the highest priority ports overriding lower priority ports for access to the transmitter.

Rule	Description	Event Resource	Event Type	Param 1	Param 2	Conditions	Actions	Enabled		
1	COR Active on Port 2	476-150/151 (4W)	COR/ELEAD went active	1	2	0	2	<input checked="" type="checkbox"/>	Edit	Delete
2	COR Inactive on Port 2	476-150/151 (4W)	COR/ELEAD went inactive	1	2	0	2	<input checked="" type="checkbox"/>	Edit	Delete



Add

**SYNERGY** M4x Action Rules Manager

File M4x Options Help

Rule	Description	Event Resource	Event Type	Param 1	Param 2	Conditions	Actions	Enabled		
1	Start Up	Blade - Start-up	On Start	0	0	0	10	<input checked="" type="checkbox"/>	Edit	Delete
2	Receive Audio Active Port 1	476-150/151 (4W)	Receive audio went active	1	1	0	5	<input checked="" type="checkbox"/>	Edit	Delete
3	Receive Audio Inactive on Port 1	476-150/151 (4W)	Receive audio went inactive	1	1	0	2	<input checked="" type="checkbox"/>	Edit	Delete
4	Receive Audio Inactive on Port 2	476-150/151 (4W)	Receive audio went inactive	1	1	1	1	<input checked="" type="checkbox"/>	Edit	Delete
5	Receive Audio Inactive on Port 3	476-150/151 (4W)	Receive audio went inactive	1	1	2	1	<input checked="" type="checkbox"/>	Edit	Delete
6	Receive Audio Inactive on Port 4	476-150/151 (4W)	Receive audio went inactive	1	1	3	1	<input checked="" type="checkbox"/>	Edit	Delete
7	Receive Audio Active Port 2	476-150/151 (4W)	Receive audio went active	1	2	0	4	<input checked="" type="checkbox"/>	Edit	Delete
8	Receive Audio Inactive on Port 1	476-150/151 (4W)	Receive audio went inactive	1	2	0	1	<input checked="" type="checkbox"/>	Edit	Delete
9	Receive Audio Inactive on Port 2	476-150/151 (4W)	Receive audio went inactive	1	2	1	1	<input checked="" type="checkbox"/>	Edit	Delete
10	Receive Audio Inactive on Port 3	476-150/151 (4W)	Receive audio went inactive	1	2	2	1	<input checked="" type="checkbox"/>	Edit	Delete
11	Receive Audio Inactive on Port 4	476-150/151 (4W)	Receive audio went inactive	1	2	3	1	<input checked="" type="checkbox"/>	Edit	Delete
12	Receive Audio Active Port 3	476-150/151 (4W)	Receive audio went active	2	1	0	3	<input checked="" type="checkbox"/>	Edit	Delete
13	Receive Audio Inactive Port 3	476-150/151 (4W)	Receive audio went inactive	2	1	0	1	<input checked="" type="checkbox"/>	Edit	Delete
14	Receive Audio Inactive on Port 1	476-150/151 (4W)	Receive audio went inactive	2	1	2	1	<input checked="" type="checkbox"/>	Edit	Delete
15	Receive Audio Inactive on Port 2	476-150/151 (4W)	Receive audio went inactive	2	1	3	1	<input checked="" type="checkbox"/>	Edit	Delete
16	Receive Audio Active Port 4	476-150/151 (4W)	Receive audio went active	2	2	0	2	<input checked="" type="checkbox"/>	Edit	Delete
17	Receive Audio Inactive Port 4	476-150/151 (4W)	Receive audio went inactive	2	2	0	1	<input checked="" type="checkbox"/>	Edit	Delete
18	Receive Audio Inactive on Port 1	476-150/151 (4W)	Receive audio went inactive	2	2	3	1	<input checked="" type="checkbox"/>	Edit	Delete

Add

### Blade-Timers

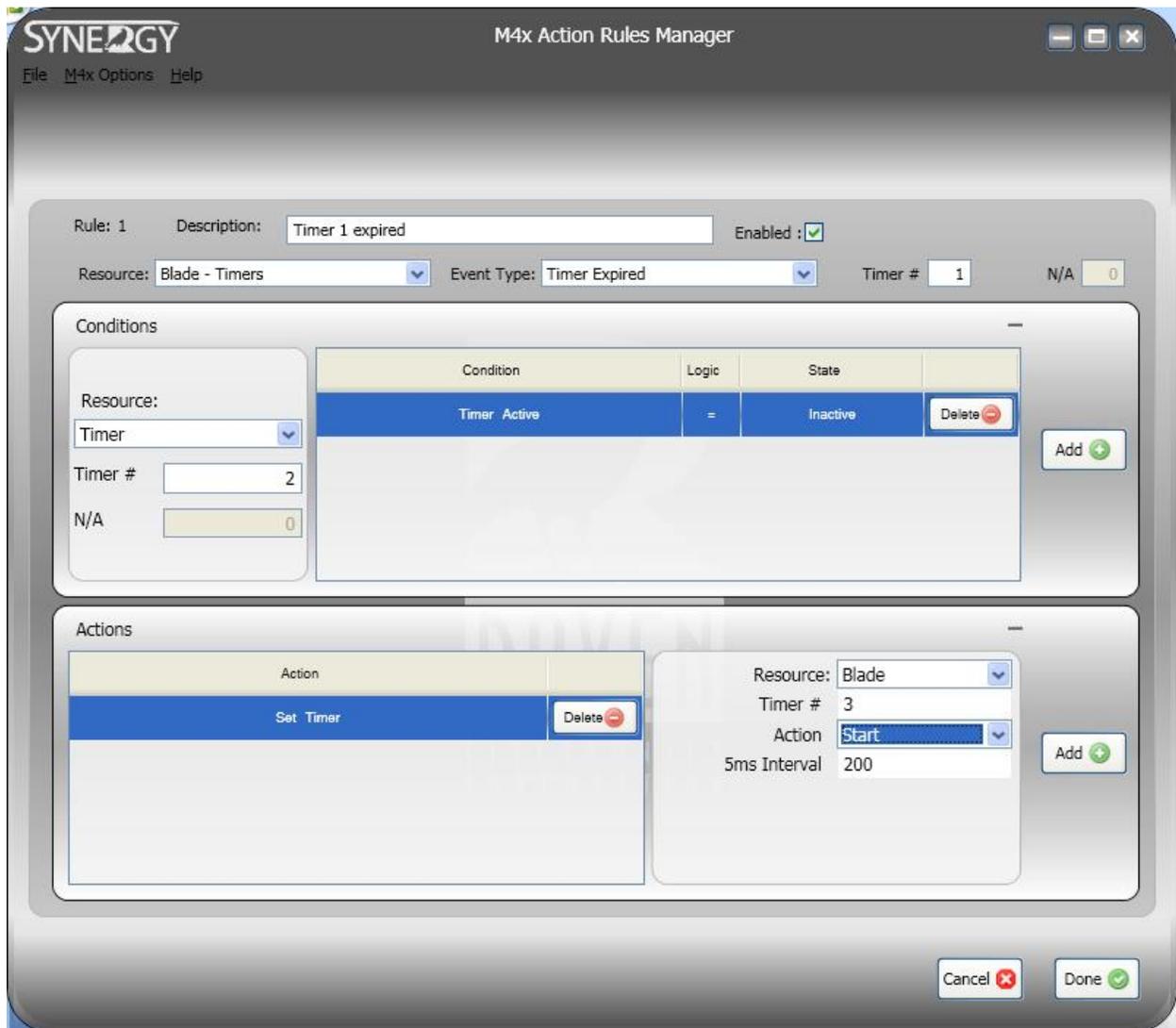
A Blade-Timer is a useful tool for an action, condition, or event in your rule set. Examples of these include:

As an action: Timers are usually started or stopped upon some kind of event. For example, you start timer 1 for 500 MS upon detection of a COR input on port 1.

As a condition: The expiration or the state of a timer (active or inactive) may be stipulated as a condition in addition to the event, before an action is executed. For example, your event is function tone detected on port 1 and your action is mute port 1 receive. In addition to the event you could stipulate that timer 1 be inactive before the muting takes place.

As an event: A timer event is when a timer expires. The expiration of the timer might trigger an action or be a condition before another action executes. For example in, you set timer 1 for 500 MS when a COR input was detected on port 1. Upon expiration of this timer (the event) you then assert a PTT output on port 2. In this example, the timer was used to delay the PTT output by 500 MS.

When setting timers, you might have more than one timer. Timers are numbered beginning with timer 1. You have up to 255 timers to work with. The screen shot below shows timer 1 expired as an event, timer 2 inactive as a condition, and time 3 set for 1 second as an action. Timers are set in 5 MS intervals so a value of 200 is entered for a timer of one second.



### Blade-Variables

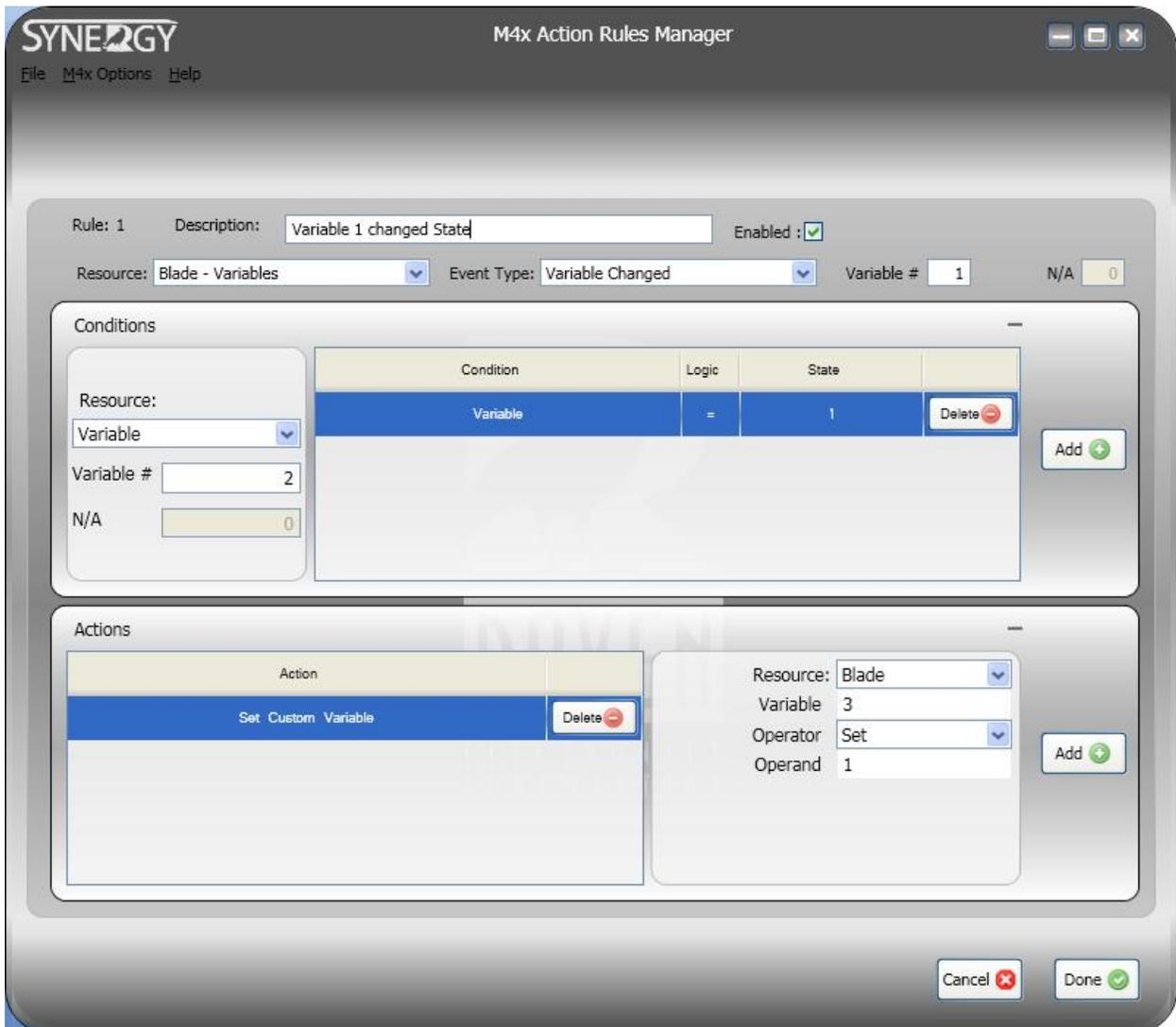
A Blade-Variable is a useful tool for an action, condition, or event in your rule set. Variables are used to keep track of the state of different activities going on in your application. Examples of these include:

As an action: When an event occurs, you create a variable related action. For example, a variable might normally have a state of 0. For example, 2175 Hz low level guard tone is detected on port 2. In response to this event, you could create an action that changes the state of a variable. Changes to variables include setting from one value to another, adding, subtracting, multiplying, and dividing. There are also options for AND and OR functions on a variable.

As a condition: As with our timer example in the previous section, a variable state can be set as a condition before any action associated with an event is executed.

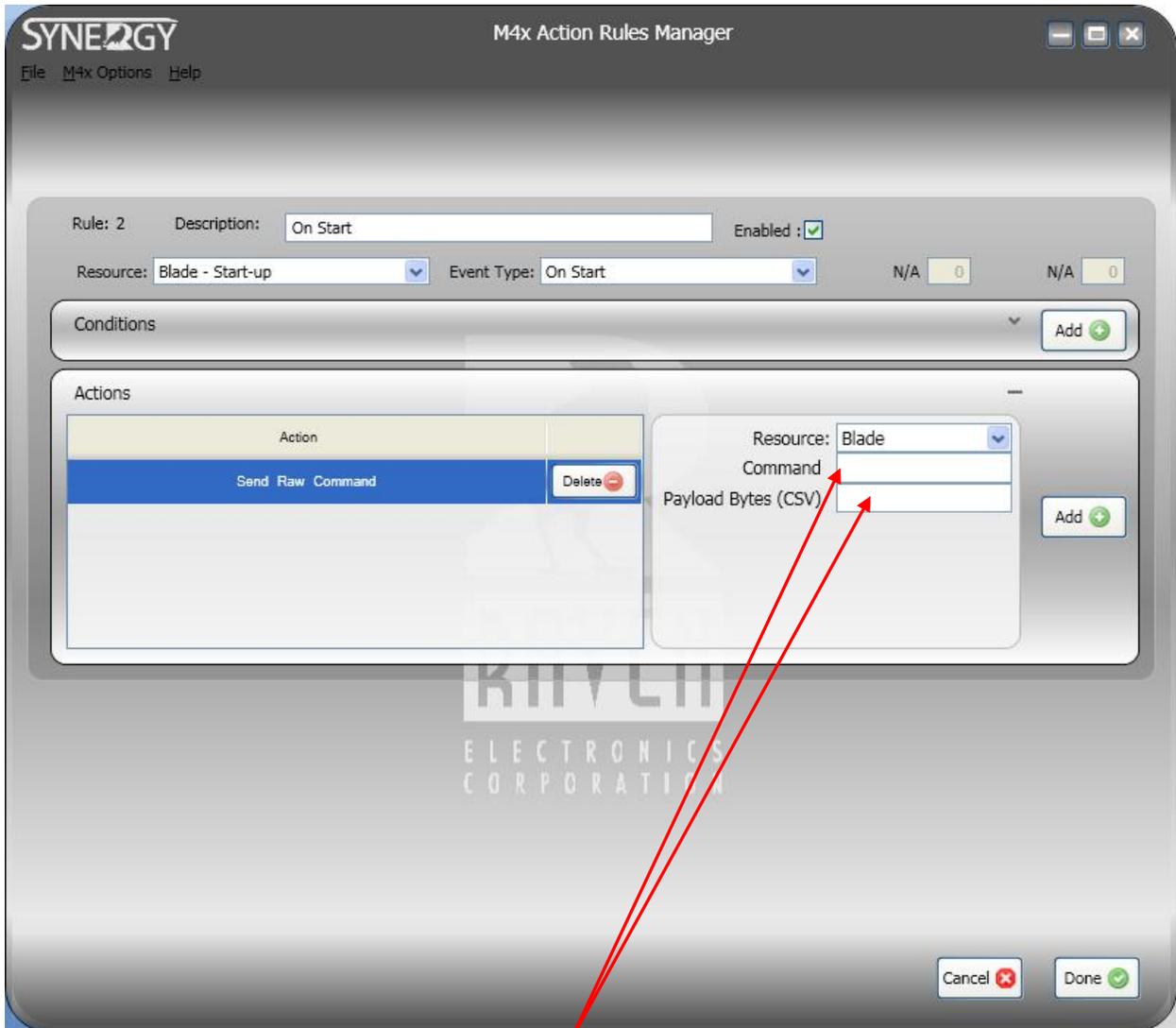
As an event: You can set as an event, a variable changing state. Associated with this event, you can then create an action, with conditions if desired, in response to this variable state change. For example, variable # 3 changes state. In response, you could assert PTT on port 2 or any other action.

The screen shot below shows an example of a variable as an event, a condition, and an action.



## Raw Commands

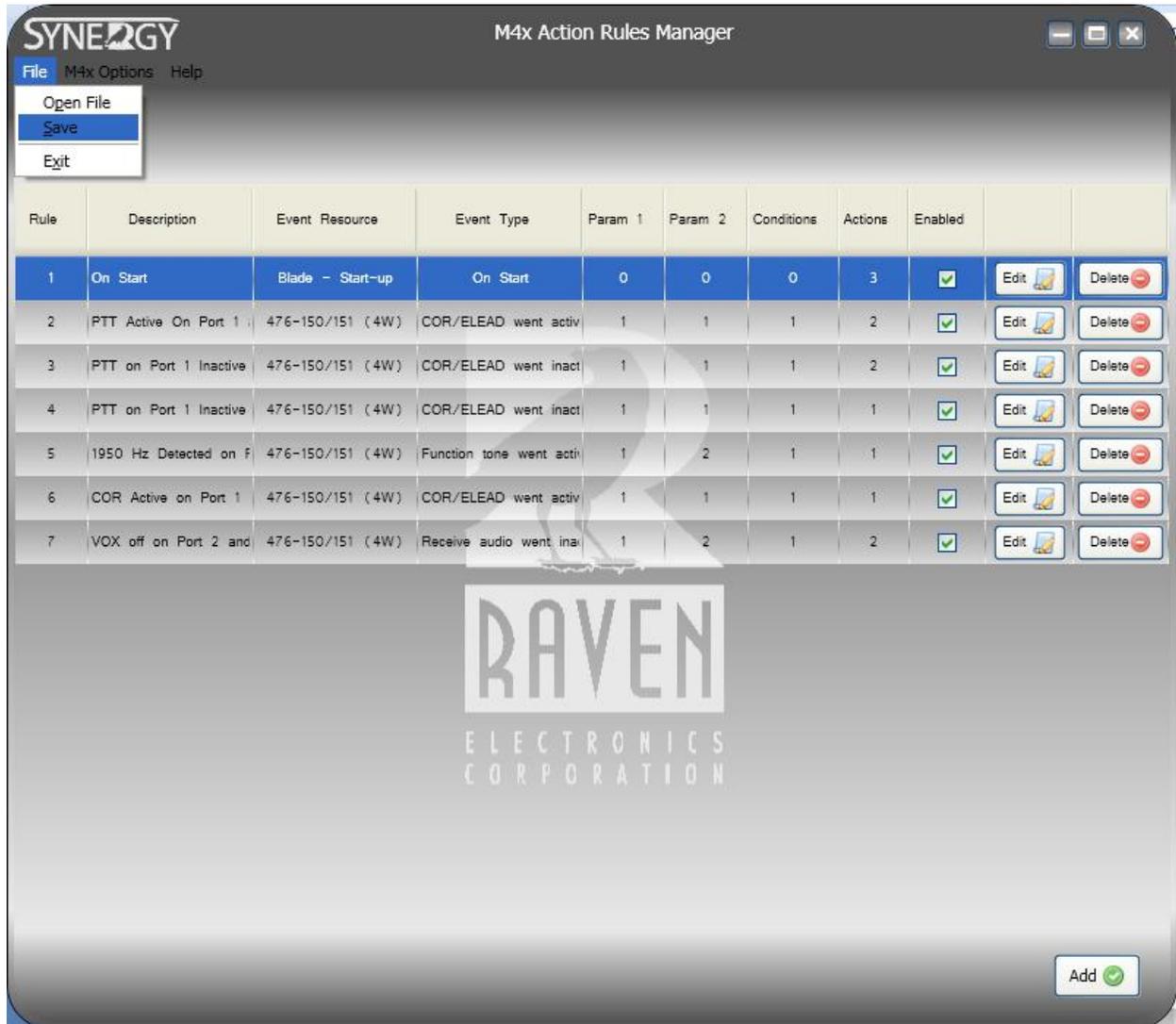
Some customers occasionally have applications that require raw commands. Raw commands are custom commands that perform actions not available in the standard offering found in the software. If you have an application for which you cannot find the appropriate actions, please contact Raven for support. It is possible your application can be fulfilled using Raw commands.



Contact Raven Tech Support for assistance with Raw Commands

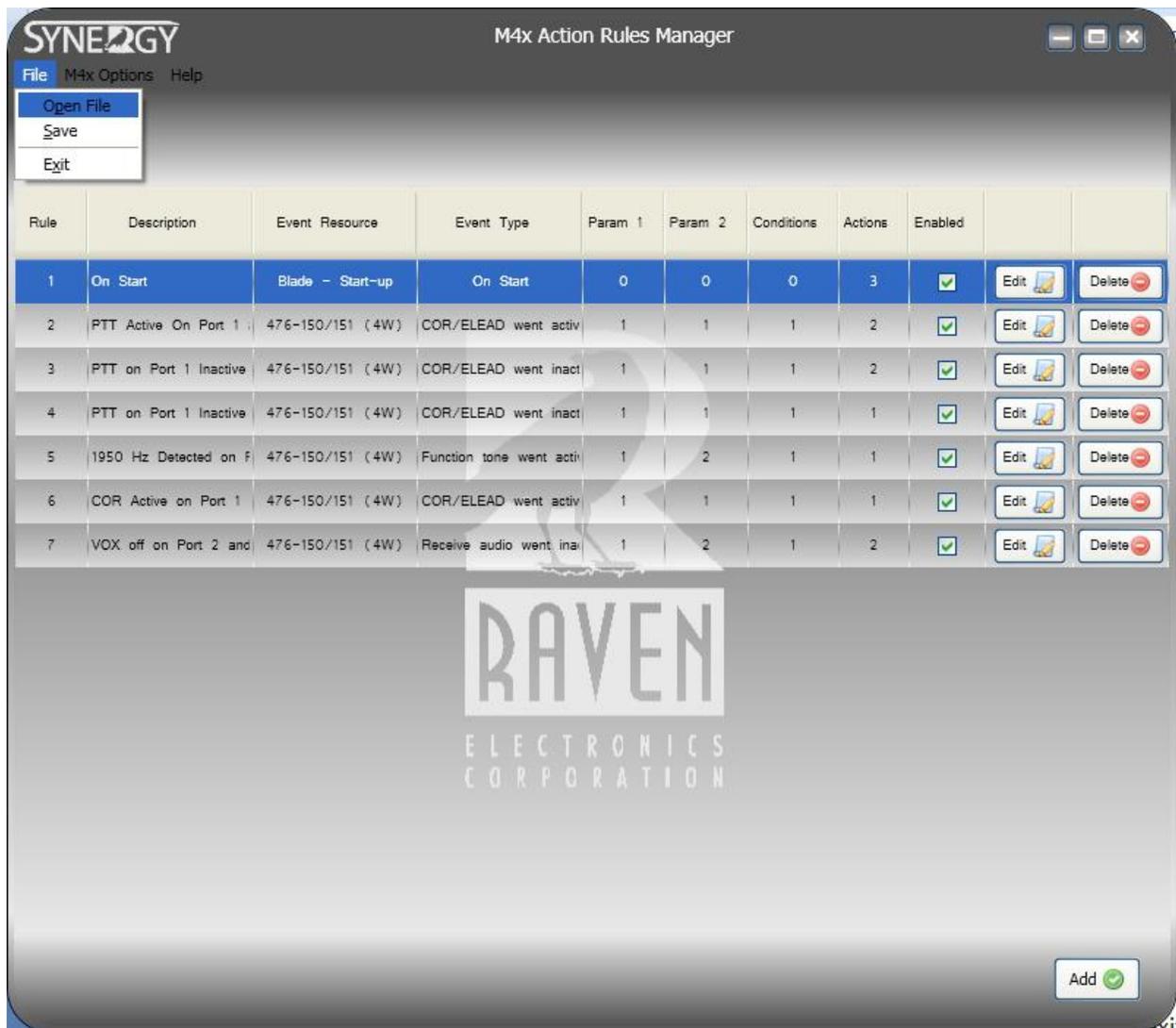
## Saving Rule sets

It is recommended that you regularly save your rules set as you work on it. To save, select the File menu and then Save. See screen shot below. You will be prompted to save your file. Change the default directory and file name if you like before saving.



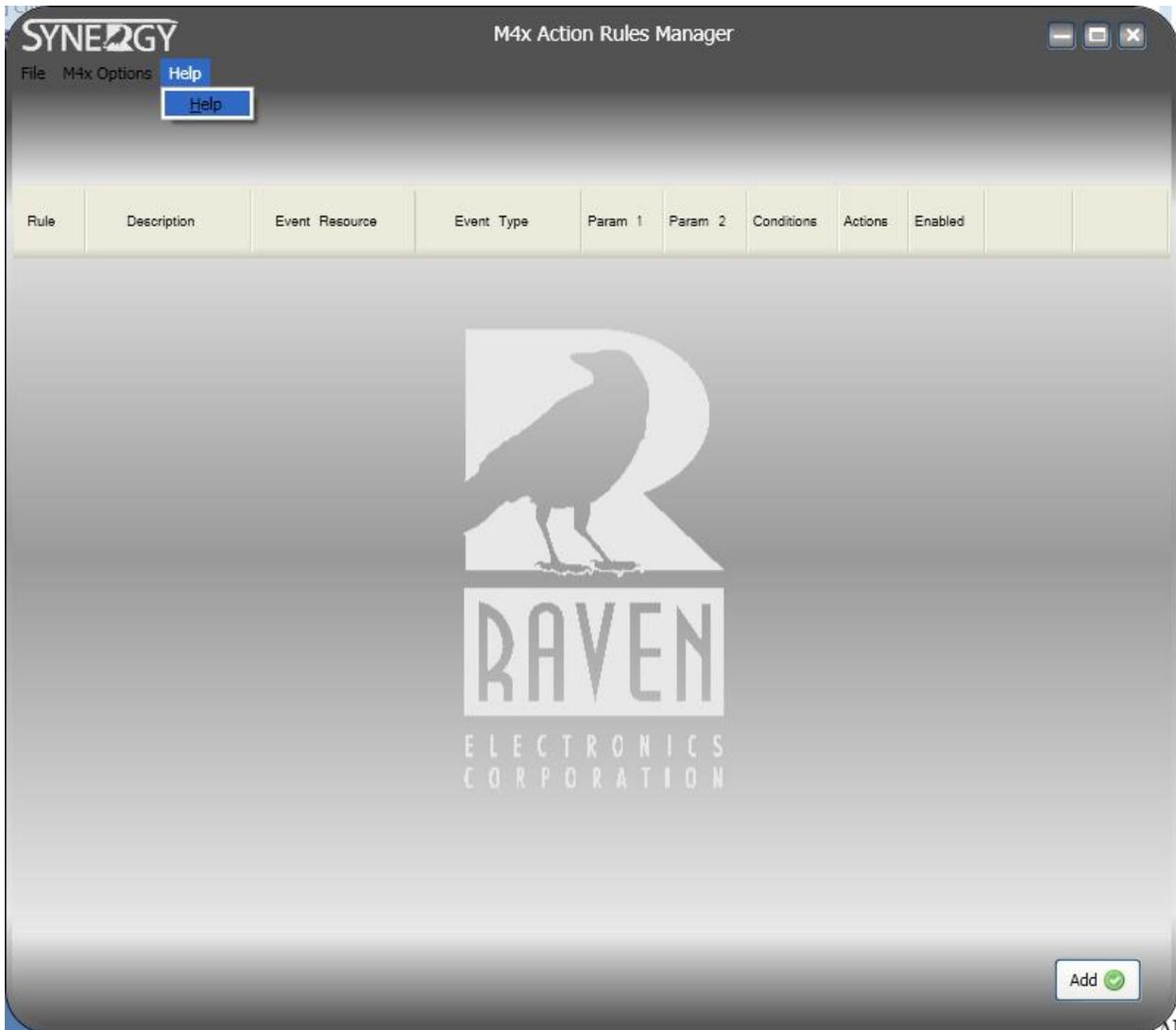
## Opening Rule sets

Occasionally, you will need to open a saved rule set to finish an in-progress rule set, make changes to a rule set, or to install a rule set on a Blade. To open a rule set select the File menu and then Open File. See screen shot below. You will then be prompted to find the file you saved. Just double click it or select it and select Open. Your rule set will then load and display.

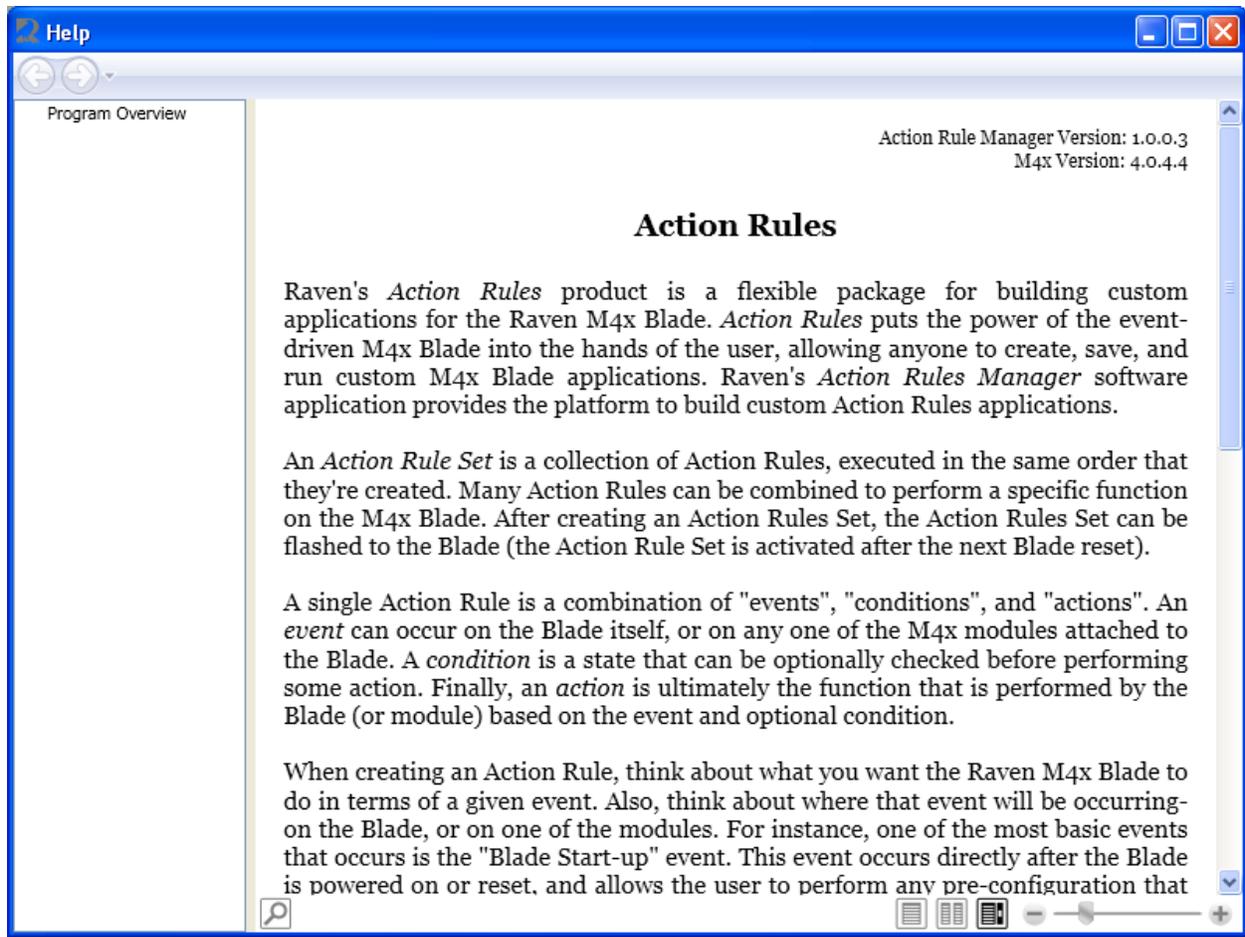


**Software version and caution about loading rules set made on prior version**

To confirm the version of software you are using, select the Help menu as shown in the screen shot below.



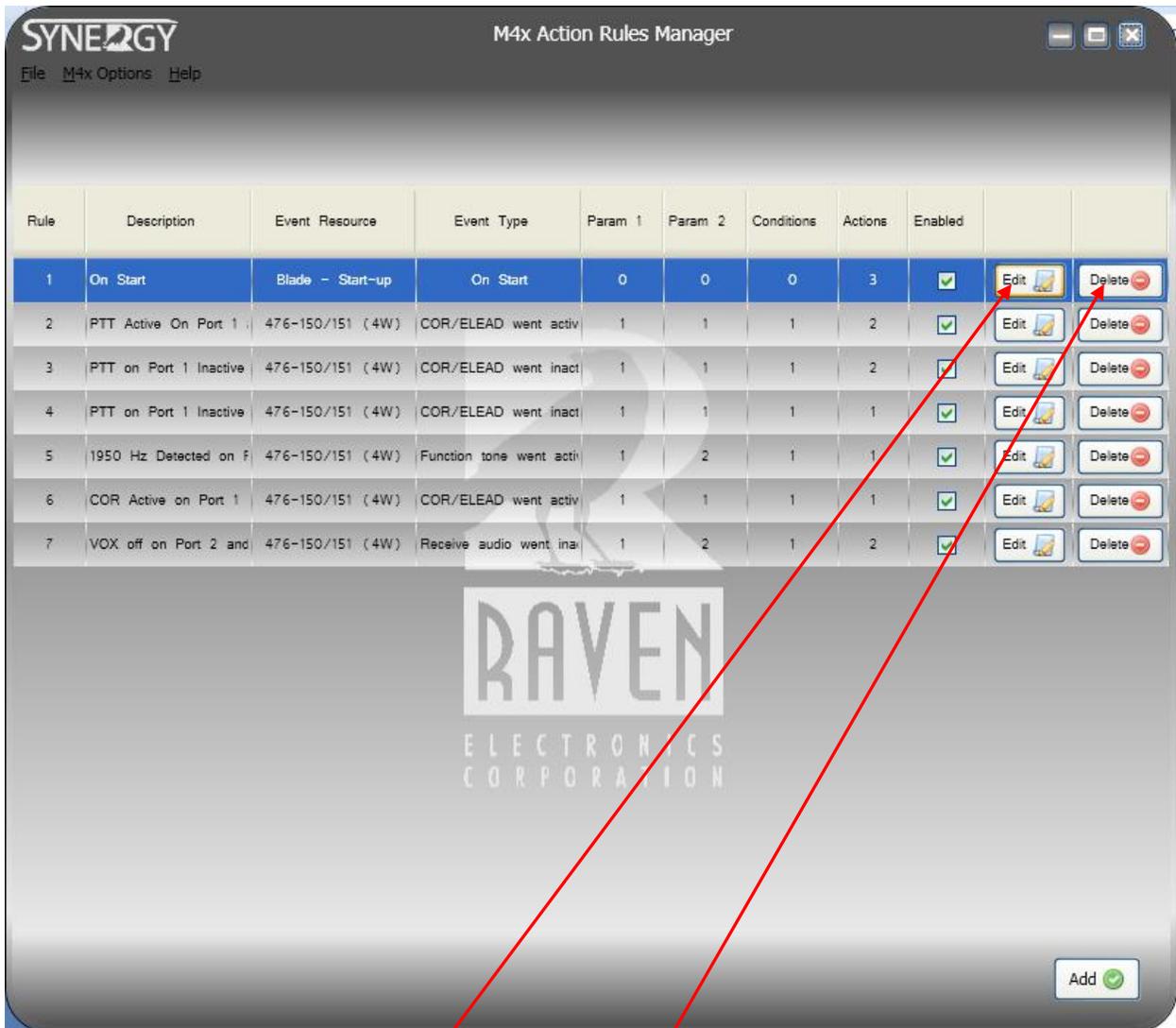
After selecting the help menu, you will see the screen shot as shown below. The software version is noted in the upper right. Note also that the M4x user app software is also noted. It is recommended that the version of M4x software be the same as that noted with the version of Synergy. For example, in the screen shot below, M4x version 4.0.4.4 is noted along with version 1.0.0.3 of Synergy software. Using a different version can occasionally cause incorrect rules sets to display. This is generally never a problem as the Synergy software and M4x software are installed on the same software disk received with your shipment. This problem usually occurs if you receive a rule set from a colleague or associate who made their rule set on a different version.



### Editing/Deleting Rules

Sometimes it is necessary to edit a rule(s) in a rule set. Open your rule set as described above, find the rule you want to edit, and select Edit to the right of the rule. The rule will expand allowing you access to the Events, resources, Conditions and Actions you need to edit.

To delete a rule, click the Delete button. **CAUTION!** When you select delete, you will not be given an **Are You Sure** warning message; the rule will be immediately deleted with no option to undo.



Click here to edit a rule or here to delete it.

### Exiting Synergy

To exit Synergy, select the File menu and select Exit. See screen shot below. After selecting Exit you will see the warning message asking if you are sure you want to exit. **CAUTION!** This is not a save prompt and if you select yes, the program will close and any unsaved progress will be lost. If you haven't saved your work, click Cancel or No and save your file before exiting.

**SYNERGY** M4x Action Rules Manager

File M4x Options Help

- Open File
- Save
- Exit

Rule	Description	Event Resource	Event Type	Param 1	Param 2	Conditions	Actions	Enabled		
1	On Start	Blade - Start-up	On Start	0	0	0	3	<input checked="" type="checkbox"/>	Edit	Delete
2	PTT Active On Port 1	476-150/151 (4W)	COR/ELEAD went activ	1	1	1	2	<input checked="" type="checkbox"/>	Edit	Delete
3	PTT on Port 1 Inactive	476-150/151 (4W)	COR/ELEAD went inact	1	1	1	2	<input checked="" type="checkbox"/>	Edit	Delete
4	PTT on Port 1 Inactive	476-150/151 (4W)	COR/ELEAD went inact	1	1	1	1	<input checked="" type="checkbox"/>	Edit	Delete
5	1950 Hz Detected on F	476-150/151 (4W)	Function tone went activ	1	2	1	1	<input checked="" type="checkbox"/>	Edit	Delete
6	COR Active on Port 1	476-150/151 (4W)	COR/ELEAD went activ	1	1	1	1	<input checked="" type="checkbox"/>	Edit	Delete
7	VOX off on Port 2 and	476-150/151 (4W)	Receive audio went ina	1	2	1	2	<input checked="" type="checkbox"/>	Edit	Delete

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Add

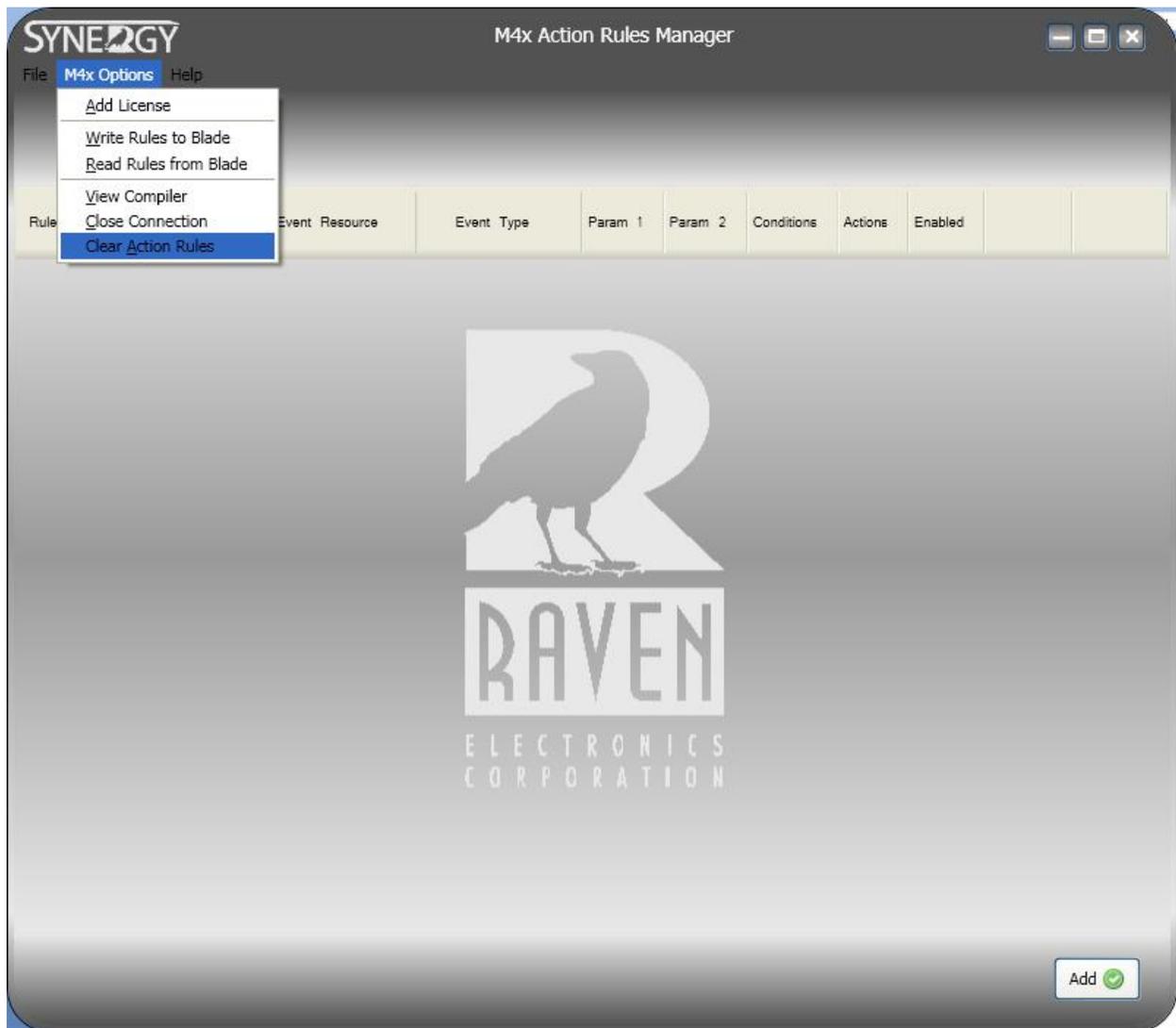
**Close Action Rule Manager**

Are you sure you want to close the application. All unsaved changes will be lost.

Yes No Cancel

## Clearing Rule sets

If instead of exiting Synergy you want to clear the rule set you are working on, select the M4x Options menu and then Clear Action Rules. Be sure you have saved your rules set first, as the warning prompt is not a save prompt. Once you select Yes, the rule set will clear from the desktop and any unsaved progress will be lost. If you are currently editing a rule, selecting Clear will give you a message saying you are in the middle of editing a rule and you must first finish and close the editing window before clearing. Be sure to save, if desired, after you finished editing. Once the rule set is cleared from the desk top, you can load another rule set or begin on a new rule set.



## Configure M4x settings before writing your rules set to the Blade

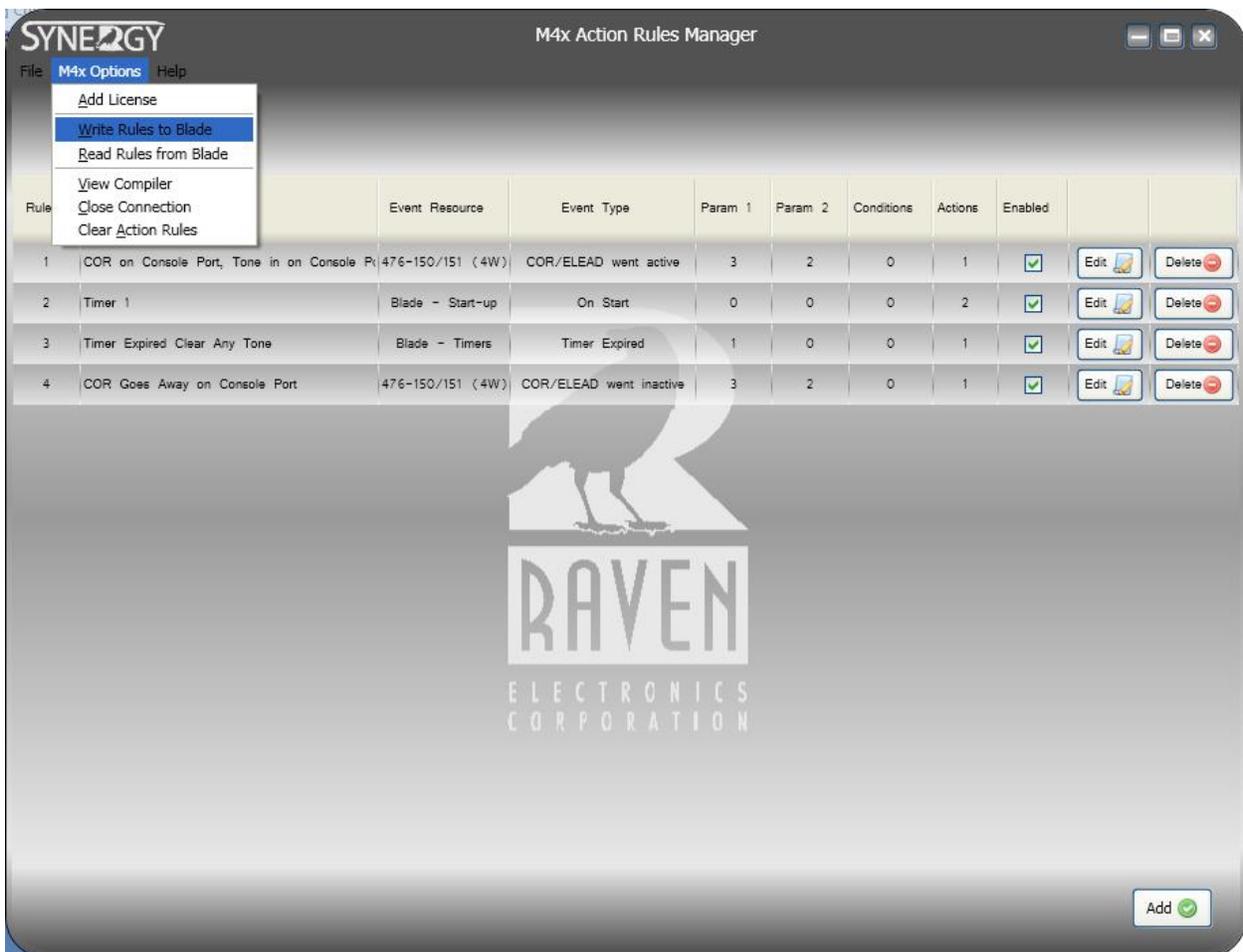
Before writing your rules to the Blade, it is sometimes necessary to configure your Blade first using the M4x software. While many of the functions and configurations available in the M4x software can be

performed using Synergy, it is generally simpler and faster to make these configurations using the M4x software. For example, you can configure a bridge using Synergy, but in almost all cases this should be done using the M4x software as it is a much simpler and faster process using the M4x software. There might be some cases where you would to bridge in Synergy. Examples might include a conditional bridge that only bridges based upon the events and conditions outlined in your rule set.

Other reasons to use the M4x software are for individual port settings such as LED status, gain settings, audio delays, etc. If you are unsure whether to use Synergy or M4x software, contact Raven tech support for assistance.

### Writing a rules set to the Blade

When you are satisfied with the rule set you have written it is time to write the rule set to your Blade. To write the rules to the Blade, be sure the USB cable is connected from your computer to the Blade. Next, select the M4x Options Menu as shown in the screen shot below and select Write Rules to Blade. As mentioned previously, do not have the M4x User software open when writing rules to the Blade, as this can cause conflicts.





After you select the Write Rules to Blade command, you should see a compiler screen like the one in screen shot above. You should see M4x Connection Closed on the last line of the compiler screen.

### **Testing Rule sets—Test incrementally as rule set is made.**

As a general strategy, Raven recommends rule sets be tested incrementally. This makes trouble shooting a simpler process in isolating where in your rule set a problem might be located. If you have simple rule sets consisting of 2-4 rules, then incremental testing might not be necessary, but for larger rule sets it is helpful to test incrementally. There are a few ways to test incrementally. One is to build the rule set incrementally and test it after each rule is added. Another way is to build it completely and then test it by disabling rules. In the screen shot below is a rule set consisting of eighteen rules. To incrementally test this rule set, you could disable all the rules by unchecking boxes in the far right column titled Enabled. This disables the rule without deleting it. In this example you might want to disable all rules except the first one and then test the first rule under the startup condition. Once you are satisfied your rule is working stand alone, then you can enable more of the rules and test again. Keep in mind that some rules might need to be enabled for another rule to function properly. For example, if you had a rule that set a timer upon a certain event and another rule that only executed upon expiration of that timer, you would need to enable both rules in order to to test. In this example, in addition to enabling both rules, you would need to create the event and conditions (if any) that started the timer.

**SYNERGY** M4x Action Rules Manager

File M4x Options Help

Rule	Description	Event Resource	Event Type	Param 1	Param 2	Conditions	Actions	Enabled		
1	Start Up	Blade - Start-up	On Start	0	0	0	10	<input checked="" type="checkbox"/>	Edit	Delete
2	Receive Audio Active P	476-150/151 (4W)	Receive audio went act	1	1	0	5	<input checked="" type="checkbox"/>	Edit	Delete
3	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	1	0	2	<input checked="" type="checkbox"/>	Edit	Delete
4	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	1	1	1	<input checked="" type="checkbox"/>	Edit	Delete
5	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	1	2	1	<input checked="" type="checkbox"/>	Edit	Delete
6	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	1	3	1	<input checked="" type="checkbox"/>	Edit	Delete
7	Receive Audio Active P	476-150/151 (4W)	Receive audio went act	1	2	0	4	<input checked="" type="checkbox"/>	Edit	Delete
8	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	2	0	1	<input checked="" type="checkbox"/>	Edit	Delete
9	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	2	1	1	<input checked="" type="checkbox"/>	Edit	Delete
10	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	2	2	1	<input checked="" type="checkbox"/>	Edit	Delete
11	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	1	2	3	1	<input checked="" type="checkbox"/>	Edit	Delete
12	Receive Audio Active P	476-150/151 (4W)	Receive audio went act	2	1	0	3	<input checked="" type="checkbox"/>	Edit	Delete
13	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	2	1	0	1	<input checked="" type="checkbox"/>	Edit	Delete
14	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	2	1	2	1	<input checked="" type="checkbox"/>	Edit	Delete
15	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	2	1	3	1	<input checked="" type="checkbox"/>	Edit	Delete
16	Receive Audio Active P	476-150/151 (4W)	Receive audio went act	2	2	0	2	<input checked="" type="checkbox"/>	Edit	Delete
17	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	2	2	0	1	<input checked="" type="checkbox"/>	Edit	Delete
18	Receive Audio Inactive	476-150/151 (4W)	Receive audio went ina	2	2	3	1	<input checked="" type="checkbox"/>	Edit	Delete

Add

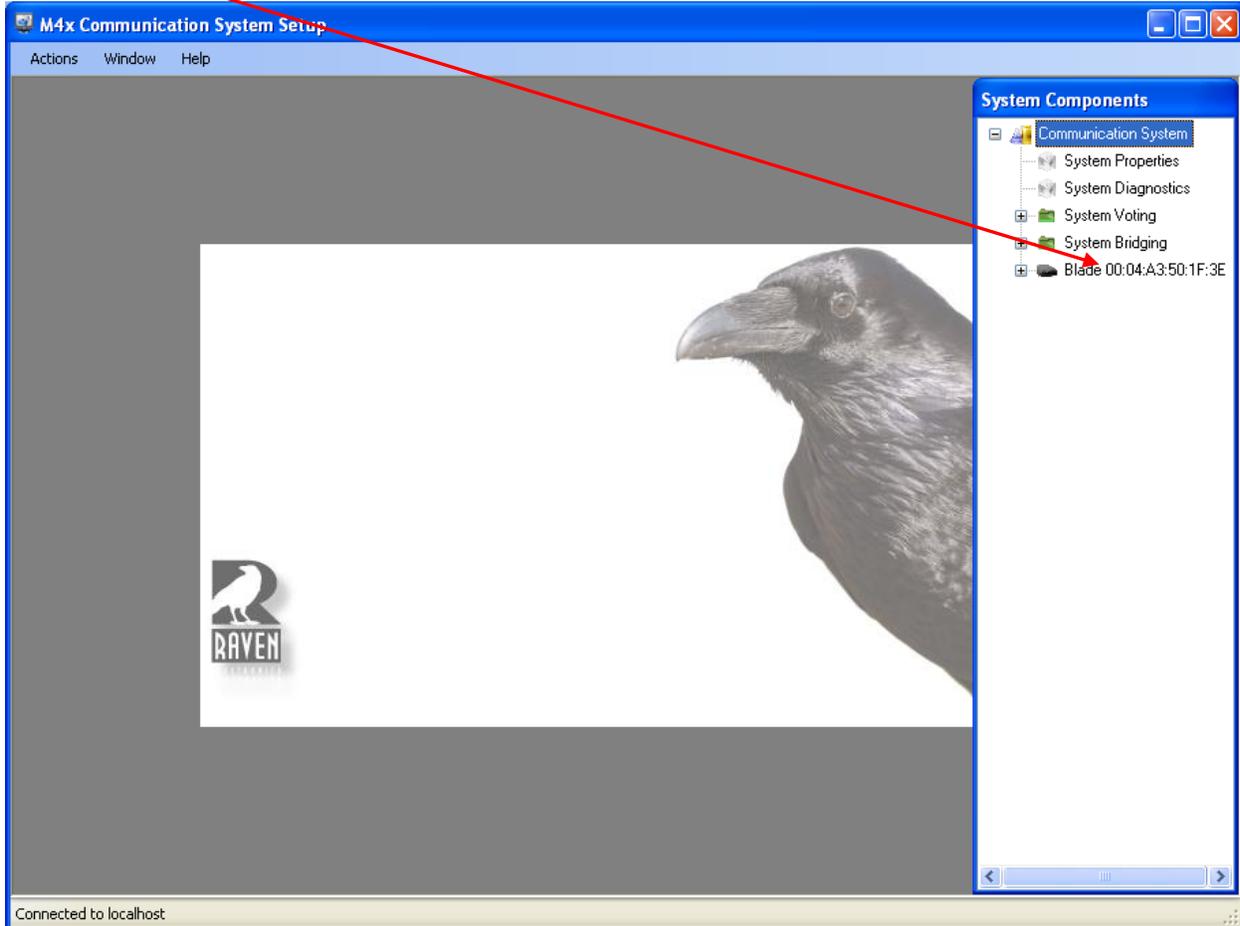
### Limited rule set

Every Blade comes with a limited Synergy license installed. The license allows you to create rules sets up to a maximum of four rules. There are many applications that can be accomplished in four or fewer rules. More complex applications require the unrestricted Synergy license. Contact Raven sales if you need to purchase the unrestricted license.

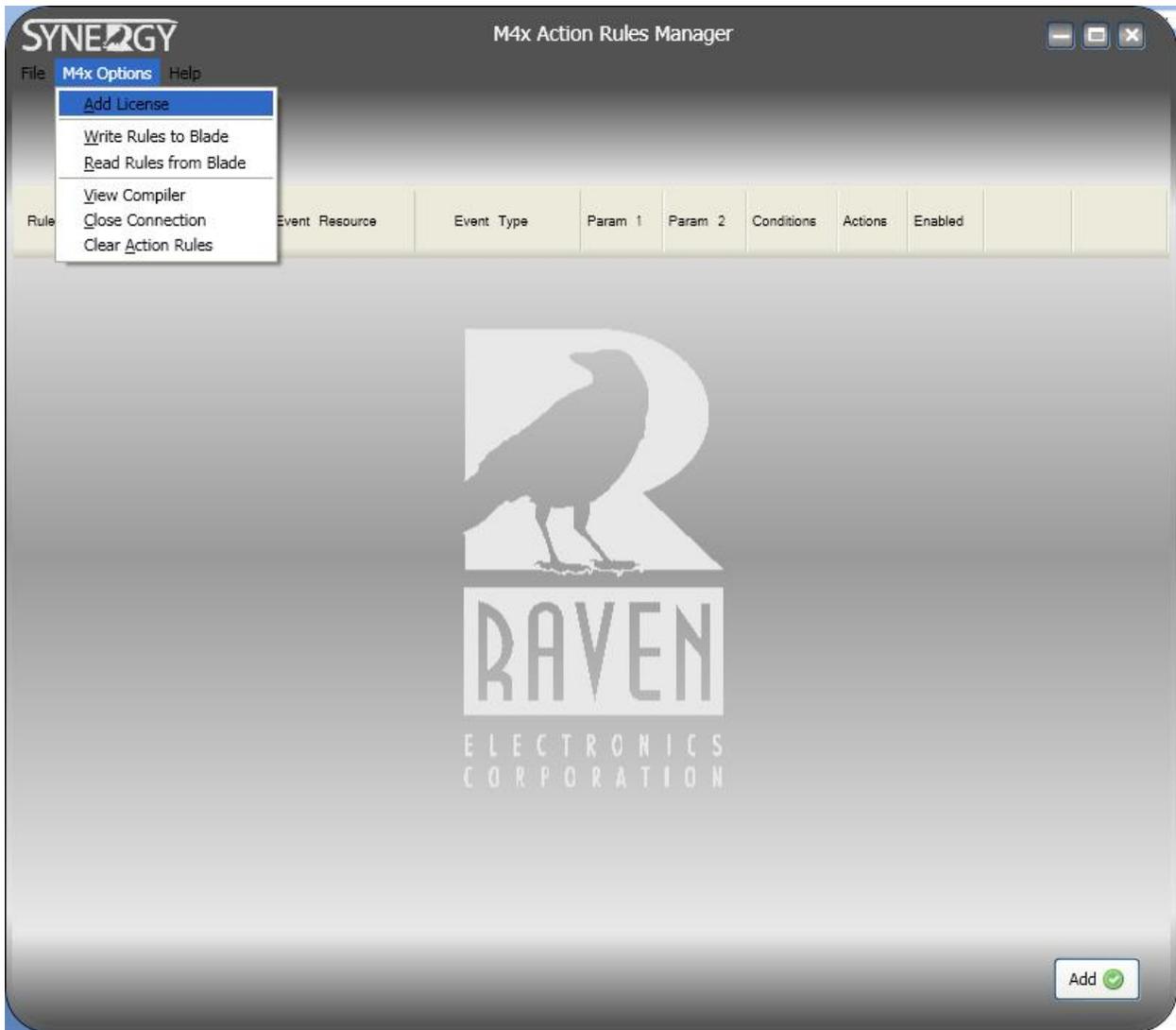
## Unlocking the full Synergy license

Skip this section if you purchased your Blade with an unrestricted license. If you are upgrading to a full license, you will need to provide Raven with your Blade ID number. To obtain your Blade ID number, open and connect the Blade to the M4x user software. You can see the Blade ID number 00:04:A3:50:1F:3E in the System Components section on the right of the screen.

Blade ID number

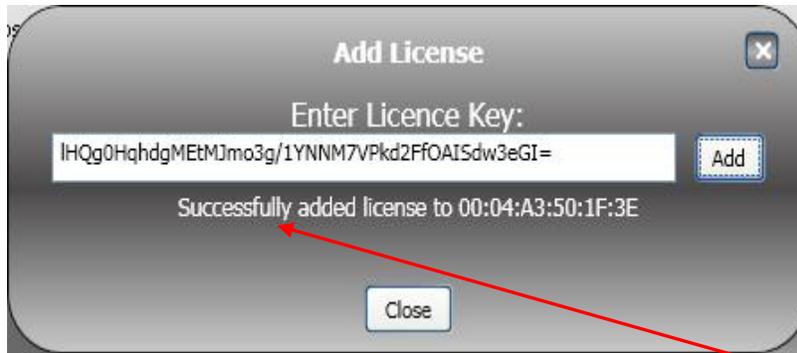


After you have given the ID number to Raven and purchased the license key, you will be sent a code key via email. To unlock the license open the Synergy software and select the M4x Options menu and then Add License.



After selecting Add License you will see the screen shot below. In the blank space, enter the license key. It is best to copy & paste the license key from the email you received as it is a very long key code, see second screen shot.





After you enter the license key and select Add, you should see this message. You can click close. Your Blade now has the full unrestricted license on it.

### **Rule limits for Mini-Blades**

If you purchase a Raven Mini-Blade with an unrestricted license, there is still a limit to the number of rules you can write. This is not a limitation of the license; rather, it is limitation of the available memory in which the rules are saved. There is no set limit on the number of rules, as it depends on not only the number of rules but the complexity of rules and how many actions and conditions the rules have. You should expect to be able to write up to ten rules in a Mini-Blade provided the rules are not overly complex with many conditions and actions for each rule in the rule set. A Mini-Blade includes a maximum of two 4-wire ports, so due to its low port density, rule sets will tend to be small anyway.

Note also that early generation Blades (up to eight ports capacity) have the same memory as the Mini-Blades and are subject to this same rule limitation. Since there are more possible ports, use of the early generation Blades might tax the rule set limit. For approximately the past two and a half years, all Blades, except the Mini-Blade, supplied by Raven are of the latest generation and include an expanded memory capacity so the maximum number of rules is greatly increased. If you are unsure if you have an early generation Blade or a current generation Blade, contact Raven Tech Support for assistance.

**SUBJECTS TO ADD:**

~~M4x settings before rules set~~

~~Writing rules to Blade—no M4 open~~

~~Exiting Synergy~~

~~Testing Rule sets—Test incrementally as rule set is made.~~

~~Opening Rule sets~~

~~Clearing Rule sets~~

~~Saving Rule sets~~

~~Editing and deleting rules~~

~~Variables~~

~~Timers~~

~~Raw Commands~~

~~47692 and 47698 rule limits~~

~~Limited rule set~~

~~Unlocking the full Synergy license~~

~~Software version and caution about loading rules set made on prior version~~