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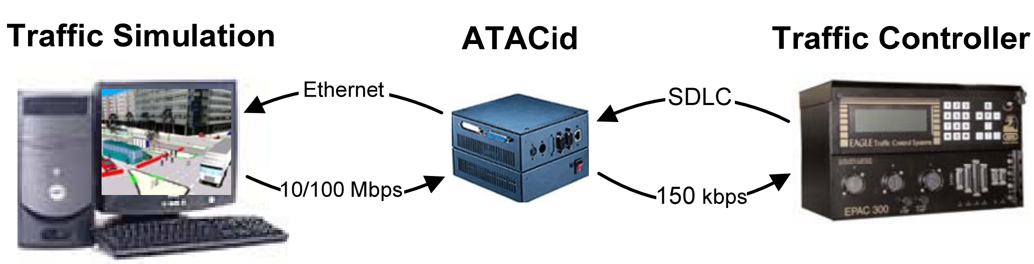
Advanced Traffic Analysis Center's Controller Interface Device *(ATACid)*

User Manual



Version 3.0

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CHAPTER 1
ATACid Setup and Operating Procedures

1.0 Overview

The Advanced Traffic Analysis Center Controller Interface Device (ATACid) was developed to interface a NEMA TS 2 (2003) compliant traffic controller with a personal computer running a traffic simulation model to perform hardware-in-the-loop simulation (HILS). In addition, the device acts as a NEMA TS 2 tester for testing traffic controllers and their timing plans prior to field installation. This device is small, easy to use, and can be networked over Ethernet for using more than one ATACid/traffic controller combination, as well as allowing agencies/companies to share ATACid/traffic controller combinations.

The ATACid acts as a malfunction management unit (MMU) by keeping the traffic controller out of Flash condition. The ATACid will then keep track of phase data, and can update the controller with detector information received over its Ethernet connection. To allow for accurate time synchronization, provisions have been developed for holding its responses until the traffic controller has passed one real-time second. Therefore, this device is well suited for controller testing and real-time hardware-in-the-loop simulation.

The ATACid runs a stock version of FreeDOS for an operating system. To view the source code, get your own copy, or get more information about FreeDOS, visit their website at http://www.freedos.org. This statement is made in compliance with the GNU General Public License (http://www.gnu.org/copyleft/gpl.html) under which the FreeDOS operating system is licensed. If you have any questions or would like Advanced Traffic Analysis Center to supply the FreeDOS source code, please contact ATAC.

1.1 Requirements
To use the ATACid, the following items are required:

- ATACid with its included software/hardware (supplied)
- NEMA TS 2 (2003) compliant traffic controller
- Computer using Microsoft Windows® running ATACid utility programs and/or simulation programs
  - VISSIM 4.3 and 5.0
  - Cube Dynasim 2.0.14
  - TSIS 6.0
- Ethernet network, switch or hub to communicate with ATACid, or an
- Ethernet crossover cable if connecting directly to an ATACid
- Null modem serial cable (RS232)for configuring the ATACid (supplied)
- A TS2 SDLC cable to connect the controller to the ATACid (supplied)

2.0 Hardware Installation

The ATACid can be mounted in any position, but must be located in a stable environment (indoors). Avoid areas of high temperature, humidity, and dust. Do not block the air flow from the fans on the side of the ATACid. It is recommended that the ATACid is located near the traffic controller to keep things organized and take advantage of the availability of long Ethernet cables compared to the custom SDLC cable.

Connect the supplied SDLC cable between the ATACid's D-sub 25 pin serial port and the traffic controller's D-sub 15 pin TS 2 SDLC serial port. Connect an Ethernet cable between the ATACid and an Ethernet port in the network you will be using (or to a PC using a crossover cable). A null modem serial cable will be needed, at least temporarily, to configure the Ethernet settings of the ATACid. This should be connected to the ATACid's D-sub 9 pin serial port and a computer's serial port. If additional cables are required or become damaged, see Table 1.1 for the SDLC cable pinout and Table 1.2 for the null modem cable pinout.

Table 1.1. TS 2 SDLC Cable Pinout

DB15 (Male)	Function	DB25 (Male)	Function	Notes
1	TxD+	16	RxD+	Pair with below
9	TxD-	3	RxD-	Pair with above
3	TxC+	9	RxC+	Pair with below
11	TxC-	17	RxC-	Pair with above
5	RxD+	14	TxD+	Pair with below
13	RxD-	2	TxD-	Pair with above
7	RxC+	11	TxC+	Pair with below
15	RxC-	24	TxC-	Pair with above
8+12	Ground	7	Ground	Use drain wire

Table 1.2. RS232 Null Modem Cable Pinout

DB9 (Female)	Function	DB9 (Female)	Function	Notes
2	RxD	3	TxD	No pairing
3	TxD	2	RxD	No pairing
5	Ground	5	Ground	Use Drain Wire
7	RTS	8	CTS	No pairing
8	CTS	7	RTS	No pairing
1+6	CD & DSR	4	DTR	No pairing
4	DTR	1+6	CD & DSR	No pairing

3.0 Software Installation

Two groups of software are available for the ATACid: CID software and simulation interface software. The CID software includes a program to configure the ATACid's Ethernet settings (SerUpdt), as well as a program to monitor and test the traffic controller operation (CIDlink). Currently, simulation interfaces have been developed for the VISSIM and Dynasim simulation models for providing real-time hardware-in-the-loop simulation.

While running the ATACid.msi file from the CD, select the desired software components to install: CIDlink, SerUpdt, VISSIM Interface, and Dynasim Interface components (please select all components). It should be noted that the VISSIM and Dynasim Interfaces also contain a separate setup file to install the required control files.

The CIDlink program, Dynasim Interface, and CORSIM Interface were written in JAVA. Therefore, a Java runtime environment must be installed on the computer (version 1.4.2 or newer). This can be downloaded free of charge from http://java.sun.com and the Java SE Runtime Environment (JRE) will work fine.

4.0 Controller Configuration

The NEMA TS 2 controller needs to be configured correctly to ensure successful operation with the ATACid. The controller will need to have the appropriate addresses/devices enabled to send the appropriate frames over its Port 1 or SDLC interface. The ATACid will receive these frames and then emulate the device that the frame was addressed to.

The ATACid supports emulation of 9 cabinet devices: the Terminal and Facilities (T&F) Bus Interface Units (BIU) 1 – 4, the Detector BIU 1 - 4, and the Malfunction Management Unit (MMU). Different controllers have different ways of enabling the specific SDLC devices (please refer to your particular controller's manual). A few examples of controller setup are shown in the following sections.

4.1 Econolite Controllers

ASC/2-2000/2100 Series Controller
From the Main Menu (F1), select number 1 (Configuration Submenu), followed by number 4 (SDLC Options). Using the cursor key and toggle key (0), turn ON the appropriate T&F and Detector BIUs (typically 1-4 for both devices). Next, enable the “Type 2 Runs As Type 1” option.

Settings of the MMU program may have to be changed to properly communicate with the CID. By default, The ATACid allows all phases to be compatible with each other. Therefore, if the MMU is enabled, such as with this controller, all of the channels listed in the MMU Program (F1, 1, 9) must be toggled ON.

ASC/3-1000 Series Controller
From the Main Menu (F1), select number 1 (Configuration Submenu), number 4 (SDLC Submenu), followed by 1 (SDLC Options). Using the cursor key and toggle key (0), turn ON the appropriate T&F and Detector BIUs (typically 1-4 for both devices). Toggle the “MMU Enable” to YES.

From the SDLC Submenu, select number 2 (MMU Program) and ensure that all of the channels are disabled “.”. Therefore, the controller will not compare its programming with the MMU Program.

4.2 EAGLE EPAC Controllers

EPAC M40 Series Controller
From the Main Menu, select number 4 (Unit Data), followed by number 7 (Port 1 Data). Using the arrow keys, enable (1-YES) the appropriate Port 1 Addresses: T&F BIUs (0-3), Detector BIUs (8-11), and the MMU (16).

EPAC M50 Series Controller
From the Main Menu, select number 4 (Unit Data), followed by number 7 (Port 1/ITS Data). Using the arrow keys, enable (1-YES) the appropriate Port 1 Addresses: T&F BIUs (0-3), Detector BIUs (8-11), and the MMU (16).

5.0 Testing the Setup

Once the cables are connected to the ATACid, turn on the device. After a short startup period (approximately one minute), the ATACid will be ready for use. The ATACid can usually bring the traffic controller out of diagnostic Flash mode, but not always. If the traffic controller is in Flash mode, power down the controller and power it back up. If the controller will not come out of Flash mode, refer to Section 9.0 (troubleshooting).

Once the controller is out of Flash mode, run the CIDlink program to see how the ATACid is working (NOTE: The CIDlink program will run only if the ATACid has been configured as described in Section 6.0). The CIDlink program provides the viewing of the phase outputs of the controller, as well as set and clear detectors, preempts, and virtual cabinet settings. Refer to Section 8.0 for directions on using the CIDlink.

6.0 SerUpdt Serial Server

The ATACid’s Ethernet settings can be viewed and adjusted through a basic serial interface. If the ATACid will be used on an existing Ethernet network (using a wall data port or a router), no modifications to the settings are required. If the ATACid will be used with a direct connection (crossover cable) to a computer, a few changes will need to be performed. To use the serial link to view or update settings on the ATACid, complete the following steps:

1. Power up the ATACid.
2. Power up a computer running Microsoft Windows®.
3. Connect the ATACid and computer with an RS232 “Null modem” serial cable (included).
4. Locate and execute the SerUpdt.exe program, it should look similar to Figure 1.1.

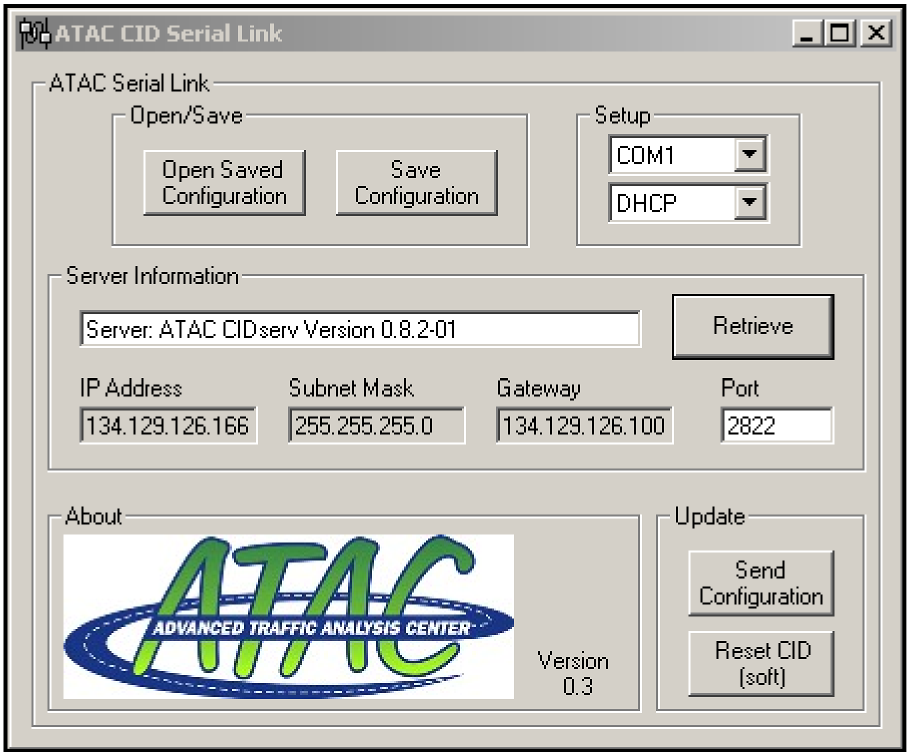

Figure 1.1. SerUpdt Screenshot

To view the ATACid's settings, click the "Retrieve" button and the IP address field will be filled in with its assigned IP address. Unless you are doing an advanced setup, the other fields (subnet mask and gateway) can be ignored.

If a direct connection to a computer with a crossover cable (without a network) is required, a few more steps are involved. If you are not familiar with manual network configurations, please consult your IT personnel at this time.

Note: If you already have a configuration file made from a previous setup, you can import it using the "Import Saved Configuration" button in the top left. Similarly, you can save the current configuration by clicking the "Save This Configuration" button at the bottom right to speed up the process in the future.

The first step in directly connecting the ATACid to a computer is to select the COM port corresponding to the serial port the ATACid is connected to. The connection can now be tested by retrieving the ATACid's Ethernet address and port number by clicking the "Retrieve Address" button at the top right corner of the window. Don't worry if it displays an error message regarding the IP or Port numbers; the ATACid needs to be setup properly before the readings will be meaningful.

If the connection was successful, the ATACid server name and version should be displayed in the "Server Information" field. If the server listed is the "ATAC CIDlink," that means that the normal ATACid software is running. However, if the server listed is "ATAC Update," that means the ATACid has a fatal network configuration error. The "Update" server is a minimally functional serial server that allows you to rewrite the network configurations, but it cannot display the IP address or port number.

Two ways are available to configure the ATACid for Ethernet access. The easiest and recommended way is through DCHP. If your network supports DHCP (most established networks do), configuring the ATACid is as easy as choosing “DHCP” from the “IP Mode” drop down box, selecting a port (default is 2822), and clicking “Send This Configuration.”

If your network does not support DHCP (if you are connecting directly with a crossover cable or through a hub/switch without a router), the ATACid will need to know a little more information to connect properly. First, choose “Manual” from the “IP Mode” drop down box. Then enter the fixed IP address, subnet mask, and the Ethernet gateway for the ATACid. The IP address should be similar to the computer’s IP address (change only the last few digits of the IP address) and use the same subnet mask and gateway as the computer. Enter a port number (2822), and click “Send This Configuration.”

The port number allows the host software to talk to the ATACid software, it must be set to the same number as in the host software. It is recommended to leave the port at the default (2822), but it may be changed if necessary.

After making any changes (clicking the send button), the ATACid will need to be reset to reflect the new changes. This can be accomplished by clicking the “Reset CID” button in the SerUpdt utility. After restarting, clicking the “Retrieve Address” button should yield the ATACid’s current IP address and port number. If an IP address still can not be acquired, see Section 9 (troubleshooting).

7.0 Updating With FTP

The ATACid has a built-in server that allows the firmware to be updated. This server uses the File Transfer Protocol (FTP) which is a very common protocol supported by many clients. Note, however, that the FTP server on the ATACid may have some compatibility issues with some newer FTP clients. This guide references the FTP client WS_FTP LE version 5.08, which is free for personal or educational use.

> **Warning:** Care should be taken when using the FTP server. It is possible to render the ATACid inoperable by overwriting, moving, or deleting its files.

When ATAC releases a new version of the ATACid’s internal software, the ATACid can be updated using an FTP client that supports non-passive (or active) transfers. For example, WS_FTP can be set for active transfers on startup by clicking the “Advanced” tab, then unchecking the “Passive Transfers” box (Figure 1.2).

The ATACid’s IP address should now be found using the SerUpdt utility. To set up the WS_FTP client, Click the “New” button under the “General” tab, type in a profile name of your choice, then add the following information (Figure 1.3):

Host Name/Address:	ATACid's Dotted IP Address
User ID:	CID
Password:	update

When the information has been added, click OK to connect to the ATACid. It may take some time to connect to the FTP server, but when it is ready, you should see a file list for the ATACid’s C drive become available. You are now able to send data to the ATACid by selecting the file on your PC that you would like to send, and choosing “Upload” (this appears as a right arrow in WS_FTP) to send the file. A short confirmation message should then verify that the file has been sent. To send additional files, simply select the new file and click the Upload button to send it to the ATACid as well (Figure 1.4).

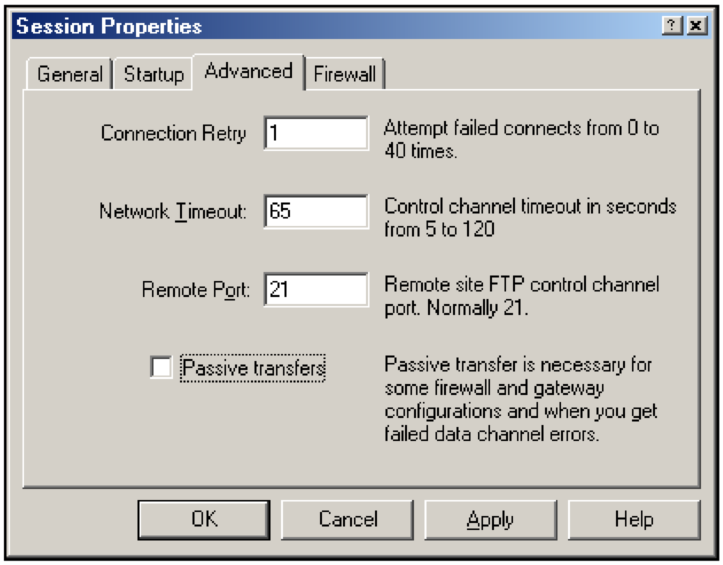

Figure 1.2. Uncheck the "Passive Transfers" Box Under the “Advanced” Tab

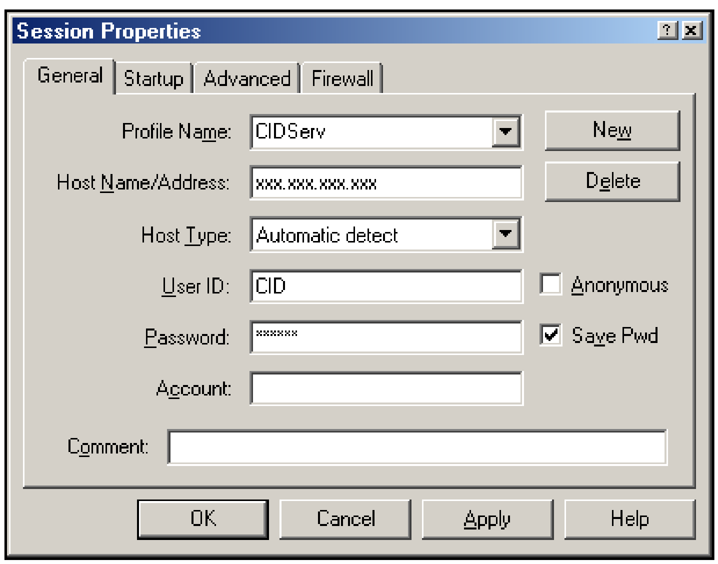

Figure 1.3. Add the Proper Host Name, ID, and Password to Connect to the ATACid

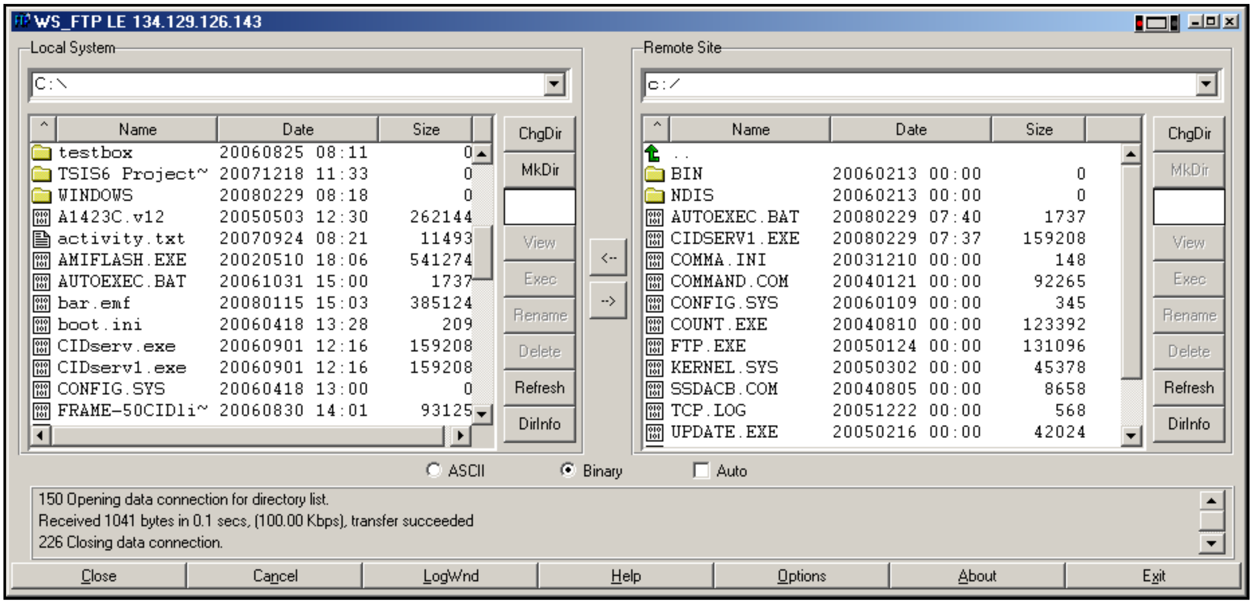

Figure 1.4. WS_FTP Client Connected to the ATACid

When all the required files have been sent to the ATACid, reboot it to finalize the update. The ATACid is now ready to continue normal operation. If desired, the old version of CIDserv (or other files) may be deleted from the ATACid. While controlling the ATACid, stop CIDserv from running by pressing ‘ESC’ and then ‘N’ to stop the restart process. Next, type “dir” and then press ‘ENTER’ to bring up a list of the files on the ATACid. Confirm the file name of the old version of CIDserv by the date listed on the side, then type “del old_cidserv_name.exe” where “old_cidserv_name.exe” is the file name of the old version of CIDserv. A confirmation message will say “One file removed” if the deletion was successful. If unsuccessful, be sure that the file name is typed correctly and the extension (in this case, .exe) is included in the file name – the command should read “del old_cidserv_name.exe” not “del old_cidserv_name”.

WARNING: Only replace or delete files that are known to be safely modified. Deleting critical files from the ATACid could render it partially or completely inoperable!

8.0 CIDlink Utility

The CIDlink is a program that allows testing and monitoring of the ATACid via an Ethernet connection. As previously discussed, CIDlink requires a Java runtime environment to be installed on the computer.

Open the “CIDlink 1.1.jar” file. If it does not open, right click on the “CIDlink 1.1.jar” file and select “Properties” from the drop-down menu. A dialog box will open, look for the “Opens with:” field, if this does not show “javaw” you will need to configure it correctly (Section 9).

Once opened, CIDlink should look similar to the illustration shown in Figure 1.5. Three points of interest are available in this window: the menu bar at the top, the status display just below, and the main display in the bottom frame.

To talk to the ATACid successfully, the correct IP address and port number must be set. These values can be found using the SerUpdt utility as described in Section 6.0. Once these values are known, they can be entered into the “Set IP” and “Set Port” selections under the “Connection” menu of CIDlink.

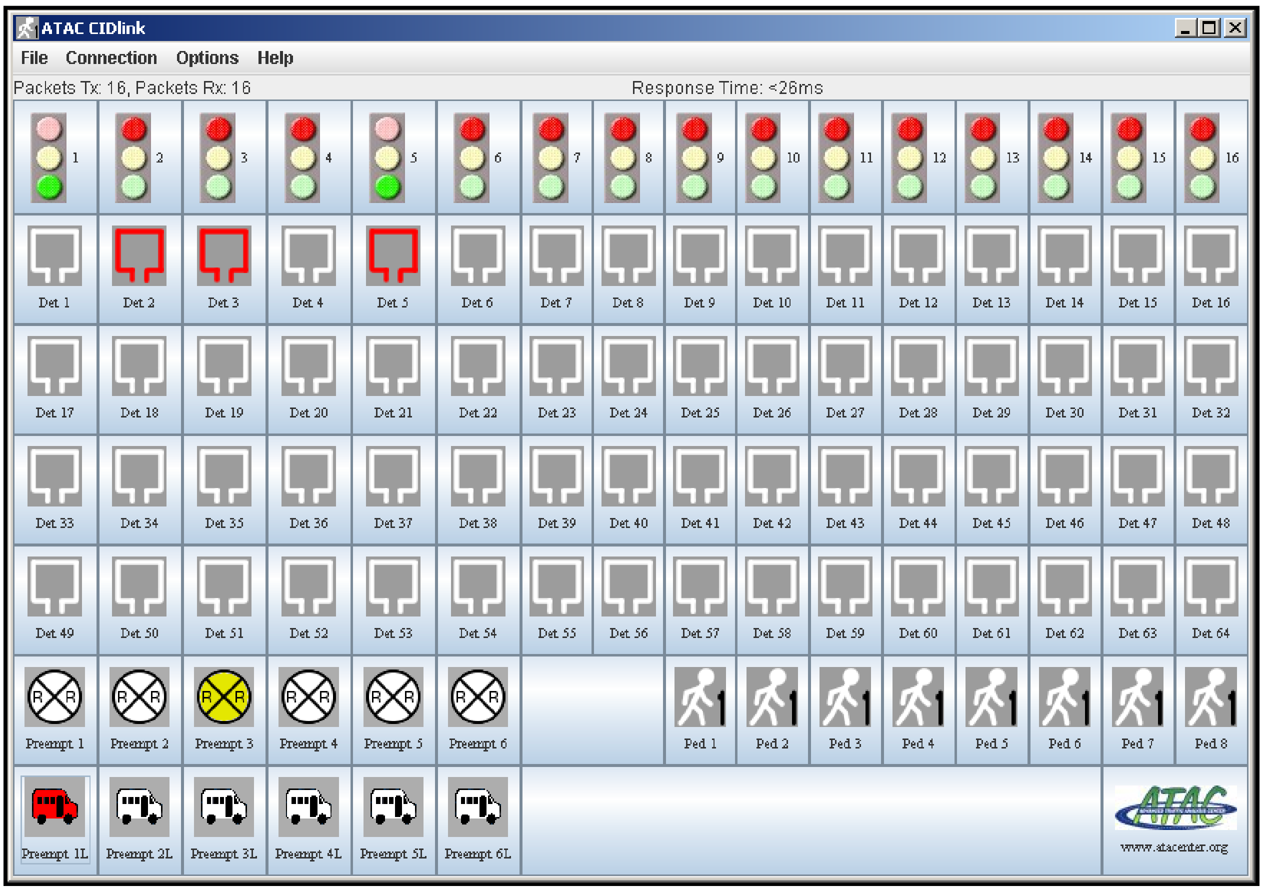

Figure 1.5. CIDlink Screenshot

Upon starting, the status display should show the ATACid’s IP address and port information in “IP:Port” format, as read from the configuration file. This is available to verify the information from the configuration file.

Select “Connection” and “Run” to start communicating with the ATACid. The status display will now show a count of outgoing and incoming communications packets. Ideally, if the communications are successful, the number of packets transmitted (Packets Tx) should equal the number of packets received (Packets Rx). Due to network delays, dropped packets, and other problems, the number of packets transmitted may be slightly higher than those received. Packets are transmitted/received using a 100ms (.1 sec) frequency. If the “Packets Rx” doesn't increment approximately 10 times per second, then something is configured incorrectly or network problems exist. If the “Packets Tx” increase, the “Packets RX” doesn’t change, and “Halted” is displayed on the status bar, a problem exists with the IP and/or port number configuration. If the packets received/transmitted don’t increment smoothly and the response time, which is shown in the status display bar on top, is showing values of several hundred ms, a network problem exists.

When running, the controller's phase data should be shown graphically on the display window. In addition, the status for vehicle (1-64), pedestrians (1-8), preemption (1-6), and priority (1-6) detectors are displayed. To manually place or clear detector calls, select “Options” and uncheck “Snoop” mode. If “Snoop” mode is enabled, detector information is not sent to the ATACid or controller.

CIDlink should not communicate simultaneously to an ATACid that is being used in a simulation. CIDlink should primarily be used to test traffic controller operation and verify controller operation (e.g., out of Flash mode) prior to using within a simulation program.

8.1 CIDlink Detector Test

The Detector Test is an extension of the CIDlink program. This feature allows users to test the vehicle, pedestrian, and priority/preemption detectors prior to field or simulation implementation. Using pull-down windows, users enter the phase, vehicle flow rate, approach speed, vehicle length, detector length, test duration, and test start time. Based on this information, detector calls are sent to the traffic controller at the appropriate rate and for the appropriate duration. Since Detector Test works within CIDlink, the detector activations are illustrated within the program.

To use the Detector Test feature, select “Detector Test” from the “Options” menu in the CIDlink main window menu bar. Once this menu item has been selected a new window with the title “Detector Test” will appear (Figure 1.6). New users should select the “Help/Info” button that will provide information related to setting up the appropriate detector information. The “Save” button may be used to save detector information as .cid files for future test cases. The “Open” button allows users to open previously saved .cid files. The test duration may have a length of 1-9999 minutes.

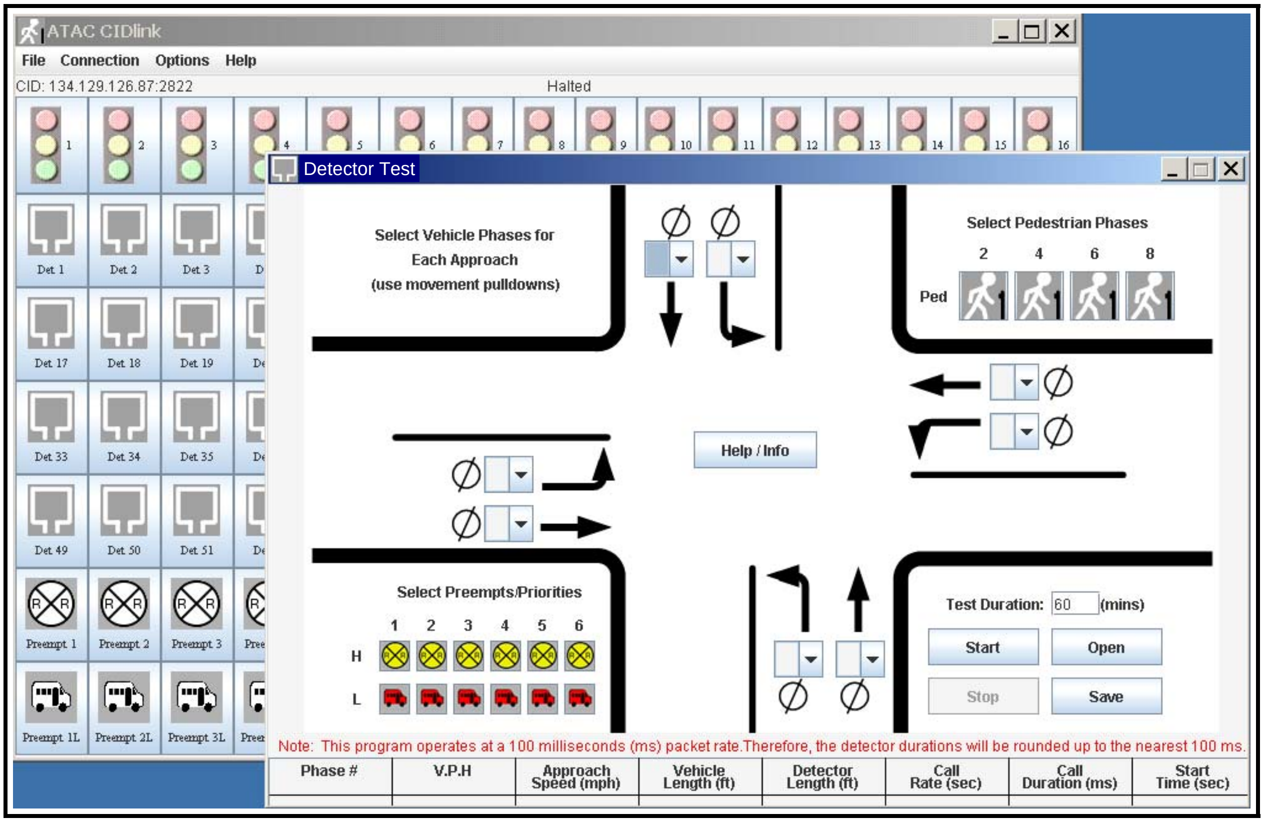

Figure 1.6. Detector Test Window

8.2 CIDlink Virtual Cabinet

Virtual Cabinet is another extension to the CIDlink program. It allows for the simulation of both the Malfunction Management Unit and the Terminal and Facilities BIU's. This can be used to evaluate a controller's response to the different situations that it could encounter while operating in an actual cabinet in the field.

To use the Virtual Cabinet, select “Virtual Cabinet” from the “Options” menu in the CIDlink main window menu bar. Once this menu item has been selected a new window with the title “Virtual Cabinet” will appear (Figure 1.7). In this window there will be three tabs; MMU, T & F, and Phase.

If the MMU tab is selected, you will be presented with several different check boxes. When a check box is selected, the corresponding information will be sent to the controller from the virtual MMU. This can be used for diagnostic purposes and removes the need to have a physical MMU.

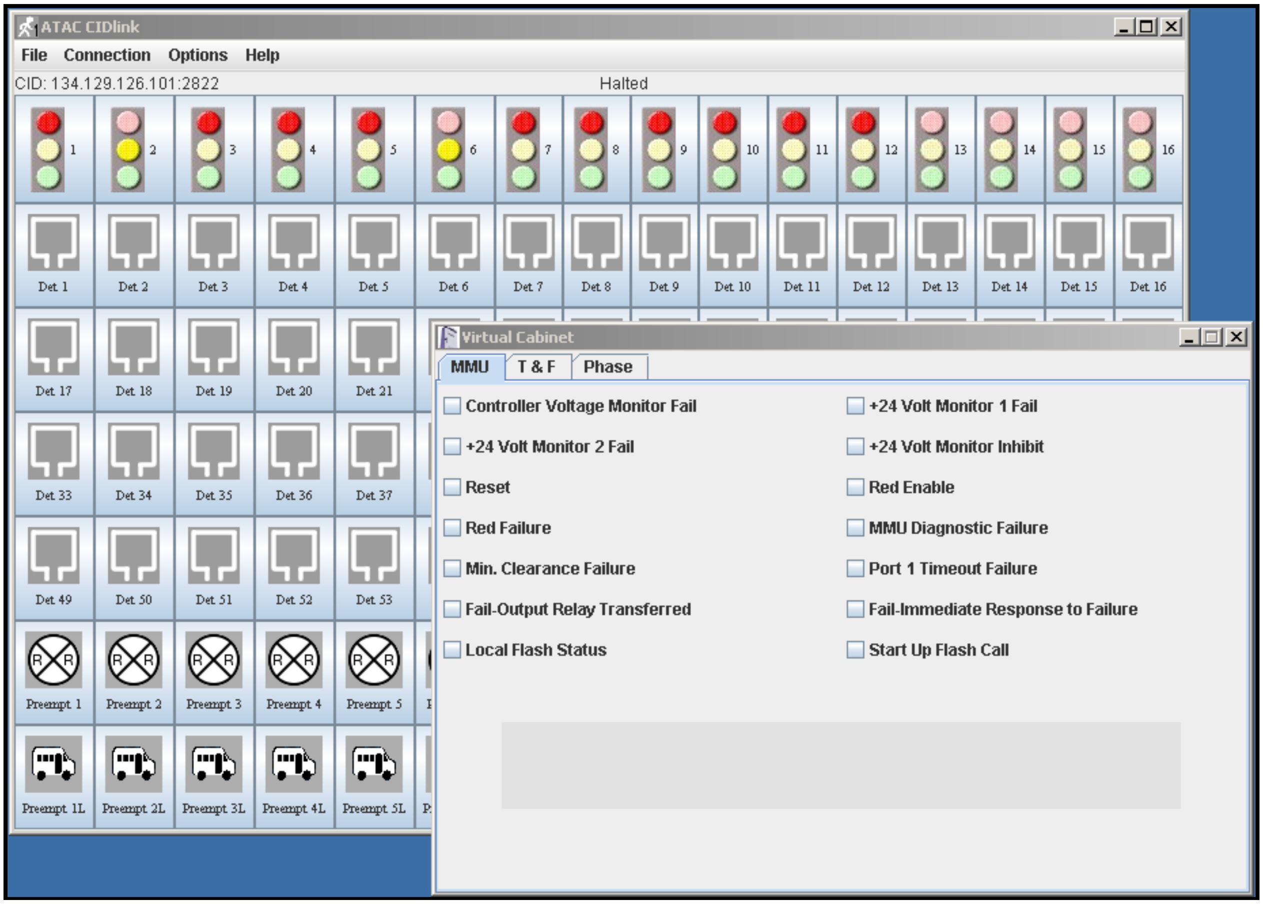

Figure 1.7. CIDlink with Virtual Cabinet Window

If the T & F tab is selected, you will be able to choose functions that duplicate those that would be available with a physical Terminal and Facilities Bus Interface Unit (Figure 1.8).

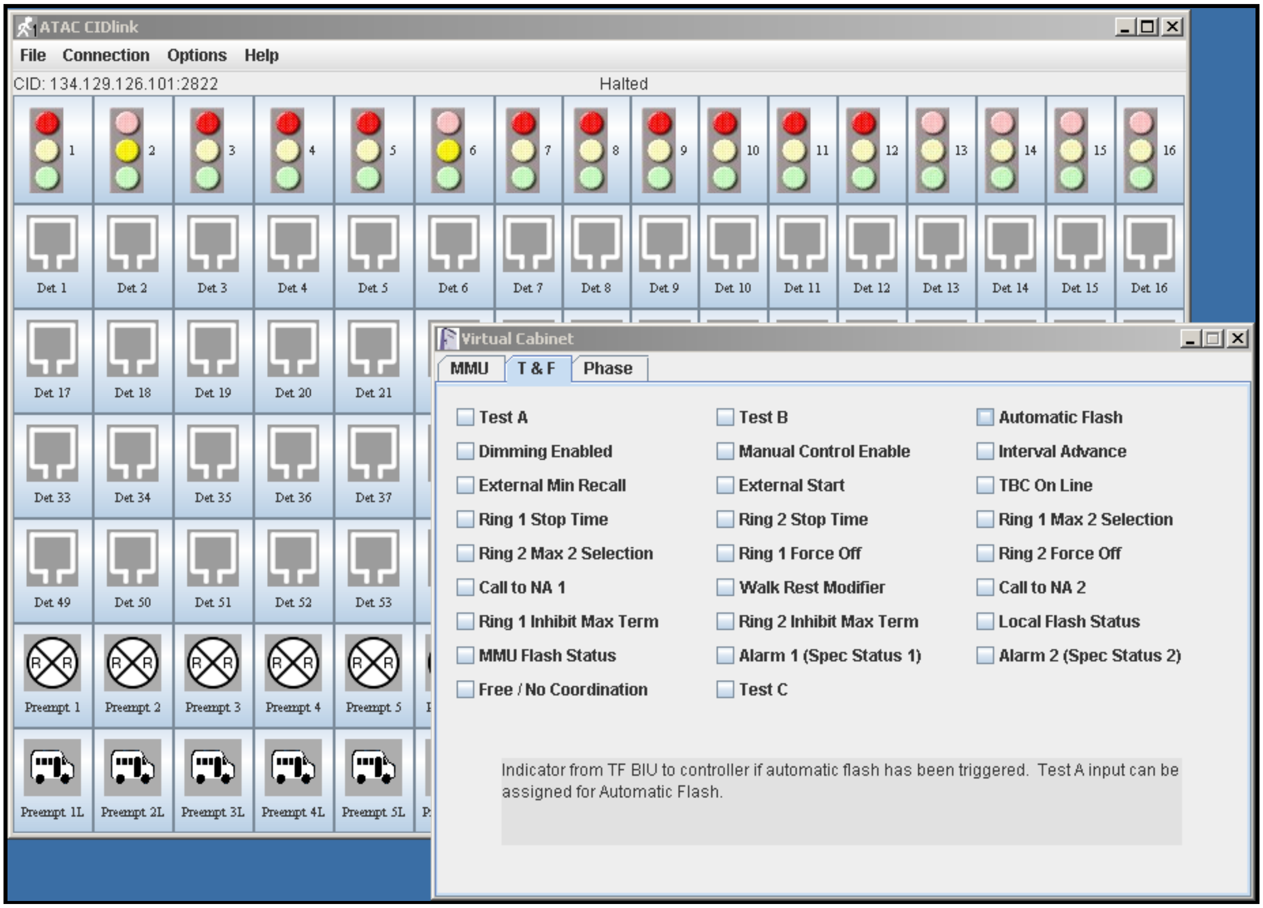

Figure 1.8. Virtual Cabinet T&F Tab

The last tab that may be selected is the “Phase” tab. The top panel of this tab is an indicator of phase information. In the same tab the bottom panel contains hold, omit, and omit pedestrian buttons. These may be selected to make the different calls (Hold, Omit, and Ped. Omit) from the channel column chosen (Figure 1.9).

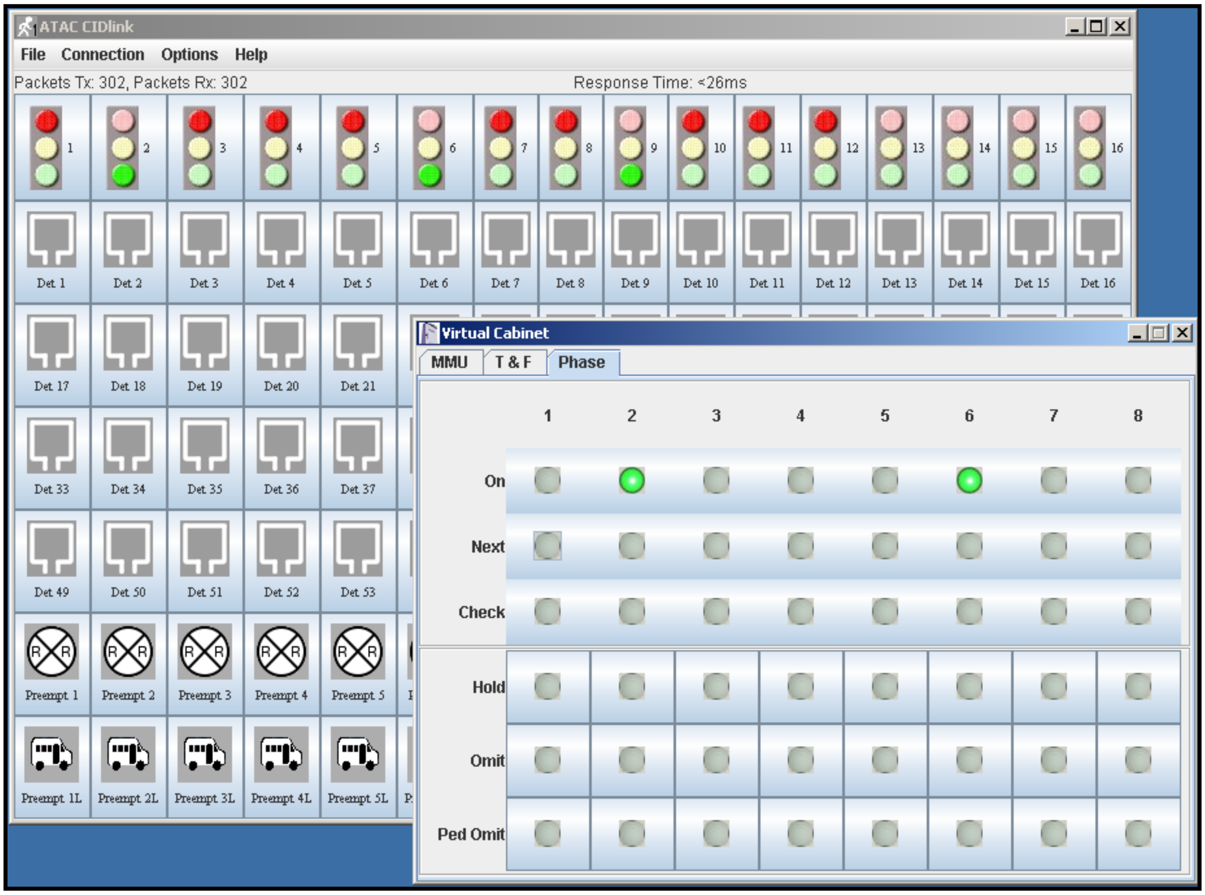

Figure 1.9. Virtual Cabinet Phase Tab

9.0 ATACid Troubleshooting

Problems can arise, especially during the initial setup. The following sections provide information related to the most common issue that may arise.

9.1 Serial Connection Problems

If the ATACid fails to accept serial connections, check the following:

1. Did you wait long enough to let the ATACid boot its software?
2. Are you using a null modem serial cable?
3. Is your COM port working?
4. Do you have the latest version of the software and firmware installed?
5. Did you try restarting the ATACid?

9.2 Ethernet Connection Problems

If the ATACid fails to respond to Ethernet connections, check the following:

1. Are you using a CAT5 Ethernet cable if plugging into a network port?
2. Are you using a CAT5 Ethernet crossover cable if connecting directly to a PC?
3. Did you configure the ATACid's Ethernet settings with SerUpdt?
4. Does the "CIDserv" server show up in the SerUpdt server information window?
5. If the CIDlink isn't starting, do you have a Java runtime 1.4.2 or newer installed?
6. If the CIDlink does start, is the response time well under 1 second?
7. If using a manual IP address, is there a network conflict?
8. Do you have the latest version of the software and firmware installed?
9. Did you try restarting the ATACid?

9.3 JAVA Problems

If the computer does not recognize the .jar file type, check the following:

1. Verify that the program "javaw.exe," located in the Java runtime "bin" directory, is selected to open the file.
2. Right click on the .jar file, select "Properties", and select the "Change" button located in the same row as "Opens with:". Select the "Other" button on the dialog box that opens next, then simply browse to the folder that Java was installed on your computer, and select "javaw.exe" in the "bin" folder. The Java folder is usually installed at the root level of your main drive.

9.4 SDLC Connection Problems

If the ATACid fails to communicate with your traffic controller:

1. Is the SDLC cable plugged in?
2. Is the SDLC cable pinout correct?
3. Did you try powering down the controller until its backup power runs out, then powering it back on (start the ATACid first).
4. Did you try restarting the ATACid?
5. Do you have the latest version of the ATACid firmware installed?
6. Is the controller out of flash mode? If it is in "TS2 DIAG FLSH – NO EXIT" a parameter will have to be changed to pull it out of Flash mode (EPAC controller).

9.5 Simulation Problems

If the simulation fails to connect to the controller:

1. Did you check everything in the “Ethernet Connection Problems” section?
2. Are you running the latest software and firmware?
3. Did you try restarting the ATACid?
4. Is the controller running normally (diagnostic flash causes all phases to be blank in the CIDlink)?
5. Do you have the configuration files set up correctly for each ATACid?

9.6 General Help

If you are experiencing a problem not listed, or the troubleshooting does not help, contact the Advanced Traffic Analysis Center for additional help.

CHAPTER 2
VISSIM – ATACid Interface

This chapter discusses the procedures for using the ATACid to provide hardware-in-the-loop simulation with PTV AG's VISSIM simulation program and a NEMA TS 2 traffic controller. The main emphasis of this information relates to the interface installation and setup. In addition, the key requirements of using the interface with a VISSIM simulation will also be addressed. It is assumed that the user has basic knowledge and experience of the VISSIM simulation model.

1.0 Interface Installation

The VISSIM Interface control files can be automatically or manually installed on a computer. When running the VISSIM Interface setup (…ATACid\VISSIM Interface\Setup), the files must be installed into the appropriate VISSIM\exe directory (e.g., VISSIM500\exe). The interface files can manually be installed by copying the four files (…ATACid\VISSIM Interface\Manual Install) and pasting them into the appropriate VISSIM\exe directory. In addition, the two configuration files (described below in Interface Setup) must be placed in the same directory as the VISSIM simulation files, specifically the network (.inp) file.

2.0 Interface Setup

The simulation interface program has two configuration files associated with it (…ATACid\VISSIM Interface\Files). The file extensions have nothing to do with the content and are only used to satisfy VISSIM. One of these files, the .vap file, is used to map simulation phase numbers with those of the controller. The "TS2.vap" file illustrates a typical setup. Following the keyword for each section ("Signal," "Detector," and "Priority") is the controller's phase number followed by the simulation's phase number (signal group), as shown in Figure 2.1. For example, "Signal 9 102" represents VISSIM's signal group 102 to be associated with the traffic controller's phase 9, which is typically pedestrian phase 2. Sixty four vehicle detectors are available (Detector 1-64) for typical actuated control.

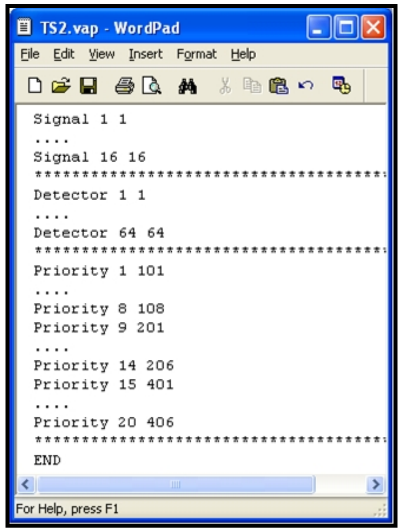

Figure 2.1. VAP Configuration File

Twenty priorities are available to accommodate pedestrians, low priority preemption, and high priority preemption. Priorities 1-8 are used for pedestrian phases, which are mapped to detectors 101-108 (default values). Using the previous signal example, pedestrian phase 2 is called using the detector tied to Priority 2 (102), as shown in Figure 2.2. Priorities 9-14 (detectors 201-206) are used for high priority preemption while priorities 15-20 (detectors 401-406) are used for low priority preemption. For example, high priority preemption 1 is activated by incorporating the detector that is mapped to priority 9 (detector 201). Typically, low and high preemption calls are limited to select vehicle types (which are a detector parameter in VISSIM) to eliminate calls by cars and heavy vehicles.

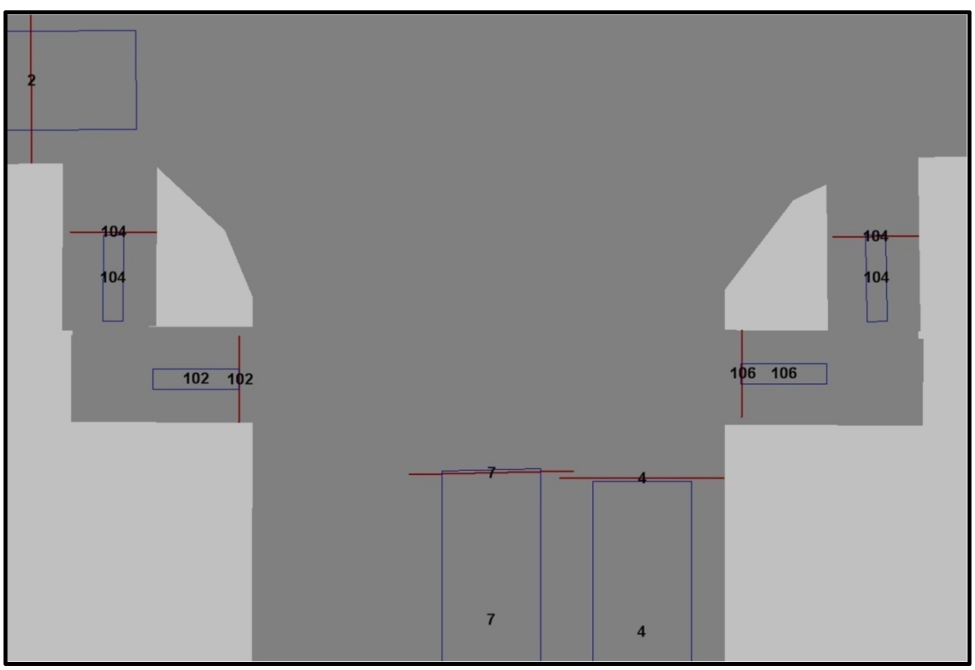

Figure 2.2. Typical Signal Group and Detector Numbering

The second file, named “ATACid_1.pua” contains all the information necessary for the interface program to locate the ATACid on the network and talk to it successfully. A unique .pua file is required for each VISSIM signal controller number (i.e., SC #2 would be “ATACid_2.pua”). This file contains several fields, which are described in detail below (Figure 2.3):

- IP address (field 1): The keyword “IP” is followed by the ATACid’s IP address in dotted form. Setting up the IP address is done using the SerUpdt utility described in Section 9 of Chapter 1.
- Port Number (field 2): The keyword “CIDPORT” is followed by a valid port number. It is recommended that the port number be left at the default 2822.
- Host Port Number (field 3): The keyword “HostPORT” followed by a valid, unique port number. This can be different than the ATACid’s port number, but it is recommended that the default of 2822 is used.   If more than one ATACid is used, each one will require a different port number.
- Synchronization (field 4): The keyword “Sync” is followed by a one or zero. A value of one activates this feature and must be used for at least one of the ATACids in the simulation. The Sync feature tells the CID to wait until the specified time period (set by the frequency) expires before returning the phase data.
- Debug (field 5): The keyword “Debug” is followed by a one or zero. A value of one activates this feature. A log file is created when VISSIM uses the ATACid that contains any errors that occurred during the simulation. When Debug is active, each time step will report the detector and phase states. The log file is located in the simulation folder and is named “ATAC#.log” where # is the controller number. It is overwritten each time the simulation is run.
- Timelog (field 6): The keyword “Timelog” is followed by a one or zero. A value of one activates this feature. This feature outputs the timing of all data transactions during the simulation. The log file is located in the simulation folder and is named “Timelog#.csv” where # is the controller number. It is overwritten each time the simulation is run.
- Frequency (field 7): The keyword “Freq” is followed by the controller frequency (1-10). A value of 10 will cause the ATACid to return signal frames every 100ms.

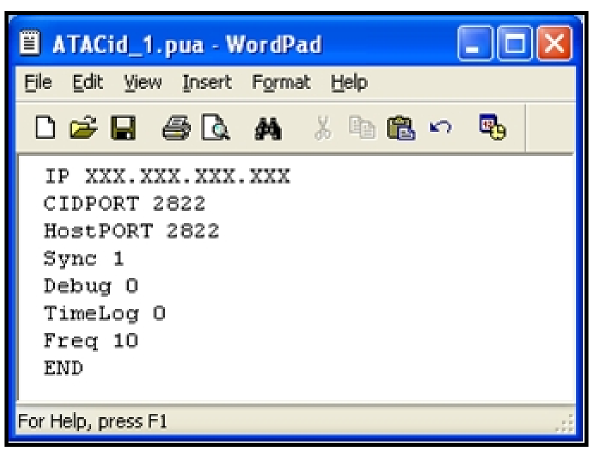

Figure 2.3. PUA Configuration Parameters

3.0 Simulating VISSIM – ATACid Interface

After correctly coding the VISSIM network and interface parameters, the network can be simulated using the following steps (Note: the ATACid must be setup and configured as described in Chapter 1):

1. Open VISSIM and create a new or open an existing .inp file.
2. Go to “Signal Control” menu and choose “Edit Controllers”.
3. Create a new or modify a signal controller to be controlled using the ATACid.
4. In the “Type” drop down box, choose “VAP”.
5. Select the Signal Groups tab and create an entry for each group/phase number used by the controller. The input parameters (e.g., values for minimum green, etc.) for the group will not be used by VISSIM. The parameters entered into the traffic controller will be used during the simulation. Figure 2.4 illustrates the parameters for eight vehicle phases and four pedestrian phases.

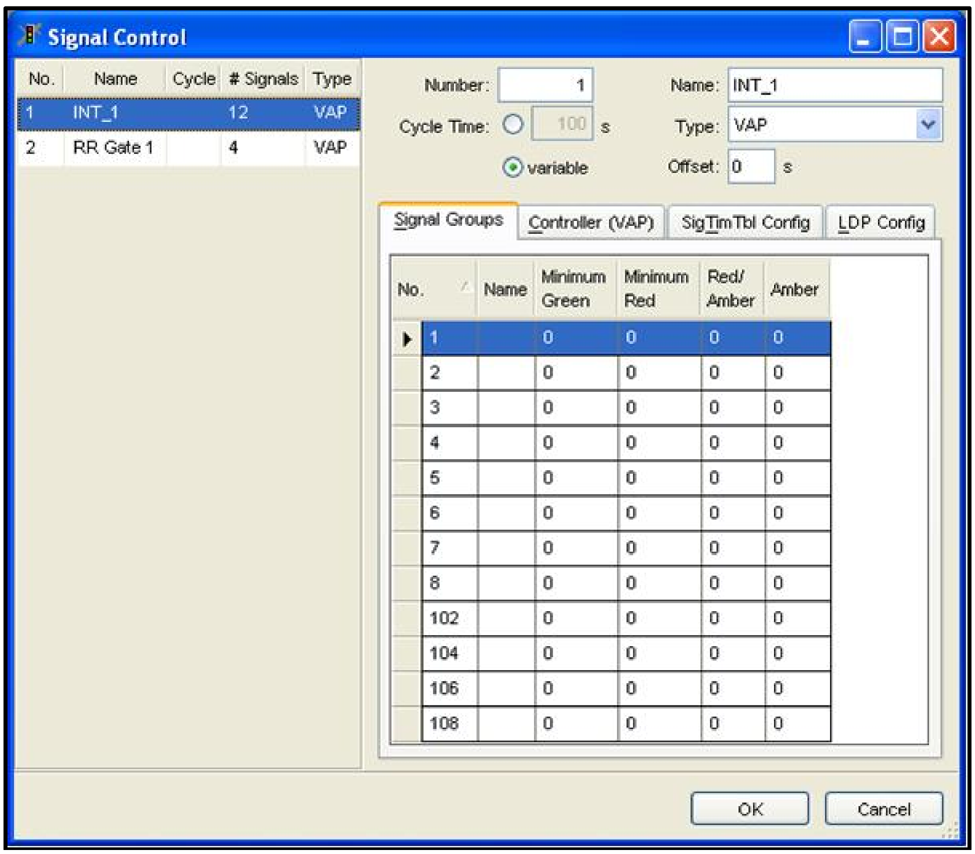

Figure 2.4. Signal Control – Signal Groups Setting Using ATACid

6. Select the Controller (VAP) tab to associate the controller files (Figure 2.5). For the program file, browse to the SC_DLL_#.#.dll file located in VISSIM\exe directory (e.g., VISSIM500\exe).
7. For the Interstages and Logic files, browse to the appropriate .pua and .vap files which must be copied into the same directory as the "INP" file. These files were provided with the ATACid installation and are named ATACid_1.pua and TS2.vap. Each signal controller (SC) must have a unique .pua file (e.g. ATACid_1, ATACid_2, etc, or INT1, INT2, etc,). However, only one .vap file is needed for each VISSIM network.
8. Click "OK".

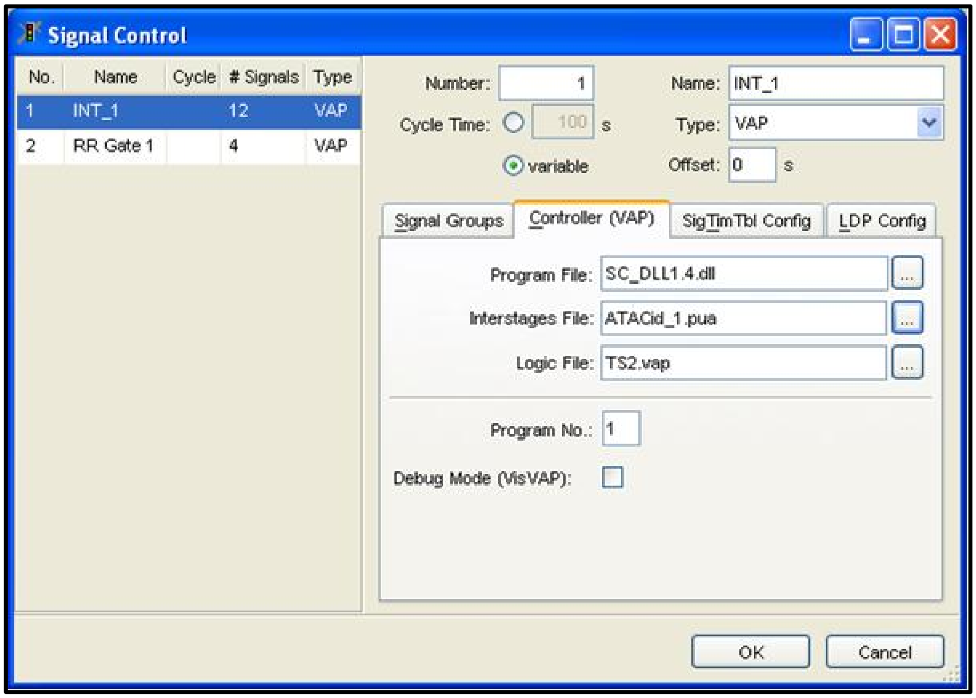

Figure 2.5. Signal Control Parameters for Using ATACid

9. Create/define the appropriate signal heads on the links for the appropriate signal controller and signal groups.
10. Run the simulation at maximum speed (note: VISSIM will pause after each simulation second to stay in real time). In addition, a simulation resolution of 10 time steps per simulation second should be used.

Notes:
Each .pua file must contain the appropriate ATACid IP address, which is different for each device. If more than one ATACid is being used in a simulation, each device must have a unique HostPORT number.

VAP signal controllers with a frequency of 10 can only be used with other VAP and/or Fixed Time signal controllers.

CHAPTER 3
Cube Dynasim – ATACid Interface

This chapter discusses the procedures for using the ATACid to provide real-time hardware-in-the-loop simulation with Citilab's Cube Dynasim simulation program and a NEMA TS 2 traffic controller. The main emphasis of this manual relates to the interface installation and setup. In addition, the key requirements of using the interface with a Dynasim simulation will also be addressed. It is assumed that the user has basic knowledge and experience of the Dynasim simulation model.

To simulate the Dynasim network with the ATACid, several network objects must be named correctly. The naming convention was defined by the Dynasim developers so users must comply with this convention when constructing the simulation network (Table 2.1). If a network already exists, the user can rename the required objects. The intersection controller must be identified as "C{Intersection Index}" where the "{Intersection Index}" is a unique numerical value to the simulation network.

The signal phase for an intersection is referenced to the appropriate phase number of the intersection controller. For example, phase 4 of controller 1 can be named "C1_4_R11_1". If more than one vehicle signal is used for the same signal phase, they can be named with a unique {signal index} name (e.g., C1_41_R11_1 and C1_42_R11_1) or use the same {signal index} name with unique {Physical Index} names (e.g., C1_4_R11_1 and C1_4_R11_2).

The vehicle detectors within the Dynasim network must be identified as "Presence Detectors" and each detector must have a unique detector index. For example, two detectors for phase 4 of controller 1 can be named "C1_41_ADA_1" and "C1_42_ADA_1".

Table 2.1. Dynasim Object Naming Convention

Network Object	Required Name	Object Explanation
Controller	C{Intersection Index}	Intersection controller
Vehicle Signal (VS)	C{Intersection Index}_{Signal Index}_ R11_ {Physical Index}	Signal phase
Presence Detector	C{Intersection Index}_{Detector Index}_ ADA_1	Vehicle detector

1.0 Interface Installation

The graphical user interface (GUI) for the Dynasim Interface was programmed using JAVA. Therefore, the user must have a Java runtime environment (Java 2, Standard Edition) installed on the computer (for more information, refer to Page 3, Section 3.0 Software Installation).

The “DynasimInterface.jar” file (…ATACid\\DynaSim Interface) serves as the application for providing the setup and communication between Dynasim and the traffic controller. The .jar (Java Archive) file contains the required application files and serves as the main executable file for the user. Create a folder/directory for storing the application and project files. Once this is done, move or copy the “DynsimInterface.jar” file into this folder. When using (double left-click) the interface for the first time, you will receive a dialog box (Figure 3.1) stating that files were extracted and that you must close the dialog box and restart the interface again. Four files should have been extracted into the folder, which include DynasimDLL.dll, Properties16.gif, Server_CAPI.dll, and Version.rtf. These files are required for the interface to work properly.

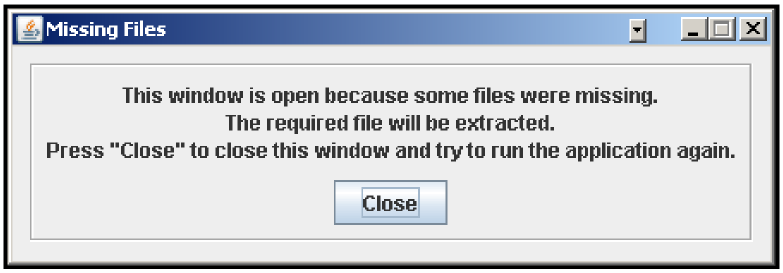

Figure 3.1. Initial Dialog Box from the DynasimInterface.jar File

2.0 Interface Setup

Setting up the Dynasim Interface requires the user to map the vehicle detectors to the appropriate signal phases for each simulation scenario. The settings for an interface project can be saved and used for other simulation scenarios. Once a Dynasim Interface project has been created, "Projects" and "Cids" subdirectories are created within the directory containing the .jar file. A .cdp file containing the project configuration parameters is created in the "Projects" subdirectory, while a .cid file containing ATACid configuration parameters is created in the Cids subdirectory.

To set up a simulation scenario with the interface, open the "DynasimInterface.jar" file. A window/desktop entitled "Dynasim – ATACid Interface" should appear (Figure 3.2). Three menus are available: File, Edit, and About, as well as three tabs: Project, Project Settings, and Simulation.

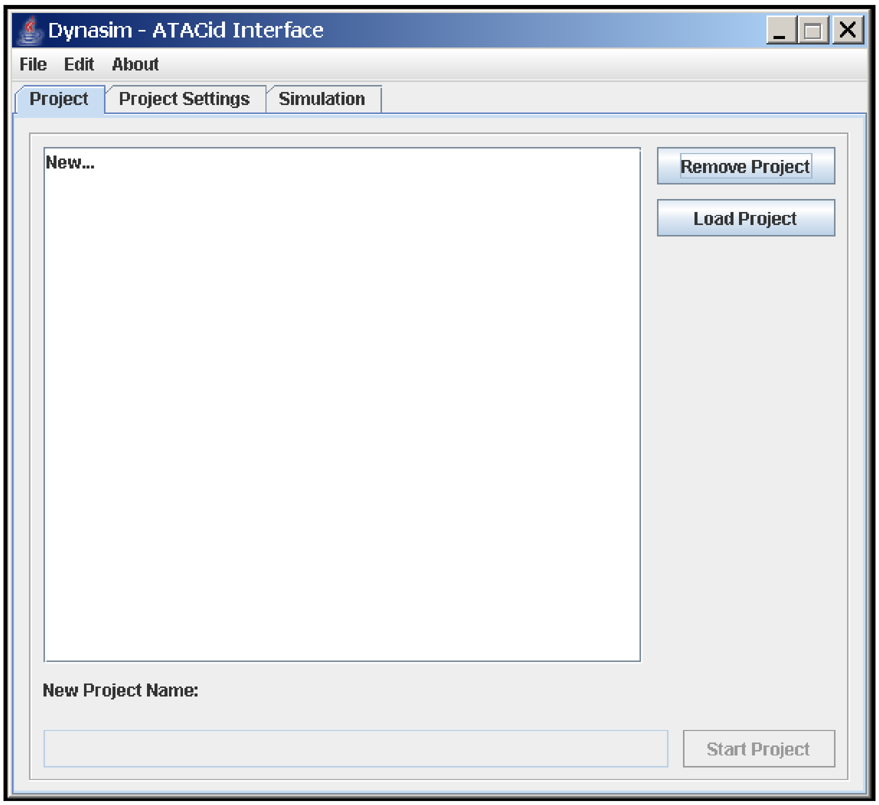

Figure 3.2. DynasimInterface main menu

2.1 File Menu

This menu allows an interface project to be created or opened. When creating a new project, a "New Project" dialog box will open and a valid file name must be entered. When opening a project, an "Open" File dialog will open the "Project" folder of the base folder of the application. This will only show Dynasim Interface project files and the appropriate project can be selected.

In addition, the most recent projects are shown. This list is stored in the DynasimInterface.ini file. If the project is deleted outside of the application it will not show up on the list.

An "Exit" command is also available. This button runs some functions such as saving the preferences and should be used to exit the application. The “X” button on the top right corner of the window is functionally linked to this “Exit” command so this is another method of closing the application.

2.2 Edit Menu

Under this pull-down menu, a command named “Preferences” is used to edit the preferences of the interface application. A dialog box will open with an option to set the default simulation directory, such as C:\Documents and Settings\{User}\edyna. Both the “Project” and “Project Settings” tabs are set to open to this simulation directory. Once the path to the simulation directory has been specified using the “Open” button, selecting the “OK” and “Apply” buttons will save these preferences. The preferences are saved in CidInterface.ini file.

2.3 About Menu

This menu contains a command labeled “Version”. When selected, a window will open showing the version history as well as a link to the ATAC website. The version history gets all information from Version.rtf file.

2.4 Project Tab

The Project tab is shown on the main menu for the interface program. To create a project, select “New…” and enter the appropriate project name in the space provided under the New Project Name: heading. An example project called “Test” is provided in Figure 3.3. Once the project is given a name, select (left mouse click) the Start Project button. This activates the Project Settings tab for the application. Once a project is started, a folder entitled Projects is created within the interface folder and a .cdp file is created for storing the interface project information and settings. Subsequent project files will also be created in the Projects folder.

After a project file has been created, the Remove Project and Load Project buttons become active. The Remove Project button is for deleting a project that is no longer needed. This function will only remove the .cdp file from the Projects folder. The “Load Project” button is used to open a previously saved project file.

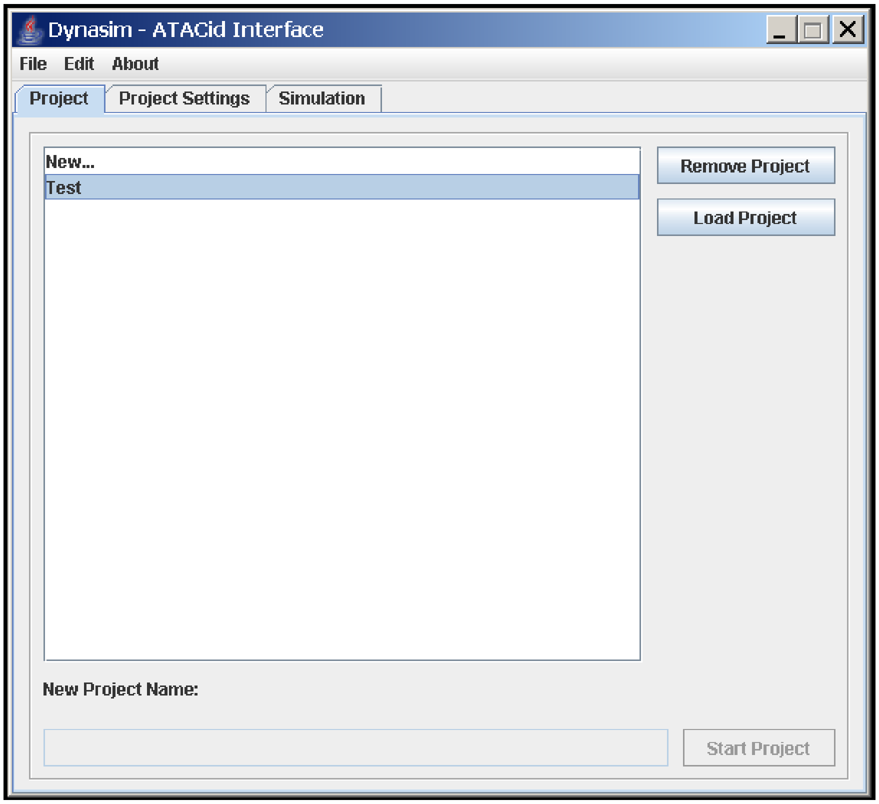

Figure 3.3. Starting a new project

2.5 Project Settings

The Project Settings tab provides the core interface setup components which include CID, Controllers, and Scenario data (Figure 3.4). A "Save" button is located within each of the three components to save the data within each respective component. The "Save Project" button saves all of the information of the interface project, which includes the component data.

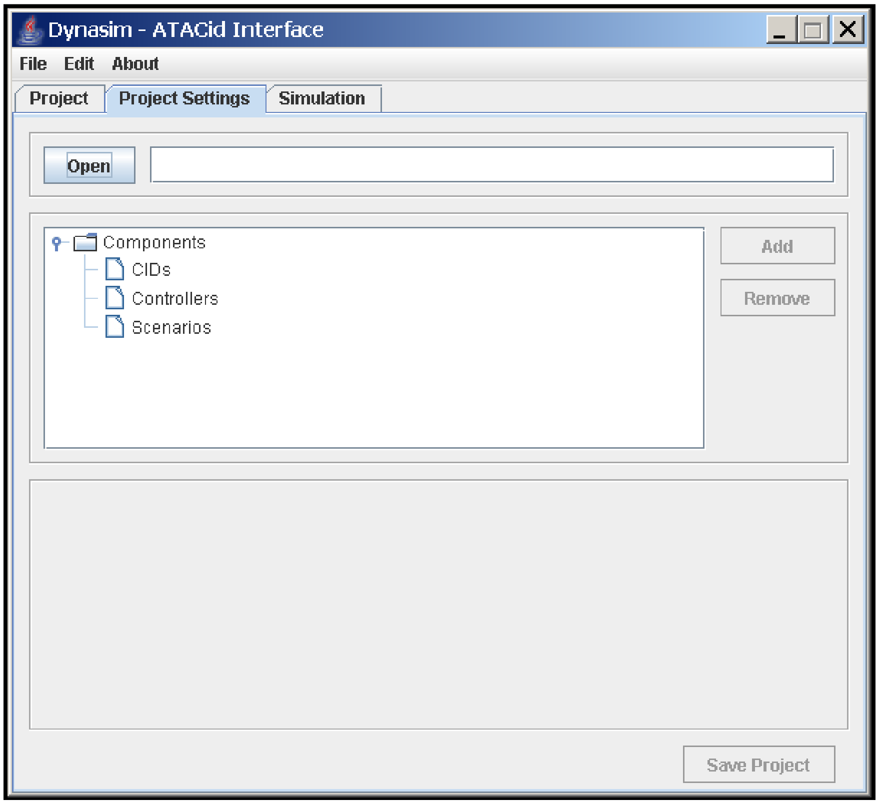

Figure 3.4. Project Settings Tab

Select the "Open" button and browse to the Dynasim simulation project folder (C:\Documents and Settings\{User}\edyna \{project title}), which is the same name as the study name identified in Dynasim's "Project Management" window. This step reads all of the simulation information related to the detectors, signal phases, and scenarios into the interface. The following sections relates to entering the data for the three interface components.

2.5.1 ATACid Setup

From the Project Settings tab, highlight the CIDs component and select the "Add" button. A dialog box will pop up requesting the CID name, which can be alpha/numeric. Once the CID is named, it will appear under the CIDs components (extend the tree by double left clicking on CIDs or single left click on the symbol to the left of the CIDs text. Activate the CID parameters by selecting the CID name (Figure 3.5). Enter the IP address for the ATACid (For assistance, note Section 6 of Chapter 1). Enter the default port number of 2822 (any valid port number is allowed). Enter a valid and unique host port number (each CID must have a unique host port number).

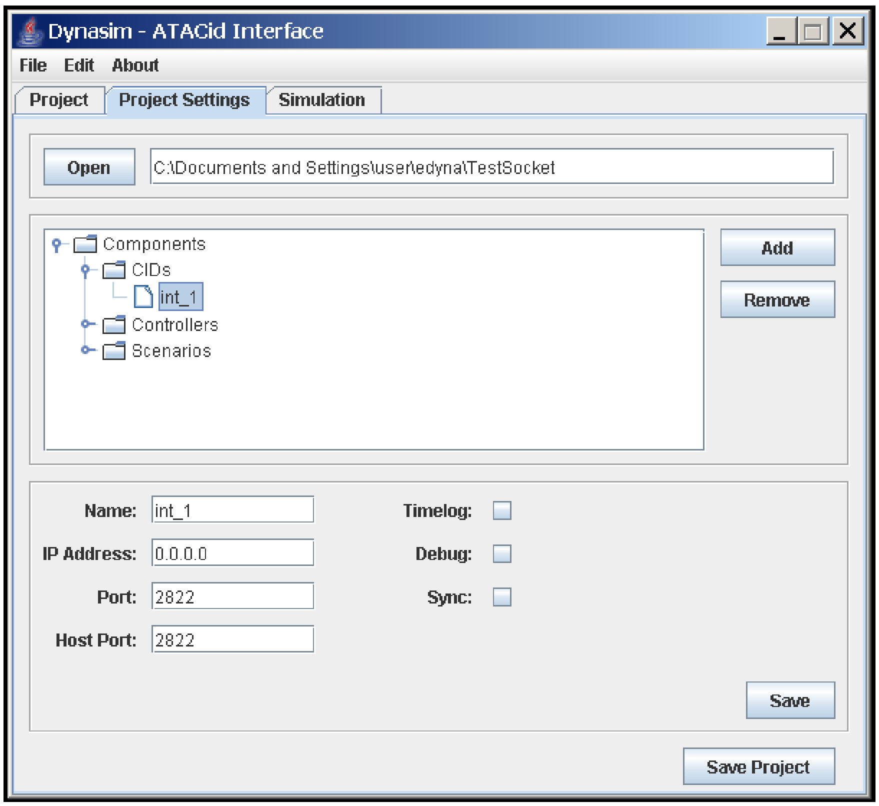

Figure 3.5. ATACid Parameters

The "Sync" feature tells the ATACid to wait until the specified time period (set by the frequency) expires before returning the phase data. This feature must be selected (checked) for at least one of the ATACids in the simulation.

Every interface simulation generates a .log file. This file contains information related to interface setup, completed time steps, and any errors that may have occurred during the simulation run. The file's naming convention contains the signal controller number, date of simulation, and time of simulation, with the following format: C{Intersection Index}_{6-digit date (month, day, and year)}_{6-digit start time (hour, minute, and second)}.

The "Debug" feature is allows the user to obtain more detailed simulation information within the .log file, specifically related to the time step information. When Debug is active, each time step will report all of the detector and phase states. The .log file will be created in the directory containing the Dynasim Interface application.

The “Timelog” feature outputs the timing of all data transactions during the simulation. Timelog follows the same naming convention as the general and Debug log files with the exception of having a .csv file extension. This file will also be generated in the directory containing the Dynasim Interface application. Since both the “Debug” and “Timelog” files always create a unique file for each interface simulation run, it is recommended to periodically delete these files.

2.5.2 Controller Setup

The controller setup associates the Dynasim signal controller to the ATACid, as well as the Dynasim vehicle detectors to the controller phases. Expand the Controller component tree to view the available controllers which were read from the Dynasim project folder (Figure 3.6). Select the controller name followed by the Set CID button. Enter the corresponding CID name, which was defined in the “ATACid Setup” section.

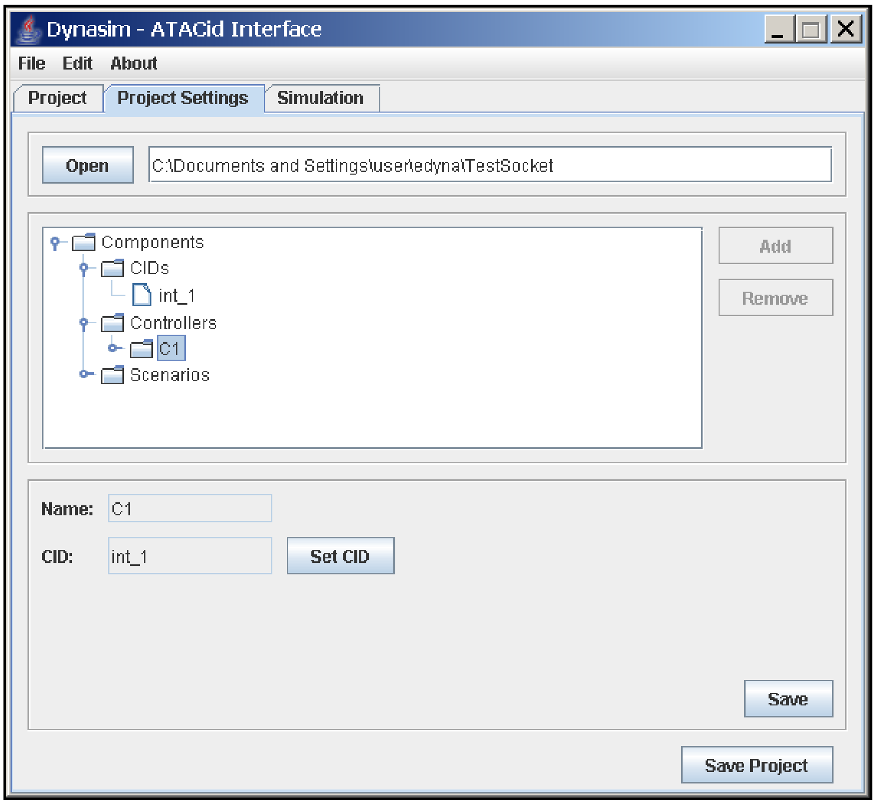

Figure 3.6. Associating a Dynasim Controller to an ATACid

Once the ATACid (int_1) is associated to a Dynasim controller “C1”, the phase and detector mapping between the two devices must occur. Expand the tree under C1 to illustrate the Special, Signals, and Detector attributes. The “Signal” group allows users to associate a signal controller phase (1-16) to the appropriate signal phase within the Dynasim network. It should be noted that the Dynasim phase must be identified as a Vehicle Signal.

To map the signal information, select the signal controller number under the Components text located in the bottom left side of the interface. The available Dynasim signal phases are illustrated in bottom middle of the interface screen. Select the appropriate phase and select “>>” (or double left click on the appropriate phase) to move it to the window on the bottom right side of the interface. A Dynasim phase can only be associated to one signal controller phase.

Once data has been added to a signal controller phase, a check mark is added in front of the phase number. Associate all of the Dynasim phases to the appropriate signal controller phase. Figure 3.7 illustrates associating Dynasim phase "C1_1_R11_1" to signal controller phase 1.

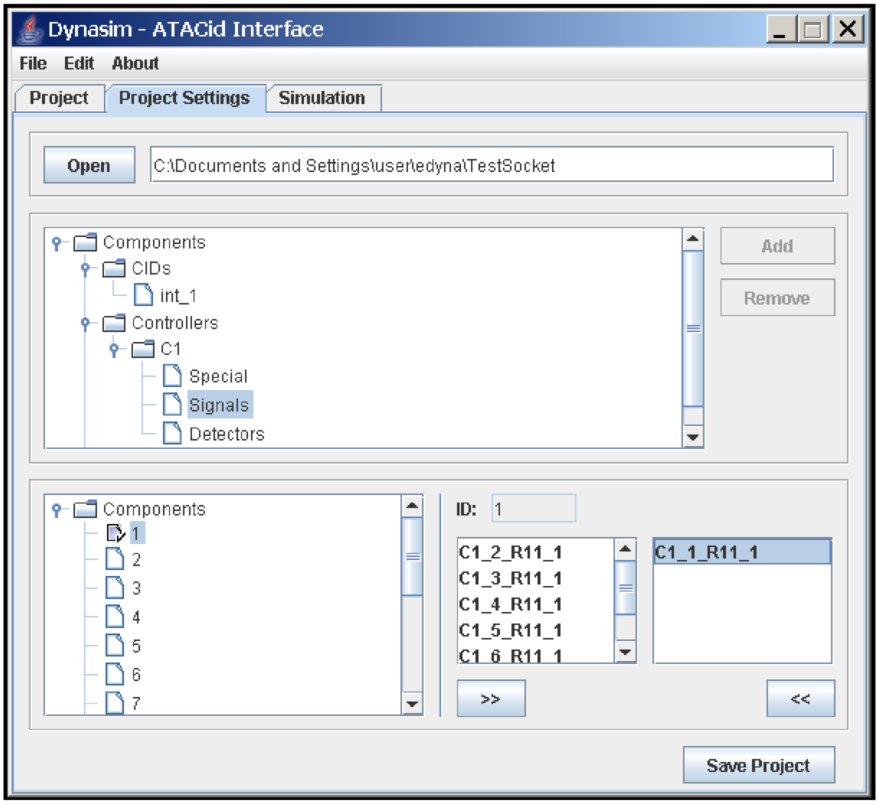

Figure 3.7. Associating Signal Phase Information

After the phases have been mapped, the user must map the detector components. The detector group allows users to associate the Dynasim detectors to the signal controller detector inputs (1-64). Select (left mouse click) the Detector component to illustrate the detectors located on the bottom portion of the screen. The bottom left window shows the available signal controller detector inputs. The available Dynasim detectors are illustrated in the bottom middle of the interface screen. Select the appropriate detector and select ">>" (or double left click on the appropriate phase) to move it to the window on the bottom right side of the interface. Several Dynasim detectors can be associated to a signal controller detector number.

Once data has been added to a signal controller detector, a check mark is added in front of the detector number. Associate all of the Dynasim detectors to the appropriate signal controller detectors. Figure 3.8 illustrates associating Dynasim detector "C1_1_ADA_1" to signal controller detector 1.

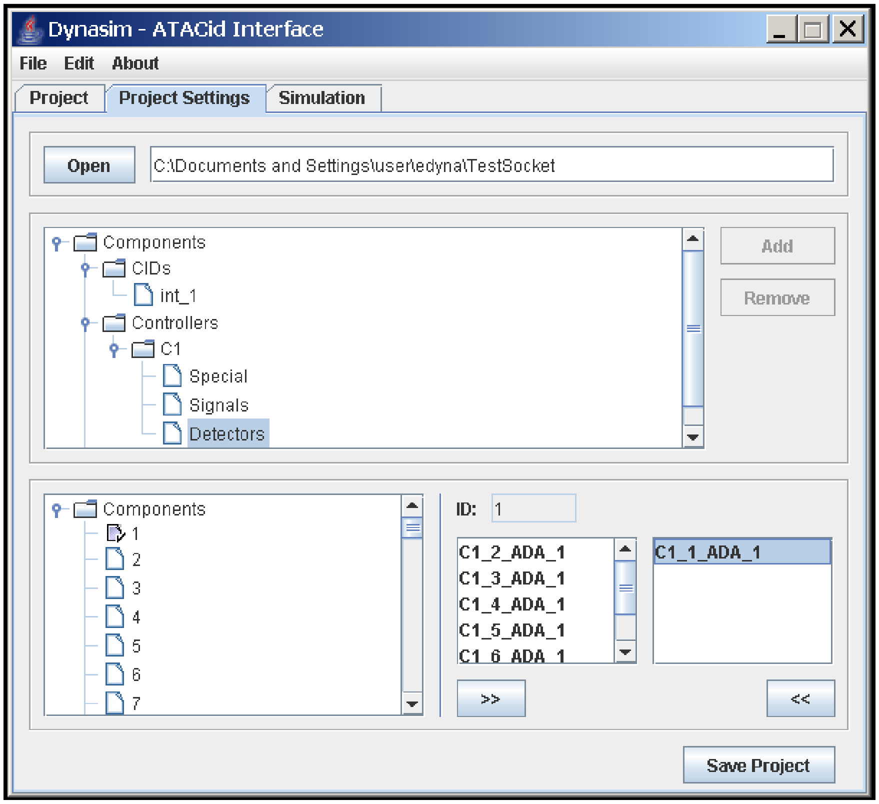

Figure 3.8. Associating Detector Information

The “Special” group behaves as a unique type of detector to simulate preempts, low priority, and pedestrian detector calls (note: pedestrian data is currently not provided by Dynasim). Users can associate up to six preempts and low priority detectors per intersection. To map the special detectors, follow the same procedures as described in the previous section. To simulate a “Special” group detector, the user must setup up a presence detector condition that will only place a call for a certain vehicle category, such as an emergency vehicle, bus, train, etc. Figure 3.9 illustrates associating Dynasim special detector “C1_2_ADA_1” to signal controller detector 1.

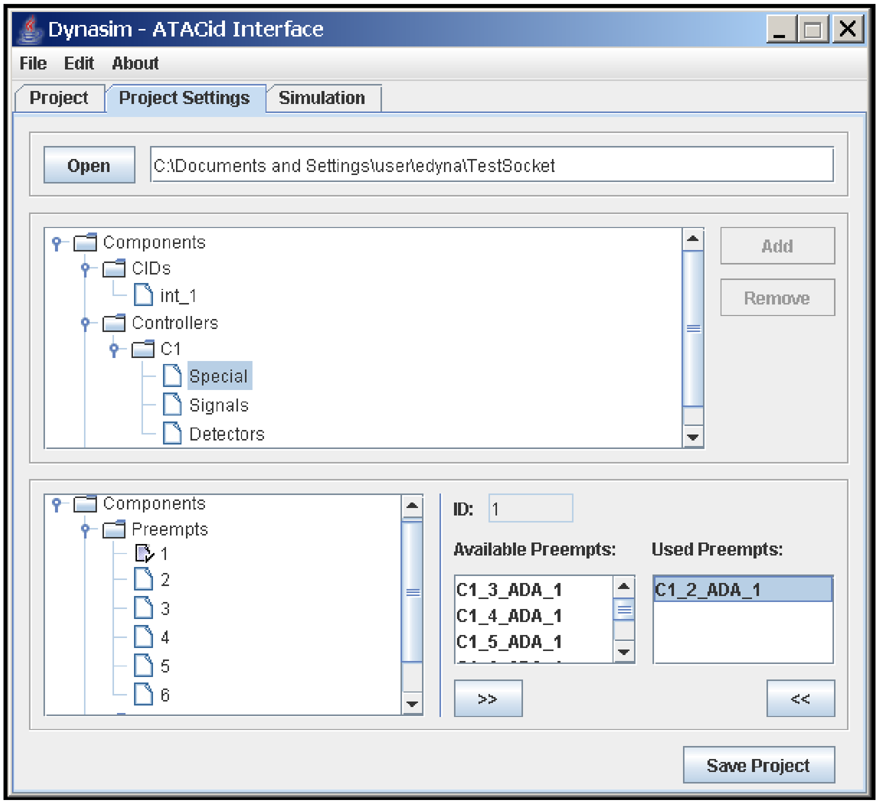

Figure 3.9. Associating Special Detector Information

2.5.3 Scenario Information

The third component of the project settings relates to the Dynasim scenarios. Extend the scenario tree to observe the scenarios that have been created within the Dynasim network. The information shown for the scenarios is related to the "Signals" module parameters acquired from the Dynasim network. The parameters shown in Figure 3.10 are recommended for use.

The IP address required for this component refers to the Dynasim communication server, which provides communication between Dynasim and the Dynasim Interface. An IP address of "127.0.0.1" means the communication server is located on the localhost (this computer). If the communication server was located on a different computer, the IP address of the appropriated computer would entered in this field within the "Signals" module. Therefore, the Dynasim Interface running the communication server does not have to be installed on the computer running the Dynasim program.

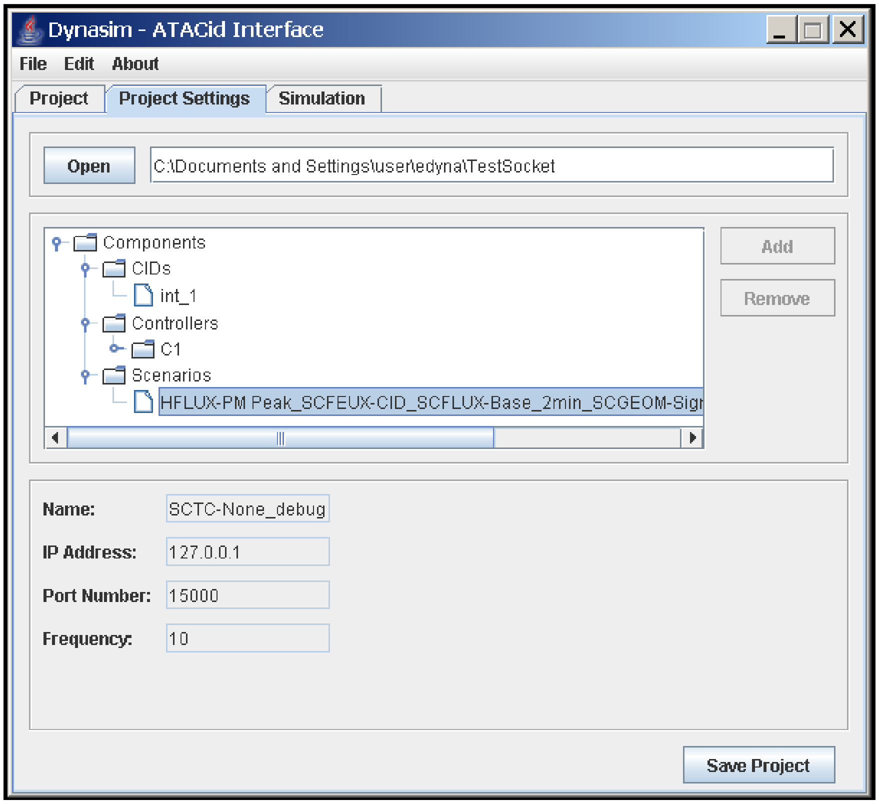

Figure 3.10. Scenarios Component Parameters

3.0 Simulating Dynasim – ATACid Interface

Performing the tasks within the "Simulation" tab is the third and final major step for setting up the Dynasim Interface. After correctly coding the Dynasim network and interface parameters, the network can be simulated using the following steps:

1. The Dynasim controller to be simulated with the ATACid must be configured as a "Socket" type of controller (located under the "Signals" module). The recommended parameters for the HILS operation are illustrated in Figure 3.11. The IP address of "127.0.0.1" means that the localhost will be running the communication server. The port number must be a computer port not currently used/restricted by the computer (15000 should be a safe bet). The communication interval defines the frequency at which Dynasim and the ATACid will communicate (1-10 times per second).

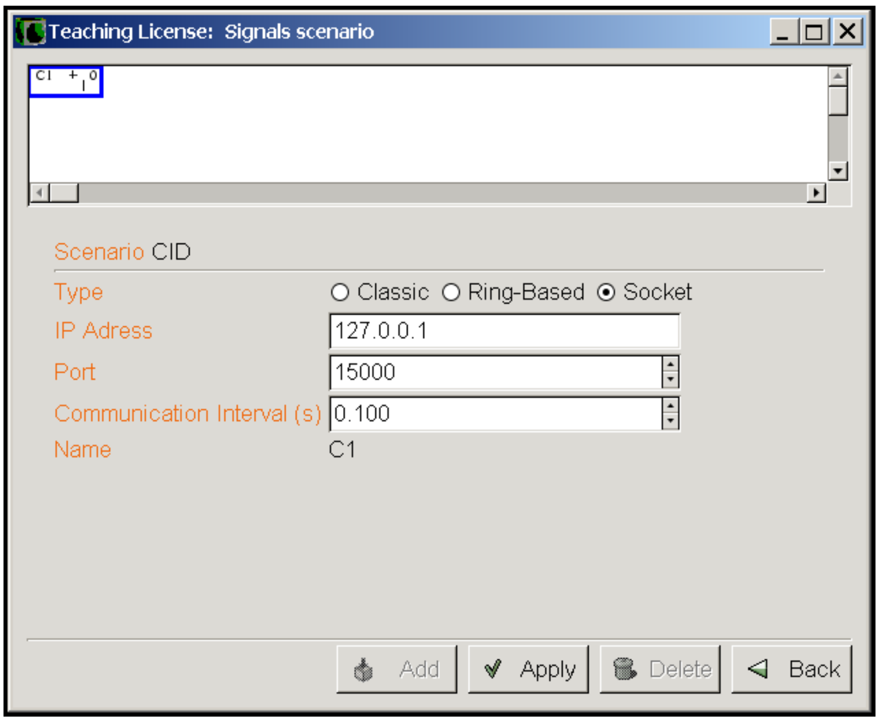

Figure 3.11. Signal Controller Parameters for Dynasim - ATACid Operation

2. Ensure that the Dynasim "Controller", "Vehicle Signal", and Presence Detector" objects have been properly named and referenced (note page 1).
3. Select the "Start Server" button to initialize the Dynasim Server that will provide the communication between the Dynasim simulation and the ATACid.
4. Open the simulation network to be used with the ATACid and go to "Simulation Management".
5. Select the appropriate Dynasim simulation scenario and select the "Set Simulation" button.
6. Go back to Dynasim, highlight the same simulation scenario, and select the Simulation button. The user can simulate a single run or multiple simulation runs. Once the simulation is started, the simulation time clock (status) should be moving.
7. Go back to the Dynasim Interface and select the "Start Simulation" button, which will provide the simulation time steps and the status in terms of percent completion (note

Figure 3.12). A simulation of 3,600 seconds using a frequency of 10 (communication interval of 0.1 sec) will simulate 36,000 time steps.

8. Once the status reaches 100% the simulation run is complete. This can be verified by observing the status within the Dynasim simulation scenario were the circle that illustrated the moving clock will display a green circle.

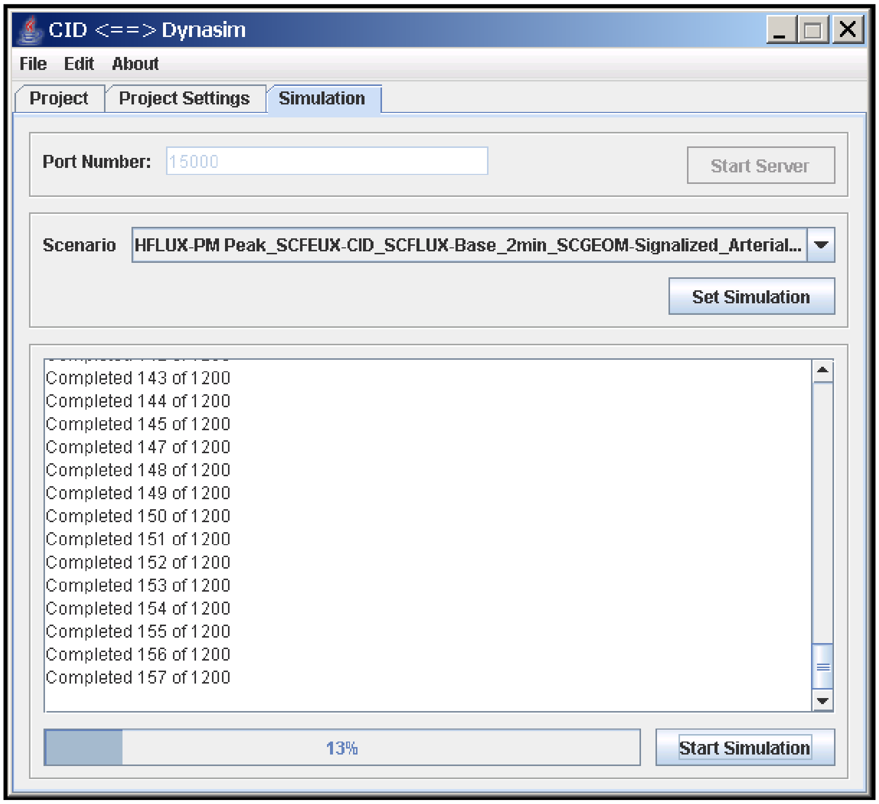

Figure 3.12. Simulation parameters

The user can now view the animation and numerical data from Dynasim. The interface can be closed at this time or another simulation run can be performed.

CHAPTER 4
CORSIM – ATACid Interface

This chapter gives an overview of procedures for using the ATACid to provide hardware-in-the-loop simulation with the CORSIM/TSIS simulation program and a NEMA TS2 traffic controller. The main emphasis of this information relates to the interface installation and setup. In addition, the key requirements of using the interface with a CORSIM simulation will also be addressed. It is assumed that the user has a basic knowledge and experience of the CORSIM simulation model and creating networks within TRAFED/TSIS.

1.0 Interface Installation

The graphical user interface (GUI) for the CORSIM Interface was programmed using JAVA. Therefore, the user must have a Java runtime environment (Java 2, Standard Edition) installed on the computer (for more information, refer to Page 3, Section 3.0 Software Installation).

To begin the installation, run the "CORSIMInterface.msi" (…ATACid\\CORSIM Interface). The installer will guide through the installation process and allow the user to choose the installation folder, and then install the ATACid_RTE.dll file to that location. The .dll file allows TSIS to communicate with the ATACid while running a simulation.

The "CORSIMInterface.jar" file (…ATACid\\CORSIM Interface) serves as the application for providing the setup and communication between CORSIM and the traffic controller. The .jar (Java Archive) file contains the required application files and serves as the main executable file for the user. Move or copy the CORSIMInterface.jar file into the simulation project folder. When using (double left-click) the interface for the first time, two files will automatically be extracted into the folder, Properties16.gif, and Version.rtf.

2.0 Interface Setup

The interface setup has two main steps: the CORSIM/TSIS network creation, and CORSIM Interface setup. The following sections will discuss the specific steps for conducting TSIS/ATACid simulations.

2.1 TSIS Network Setup

Internal actuated control within TSIS uses detectors created at the node. However, using run-time extensions (RTEs), such as the ATACid, requires using detectors on the surface links. When creating these detectors, two settings are critical for the simulation to work properly. First, the detectors must to set to "Presence" by selecting the Operation Code "Presence" (Figure 4.1). Second, name the Detector Station ID values correctly in accordance to the proper traffic control detector (1-100 are available for normal vehicle detectors).

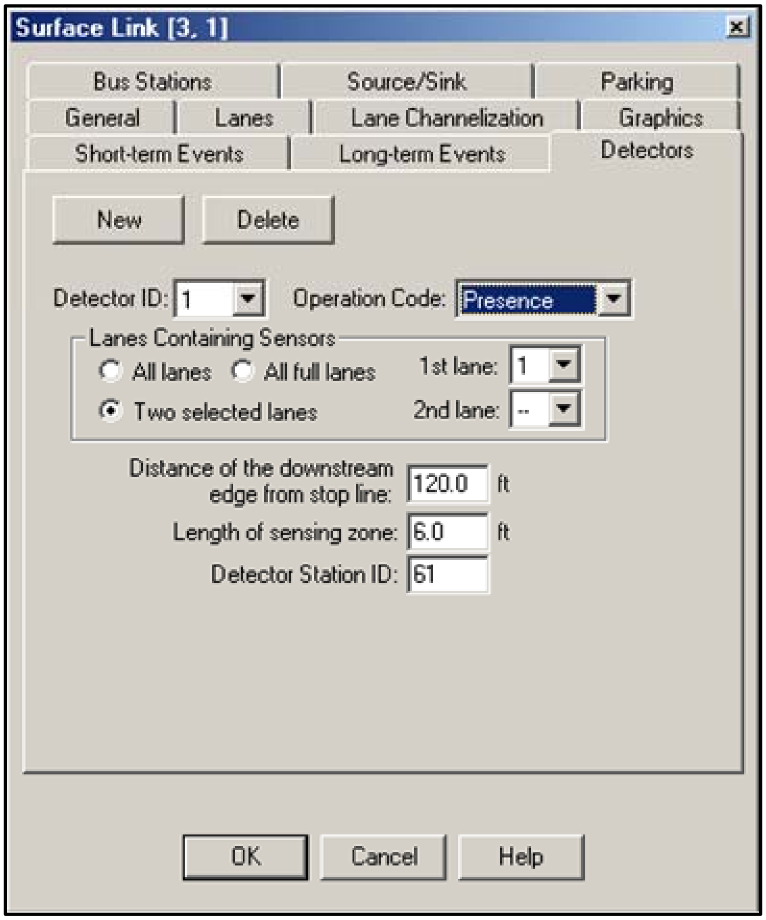

Figure 4.1. Detector Parameters for Surface Links (TRAFED)

Once the surface link detectors have been created for the links approaching the intersection, the intersection (node) control must be set up. The intersection control (node) must then be set to "Actuated" and then "External" by selecting the control node (double left click) to bring up the "Intersection Properties" menu. Select the "Control" tab, select "Actuated" from the drop-down menu, then select "Properties" and check the box labeled "Under External Control" (Figure 4.2). All of the other fields in "Properties" can be left to their default values (these values are not used). Save the .tno file and create the.trf file.

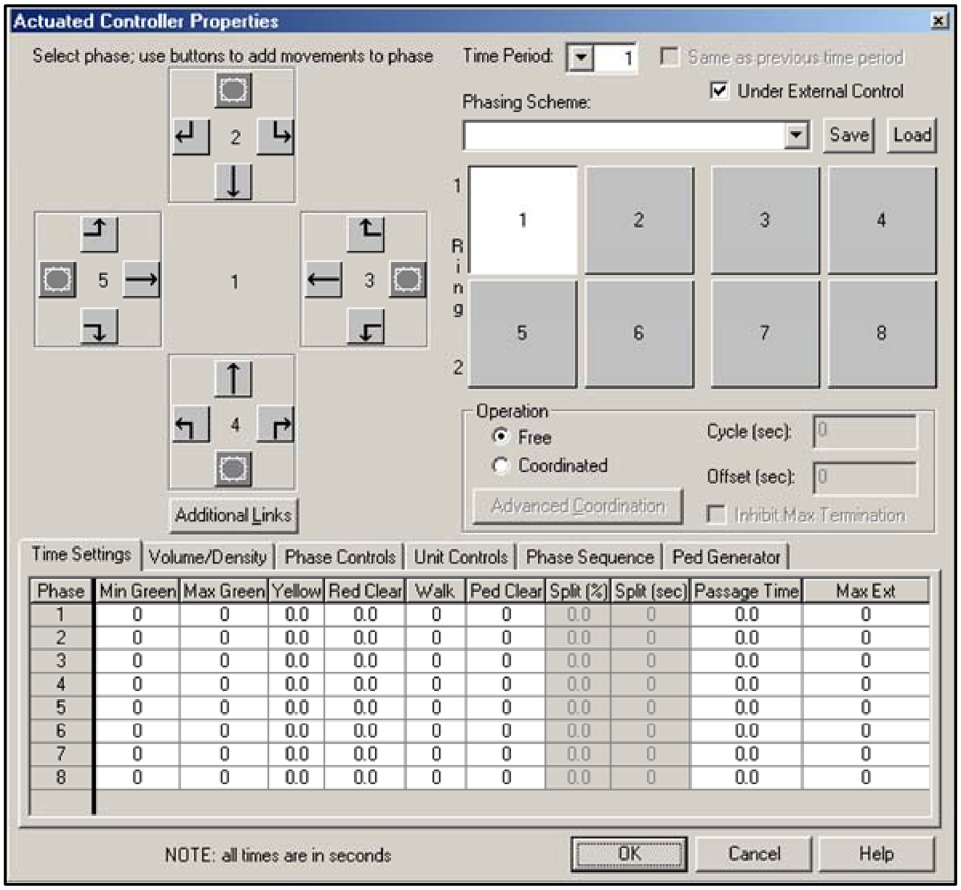

Figure 4.2. Actuated Controller Properties Using ATACid (TRAFED)

2.1.1 Preemption Setup

Both high priority preemption (e.g., emergency vehicles) and low priority preemption (e.g., transit vehicles) can be incorporated with the ATACid RTE. The Detector Station ID numbers must be set for this, as well as the appropriate vehicle type to place the preemption call.

The Detector Station ID (note Section 2.1) is the number that is used to identify the appropriate preemption input to the traffic controller. As previously discussed, Detector Station ID values 1-100 are for normal vehicle detectors. High priority preemption and low priority preemption use Detector Station ID numbers 101-106 and 201-206, respectively. The third digit of the Detector Station ID equates to the priority preemption number. For example, Detector Station ID number 101 is associated to high priority preemption 1, while Detector Station ID number 102 is associated to high priority preemption 2.

TSIS must be set up to generate the right vehicle type to place preemption call. A few methods are available to accomplish this task. The first and easiest method is to change the volume of truck and carpool vehicles that are generated. To change modify this data, double left click on the appropriate entry node of the network, which should cause the “Entry Properties” window to appear. Under “Vehicle Types (other than passenger cars)” field, two options are available: Trucks and Carpools. If both of these options already contain data, this method of placing a preemption call should not be used. If one or both of these options are not used in the simulation (e.g., 0%), place the appropriate percentage of vehicles that should place a preemption call. A potential drawback to this method is that the vehicles preempting the traffic controller will be randomly generated within the given time period.

The second method of generated vehicles for placing preemption calls is to add a bus route to the network. From TRAFED, select Network, Bus Routes…, Add new route…, and create the desired path nodes for the appropriate time period(s). Enter the desired Mean Headway value between buses and the Offset value, which is based on the start time of the simulation including the initialization time.

The vehicle type information can be modified to reflect the vehicle characteristics of the emergency vehicle. Under the Network Properties menu, select the Vehicle Types tab. The user can modify the vehicle properties of one or more vehicle types. It must be noted that the percentage of each vehicle type must equal 100. By default, vehicle type "FRESIM 6 – NETSIM 8" (Vehicle Type 6) contains 50% of the transit vehicle and "FRESIM 7 – NETSIM 4" (Vehicle Type 7). To force a transit vehicle to be generated from only one vehicle type, have one vehicle type equal 100 while making the remaining vehicle types have a value of 0 for transit vehicles. For example, change Vehicle Type 7 to have 100% of the transit vehicles and Vehicle Type 6 to have 0% of the transit vehicles. The detector(s) used for preemption can then be set up in the CORSIM Interface to only recognize transit vehicles (which will be discussed in section 2.2.3 Detectors tab).

2.1.2 TSIS Run-Time Extension Setup

TSIS requires a run-time extension (.dll file) to correctly interface with the ATACid. It should be noted that the RTE only needs to be set up once on each computer. To set up this tool in TRAFED/TSIS, select "Tools" on the main menu and "Tool Configuration" to bring up the list of tools available in TSIS. Under the Tool Set Configuration tab, select "Add" to begin the tool setup process. The "Path" field should be set to the "TSIS CORSIMDriver.dll" file (Figure 4.3). Click the top "…" button to browse for this file, which is located by default in the same folder as TSIS. Next, name the tool "ATACid Sim" in the "Name" and "Tool Tip String" fields. Choose Simulation as the category for the tool, and set the "Associated Extensions" field to ".trf". For the Toolbar Button field, click the bottom "…" button to select a picture in TSIS to use for this tool. In this example, the bitmap used is "bluecar.bmp", but this does not affect the simulation. Click "Next" to move to the next part of the configuration.

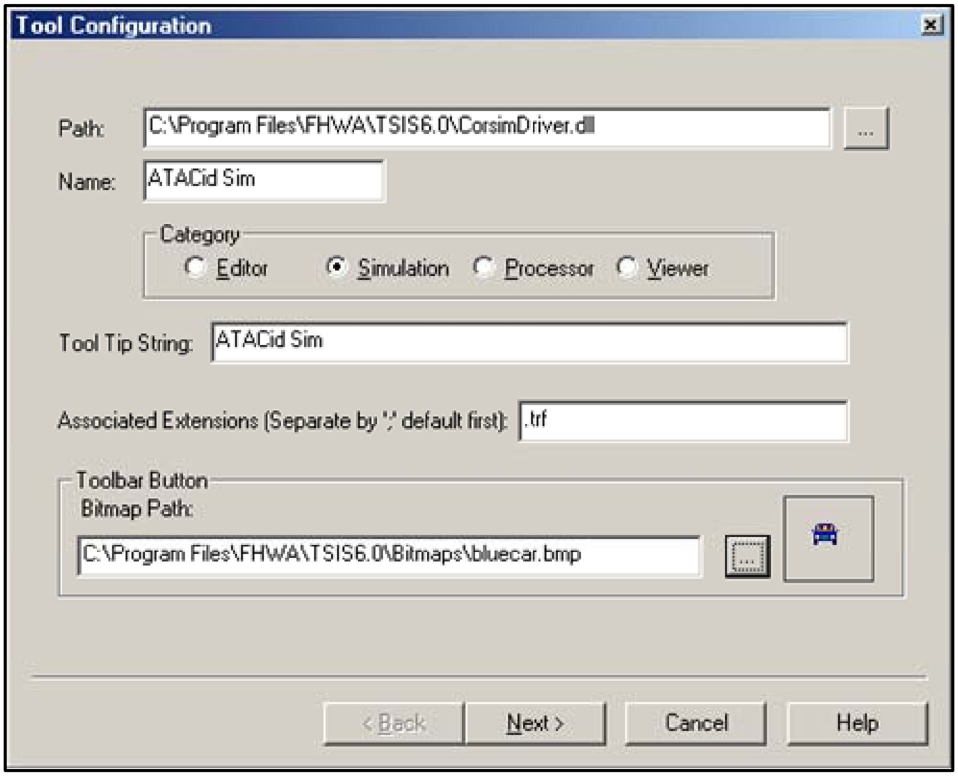

Figure 4.3. Tool Configuration (1st Page)

The default values for the next few steps of configuration remain the same; therefore, click "Next" for the COM Object, CORSIM Properties, Message Text Properties and Multiple Run Properties pages. When the "Run Time Extensions" page is reached, click the "Add" button to bring up the "Run-Time Extension Properties" menu.

Click "Browse…" and set the Path field to the "ATACid_RTE.dll" file that was installed in Section 1.0 of this chapter (Figure 4.4). Set the Exit Function to "_EXIT@0" from the drop down menu. Set the following Call-Point Functions by clicking on the name of the Call Point and selecting the corresponding Function from the "Select Function" drop down menu and then click "Apply" to set the function: Initialize to "_INIT@0", PreNetsimVehicle to "_INIT2@0", and PreNetsimSignal to "_MAIN_RTE@0". Click "OK" to finish the Run-Time Extension Properties and continue with the configuration.

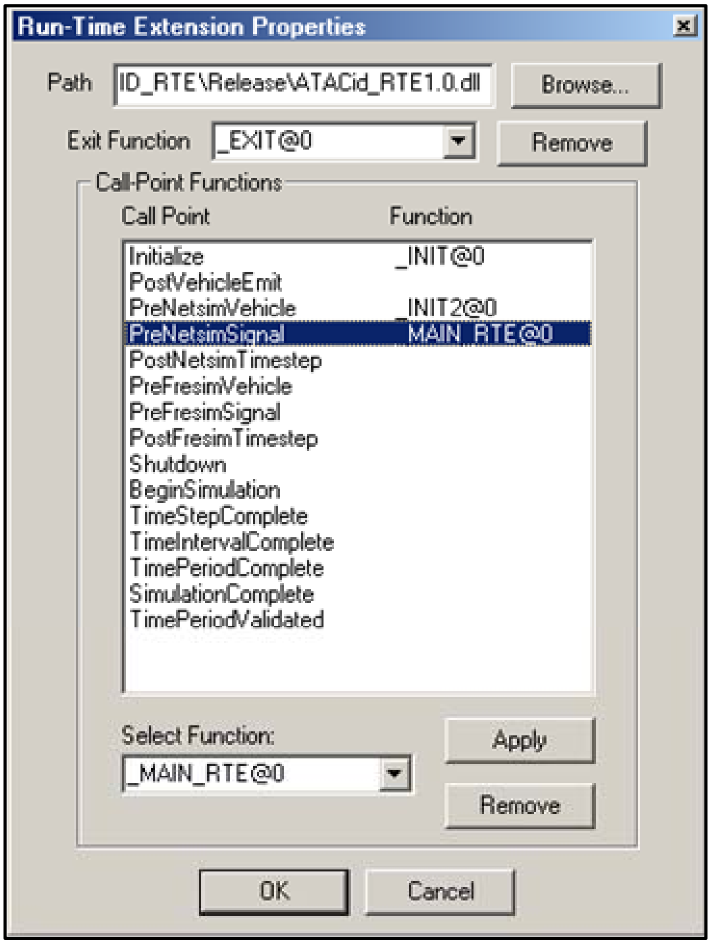

Figure 4.4. Run-Time Extension Properties Page

After the "Run Time Extension" page is completed, click "Next" to go to the final page (Version Information). Since the default values will be used, click "Finish" to complete the configuration. The picture file that was selected will now appear in TSIS on the toolbar next to the CORSIM simulation button. The ATACid RTE can also be accessed from the top menu under Tools, Simulation, and ATACid Sim. It should be noted that the tool is only available when a .trf file is selected.

2.2 CORSIM Interface Setup

The CORSIM Interface is started by locating the "CORSIMInterface.jar" file that was installed in the first section of this chapter. The .jar file is an executable Java file, so simply double left click on the file to begin using the Interface. The top menu of the Interface has only two options, File/Exit, which closes the interface, and About/Version, which displays current version information and the link to the ATAC website. Three tabs must be set up prior to running a simulation: CIDs, Network, and Detectors. Once a CORSIM Interface project has been created, a .cpf file is created within the same directory as the .jar file. In addition, a "CIDs" subdirectory is created that contains the ATACid configuration parameters (.cid files).

2.2.1 CIDs Tab

The CIDs tab is where the ATACid is set up to interface with TSIS for the simulation. Select the CIDs tab and click the Add Cid button. Enter a name for the ATACid and click "OK". Double left click on the folder icon labeled CIDs and select the name of the ATACid that was just created. Using the SerUpdt program described in Chapter 1, find the information for the ATACid and fill in the IP Address, CID Port, and Host Port fields (Figure 4.5). If multiple ATACids are used for a simulation, each device must have a unique IP Address and Host Port number. The boxes for Time Log and Debug are optional, but Sync should only be checked if this ATACid is the first or only unit being used. Click Save when all information is set for this tab.

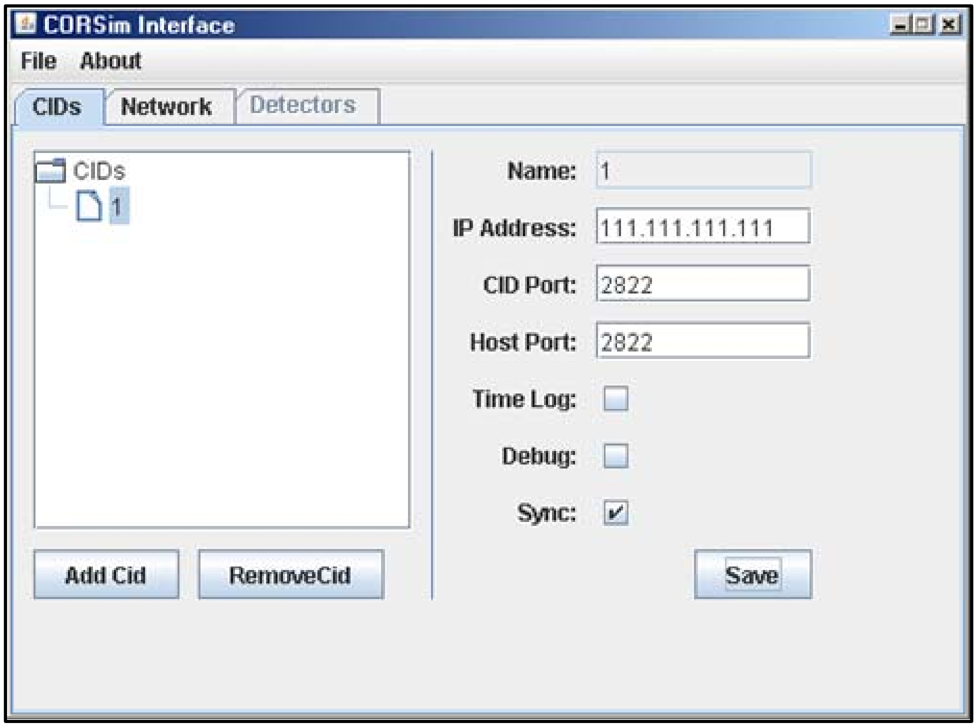

Figure 4.5. CIDs Tab Information

2.2.2 Network Tab

To set up the simulation network, select the Network tab and pick the desired project from the Projects drop-down menu and click “Get Network” to load the .trf file created in TSIS. Choose the control node from the drop-down menu and then specify the ATACid information by clicking “Set Cid” and picking the name of the ATACid from the drop-down menu and then click “OK”. Now the signal data must be specified for each phase by selecting the signal from the left side list. The “Upstream Node” list corresponds to the node created in TSIS (Figure 4.6). When finished, click “Save” to store the network information.

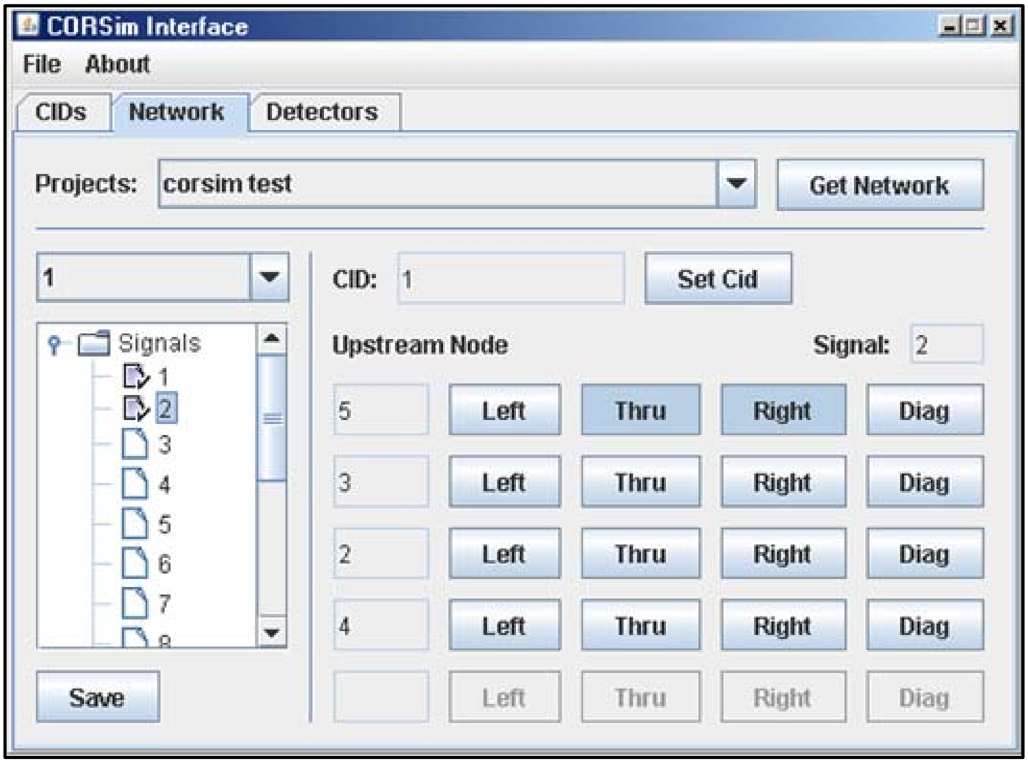

Figure 4.6. Network Tab Information

2.2.3 Detectors Tab

The Detectors tab maps the vehicle types to the appropriate detectors. Select the Detectors tab and then the proper Control Node number from the drop down menu. A list of links will be displayed on the left (Figure 4.7). If no special detectors exist (e.g., preemption), the default values do not need to be changed. To change a specific detector, select it from the list and check the desired boxes. Each column of boxes has a different value (Car, Truck, Car Pool, and Transit) and the rows correspond to the CORSIM vehicle types.

If a preemption detector was coded in the simulation network, select the appropriate Detector Station ID number (the number in parenthesis), and change the vehicle type data accordingly. For example, to detect only transit vehicles as high priority preemption, clear all checkmarks besides the ones associated with the correct vehicle type and fleet type, as shown in Figure 4.8.

When all detectors have been properly set, click “Save” to update the file used for simulation. NOTE: When modifying the Network and Detector tabs, it is only necessary to click one of the “Save” buttons, as they both have the same function. It is important to remember to save after all work is completed, as there is no auto-save feature, and no prompt to save upon closing the interface.

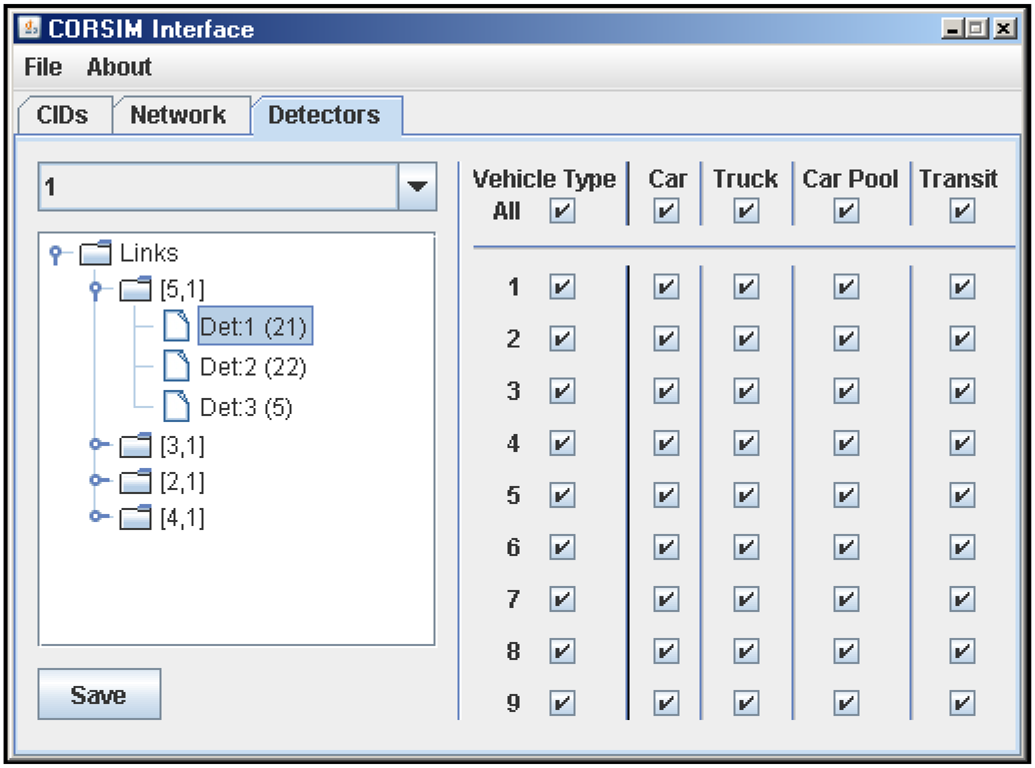

Figure 4.7. Detector 1 (Detector Station ID 21) with Default Vehicle Types

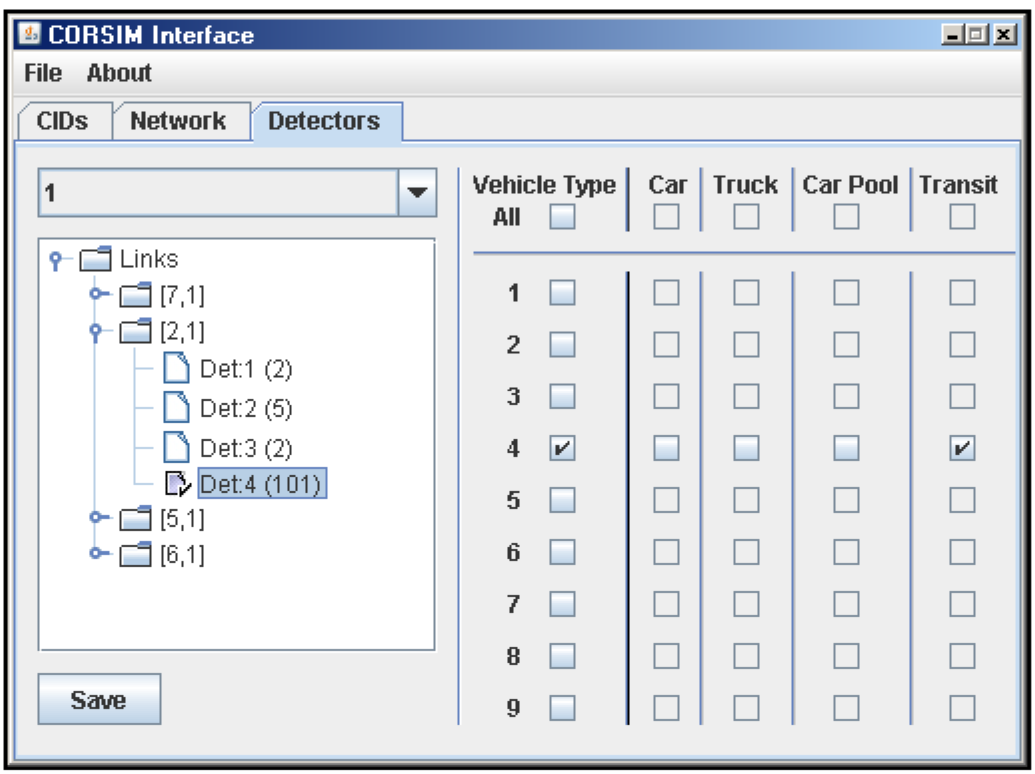

Figure 4.8. Detector 4 (101) Set to Only Place Calls for Transit Vehicles of Vehicle Type 4

3.0 Simulating CORSIM – ATACid Interface

Once the simulation network and CORSIM Interface have been set up, the network is ready to be simulated. It should be noted that CORSIMInterface.jar can be opened or closed during the simulation process. To simulate the network, select the appropriate simulation file (.trf) in TSIS/TRAFED. Click on the “ATACid Sim” button set up previously and then click the “Play” arrow to start the simulation. Once the initialization process has started, the nodes that were set up for external control should be noted as “flagged”. After each time interval has elapsed, CORSIM will print a line of text stating the time interval completed and the actual time required to complete the simulation interval.