



Emerging Network Technologies

Riverbed Modeler Exercise 1

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1.0. Introduction and Objectives

Riverbed Modeler uses a project-and-scenario approach to model networks. Project is a collection of network-related scenarios, each of which explores a particular aspect of the network design. All projects contain at least 1 scenario. Scenario is a single instance of a network. Typically, a scenario presents a unique configuration for the network. The term "configuration" can refer to different aspects such as topology, protocols, applications, traffic, and simulation settings

This exercise focuses on the use of Riverbed Modeler Project Editor

The Project Editor will allow you to quickly create, simulate, and analyse the performance of a computer network

By the end of this exercise, you should be able to:

- Build a network quickly
- Collect statistics about the network's performance
- Analyse these statistics

In this exercise you will:

- Build a small network
- Choose statistics to collect
- Run a simulation
- Analyse the results

Projects and Scenarios

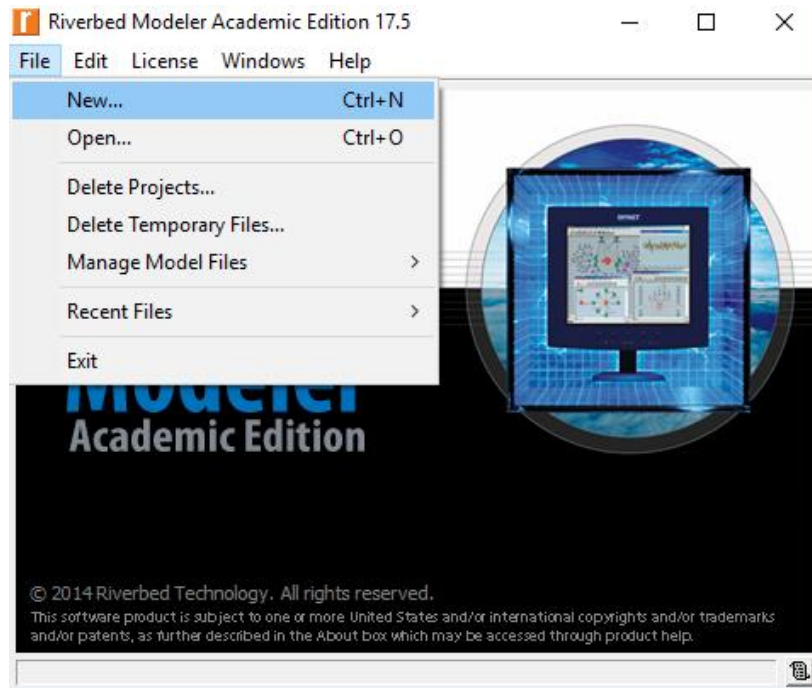
When creating a new network model, you must first create a new project and scenario.

A project is a group of related scenarios that each explores a different aspect of the network design. Projects can contain multiple scenarios.

Once you have created a new project, you can use the Start-up Wizard to set up a new scenario

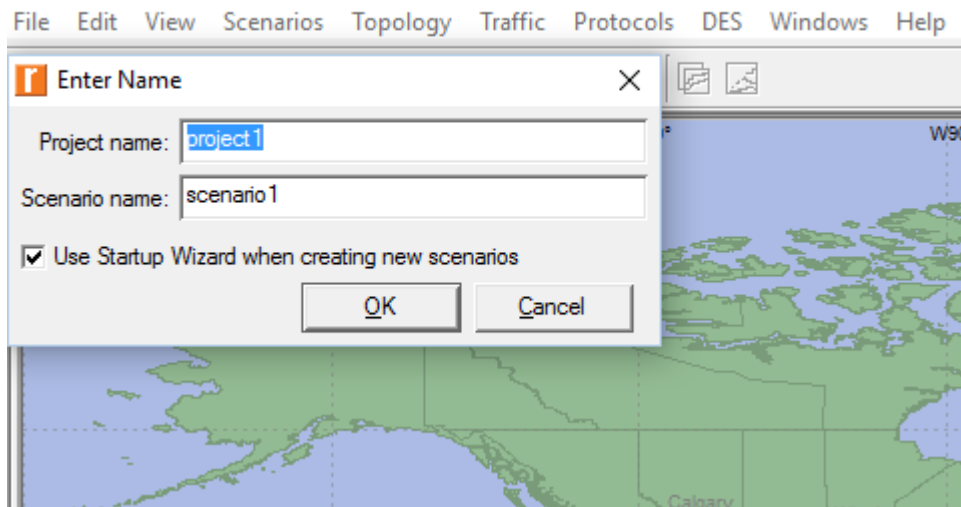
Creating a project:

- Open the Riverbed Modeler program by clicking on the respective icon.
- Go to File and select New.
- Select Project and click Ok

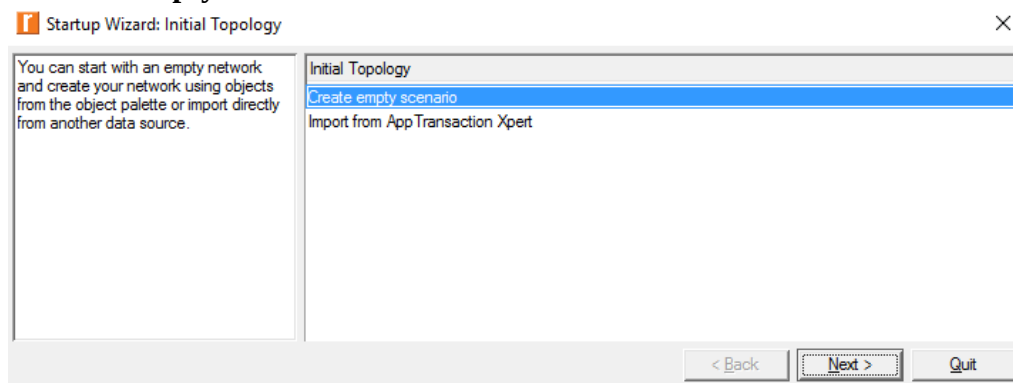


- Give the project a meaningful name other than the default (project1) and also a scenario name other than the default (scenario1). Select Use Start-up Wizard when creating new scenario, and then click OK.

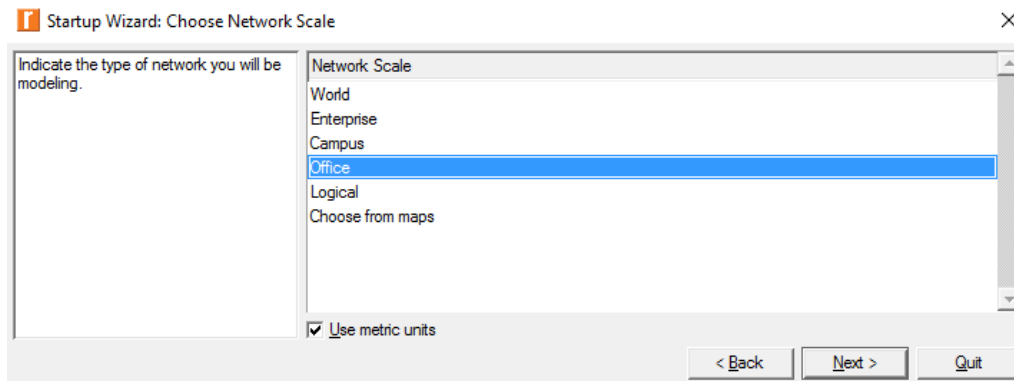
 Project: project1 Scenario: unnamed [Subnet: top]



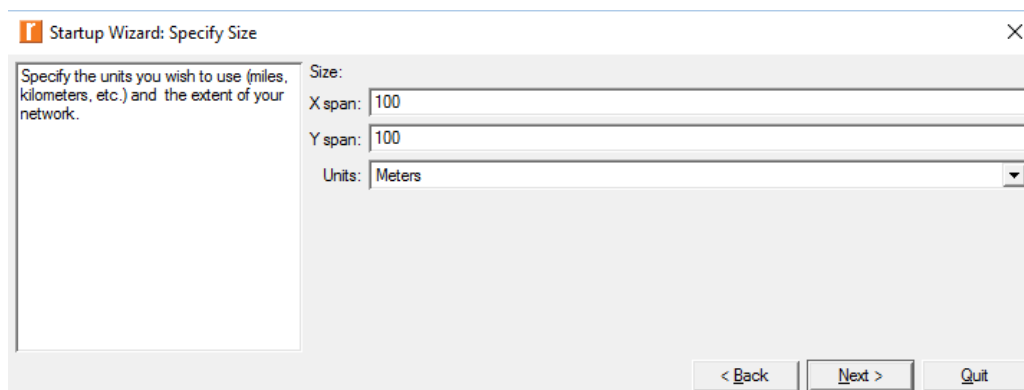
1) Choose **Create empty scenario** and click **Next**



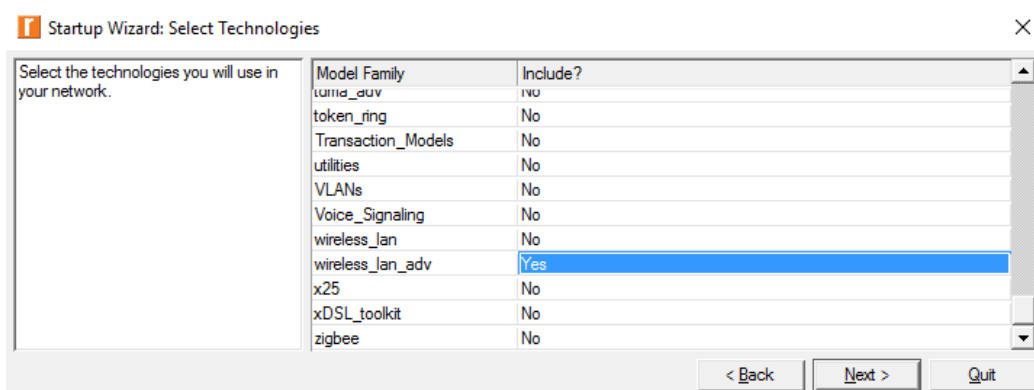
2) Select **Office** as Network Scale and select **Use metric units**.



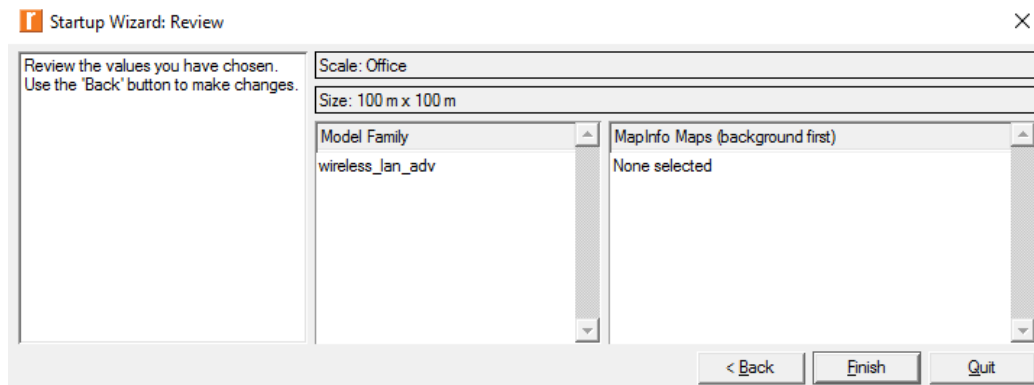
3) Specify the units as follows and click **Next**:



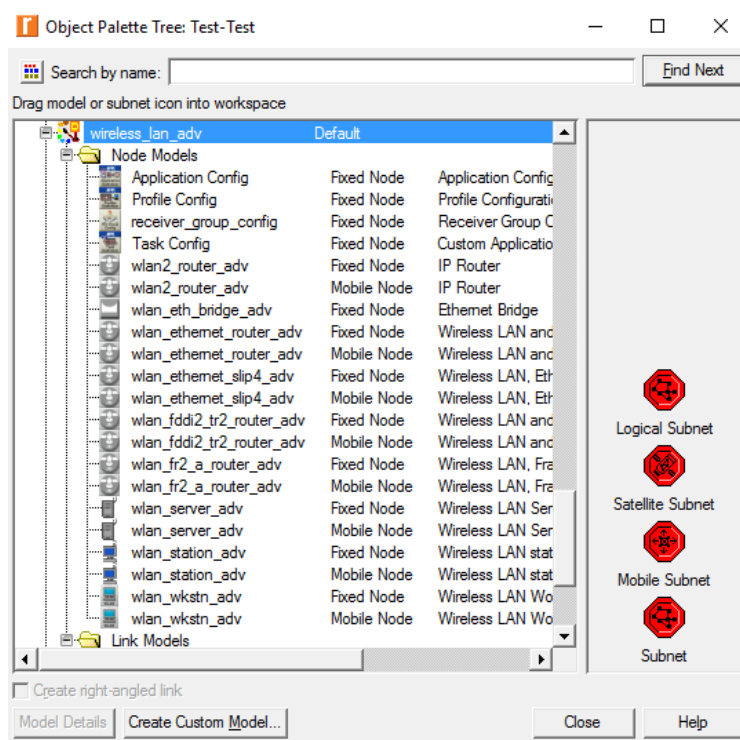
4) Scroll down to the bottom and select the technology **wireless_lan_adv** (or a network of your choice) by clicking on the corresponding field in the Include? column, and click **Next**.



5) Click **Finish**



The **Object Palette** is used to drag and drop objects into the workspace:



Building the Network

(a) From Node Models under the item **wireless_lan_adv** in the the object palette, drag the **Application Config** object into the workplace by pressing the left button of the mouse on and then press out the left button and press the right button to drop that in the workplace.

(b) In the same way, drag and drop the **Profile Config** object.

(c) Add one wireless LAN fixed workstation which is labelled **wlan_wkstn_adv** as the Fixed Node and one wireless LAN mobile workstation which is labelled **wlan_wkstn_adv** as the Mobile Node into the workplace.

Your scenario should now look like this:

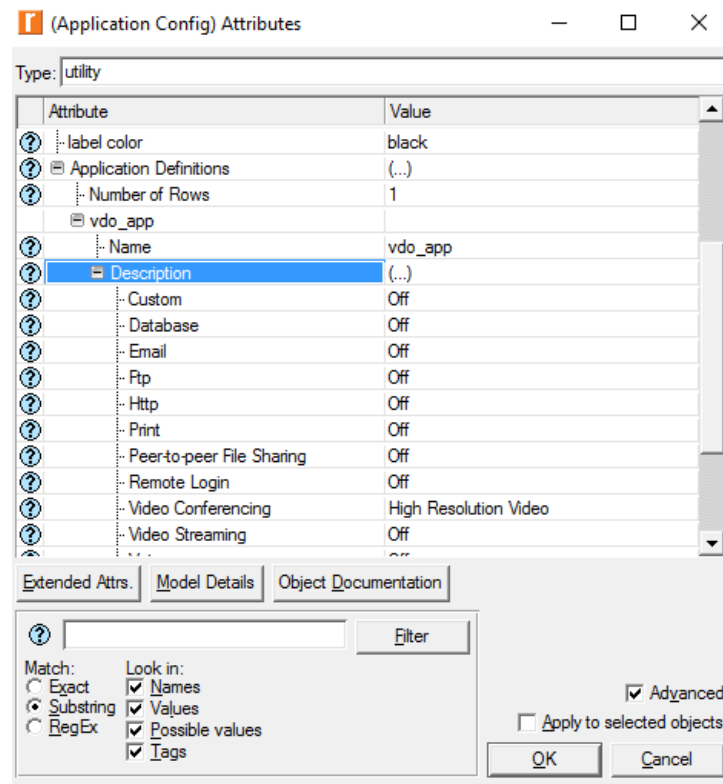


Configuring Applications

(a) Use the *Application Config* and *Profile Config* nodes from the object palette.

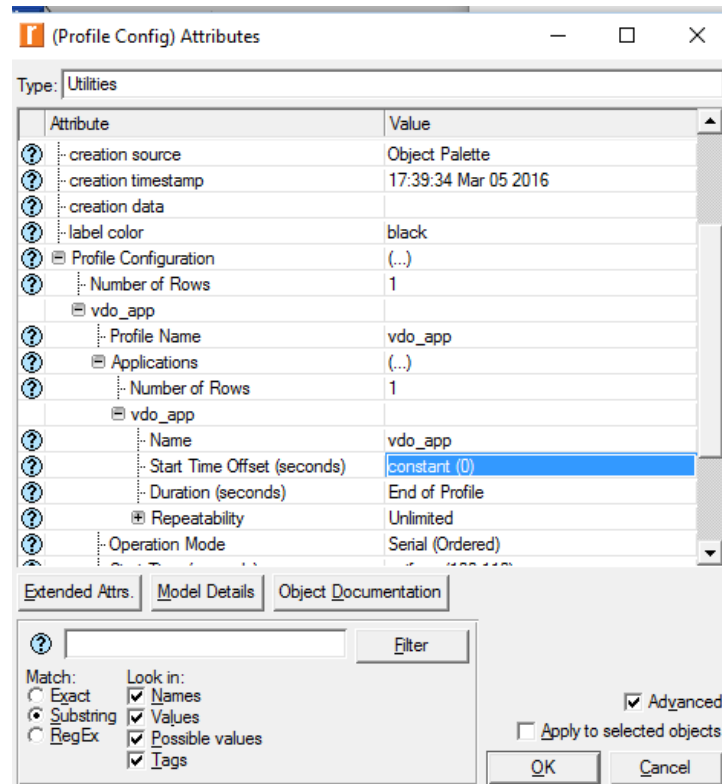
(b) Configure the *Video Conferencing* application like as follows using the application configuration:

- Click the right button over the Application Config object, and then click on **Advanced Edit Attributes** to open a window with different attributes and corresponding values.
- Click on the *Application Definition* attribute. Add a row and name as **vdo_app**. Set the *Video Conferencing* item to *High Resolution Video*.



Using the *Profile Config* node we can now deploy the application.

- Under *Profile Configurations* in the applications list add a row and select the name `vdo_app` from the drop-down menu.
- Select *Start Time* of the simulation as constant (0) and keep the other items as default.

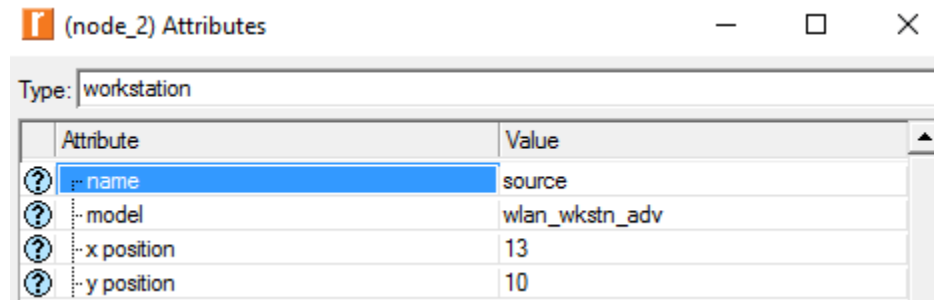


The next step is to configure some basic attributes of the two workstation nodes.

(a) Click onto the fixed station with the right mouse button and select Advanced Edit Attributes.

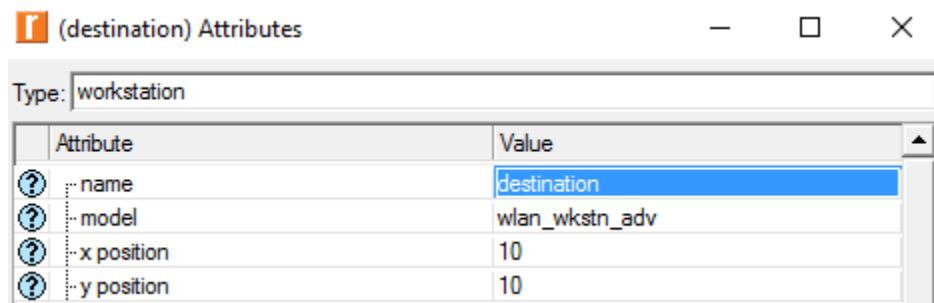
(b) Set the following values.

- name: **source**
- x position: **13**
- y position: **10**



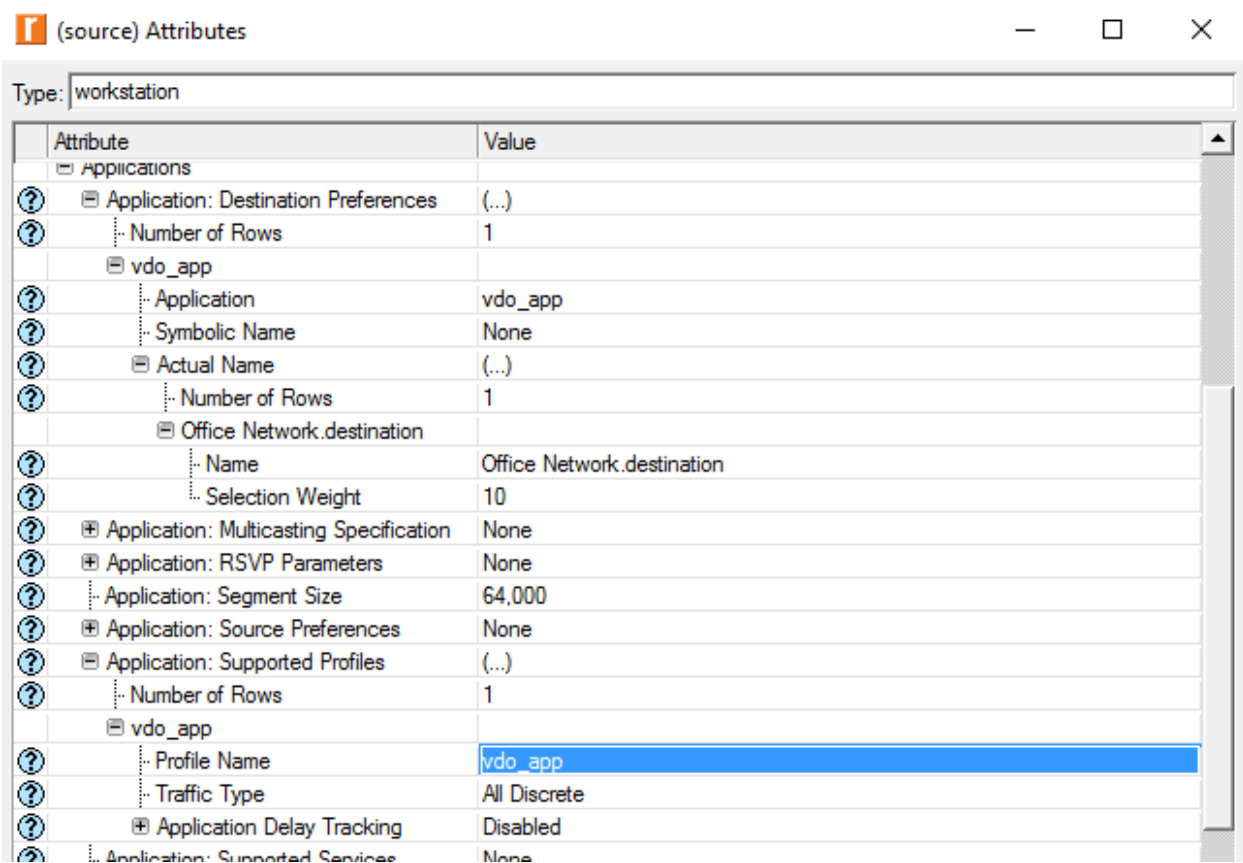
(c) Click onto the mobile station with the right mouse button and set the attributes as follows.

- name: **destination**
- x position: **10**
- y position: **10**



Next, we need to configure the workstation nodes and deploy the profile that we configured earlier.

(a) Go to the attributes of the **source** node. Set **Application: Destination Preference** and **Supported Profiles** as follows.



Attribute	Value
Applications	
Application: Destination Preferences	(...)
Number of Rows	1
vdo_app	
Application	vdo_app
Symbolic Name	None
Actual Name	(...)
Number of Rows	1
Office Network.destination	
Name	Office Network.destination
Selection Weight	10
Application: Multicasting Specification	None
Application: RSVP Parameters	None
Application: Segment Size	64,000
Application: Source Preferences	None
Application: Supported Profiles	(...)
Number of Rows	1
vdo_app	
Profile Name	vdo_app
Traffic Type	All Discrete
Application Delay Tracking	Disabled
Application: Supported Services	None

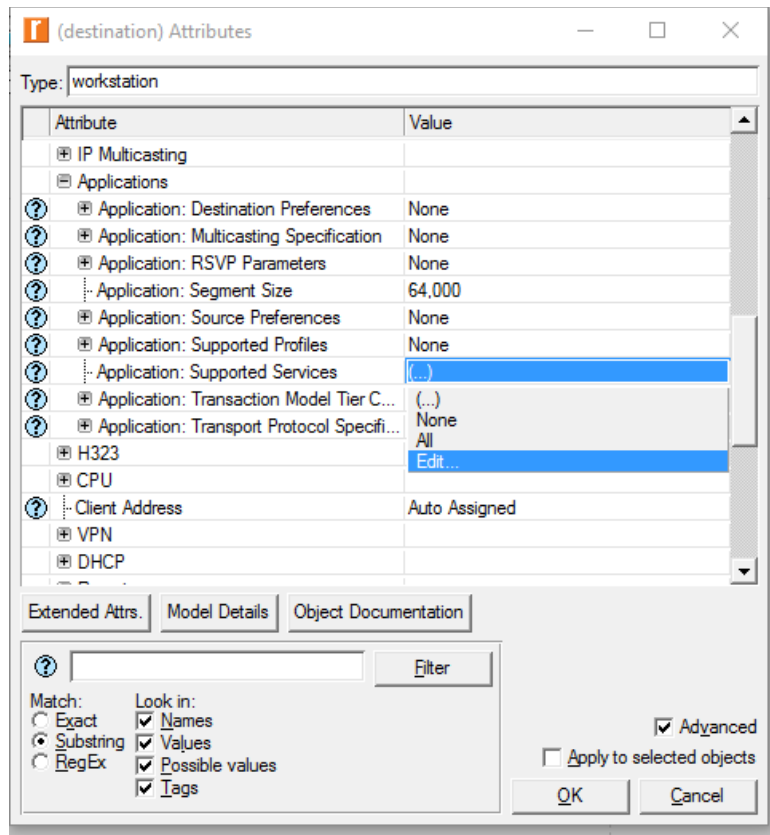
Set the following wireless LAN parameters like in the figure below:

- *Physical Characteristics,*
- *Data rate (bps)*
- *Transmit power (W)*
- *Packet Reception-Power Threshold (dBm)*

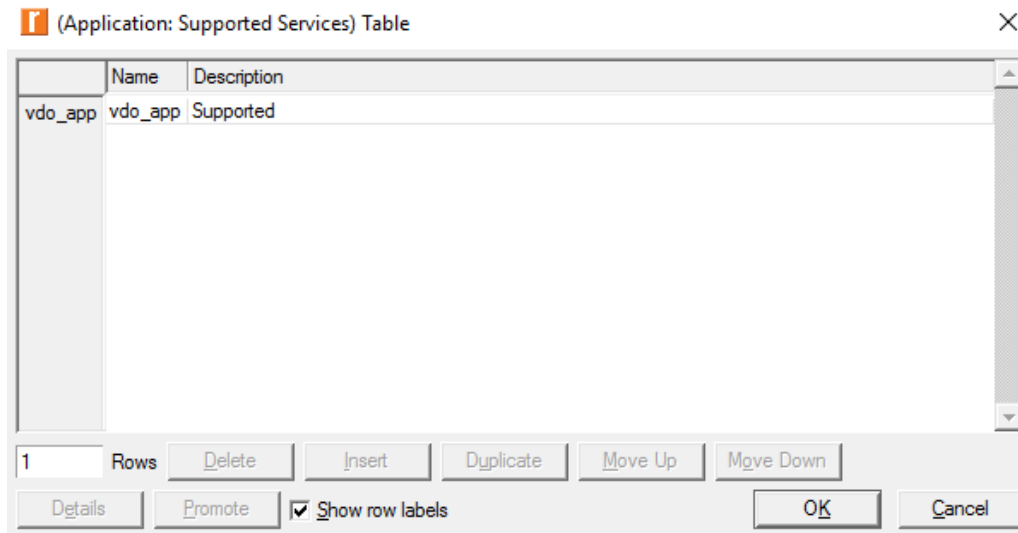
?	Wireless LAN Parameters	(...)
?	BSS Identifier	Auto Assigned
?	Access Point Functionality	Disabled
?	Physical Characteristics	Direct Sequence
?	Data Rate (bps)	11 Mbps
?	Channel Settings	Auto Assigned
?	Transmit Power (W)	0.001
?	Packet Reception-Power Threshold...	-67
?	Rts Threshold (bytes)	None
?	Fragmentation Threshold (bytes)	None
?	CTS-to-self Option	Enabled
?	Short Retry Limit	7
?	Long Retry Limit	4
?	AP Beacon Interval (secs)	0.02
?	Max Receive Lifetime (secs)	0.5
?	Buffer Size (bits)	256000
?	Roaming Capability	Disabled
?	Large Packet Processing	Drop
?	PCF Parameters	Disabled
?	HCF Parameters	Not Supported
?	High Throughput Parameters	Default 802.11n Settings
?	altitude	0.0

(b) Go to the attributes of the node destination. Set **Application: Supported Services** as follows:

- Click **Edit**



The following window will appear:



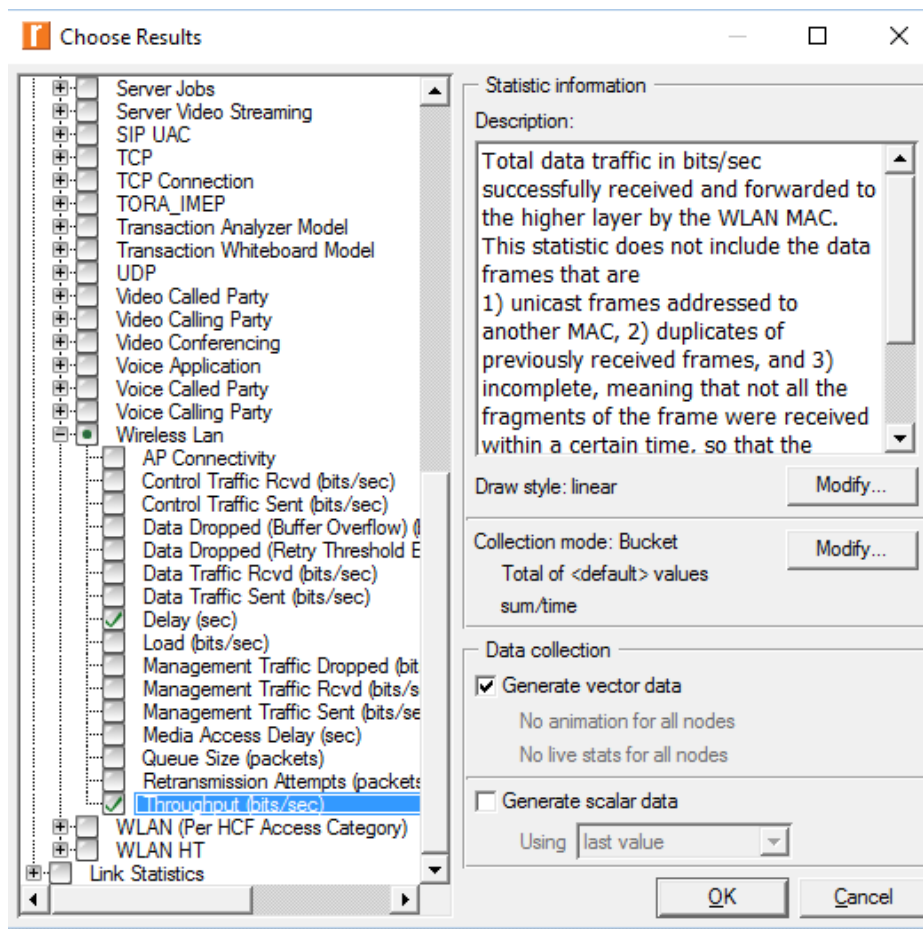
- Add a row and under name, select **vdo_app** and set *Description* to **Supported**.

Configure the same Wireless LAN parameters as you previously configured for the source workstation.

Choosing Statistics

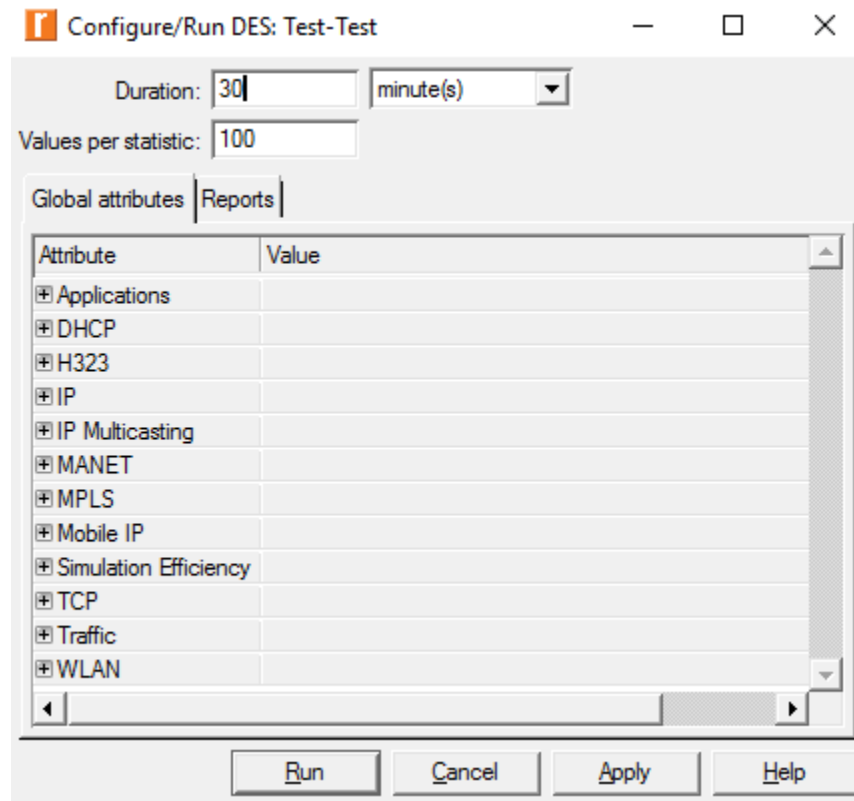
Now that the nodes have been configured, we need to choose the statistics we want to gather from the simulation.

- In the menu bar, go to **DES > Choose Individual Statistics**
- Click Node Statistics, then Wireless LAN. Check Delay (sec) and Throughput (bits/sec) as shown below.

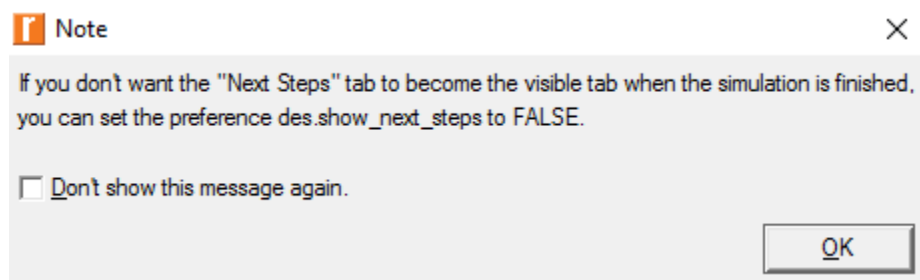


Running the Simulation

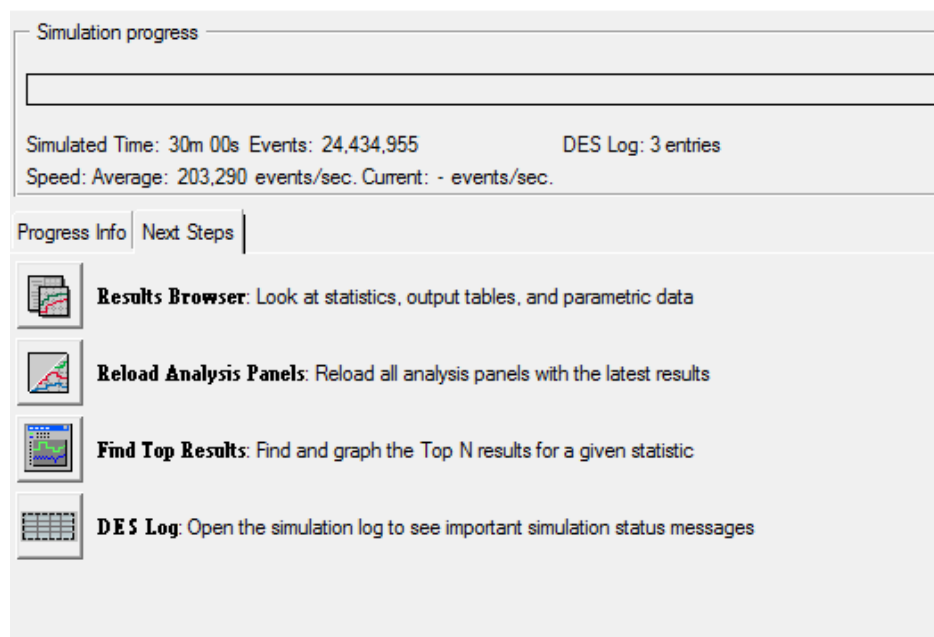
- (a) Go to DES in the menu bar and click on Configure/Run Discrete Event Simulation.
- (b) Set the *Duration* to **30 minutes**
- (c) Click **Run**



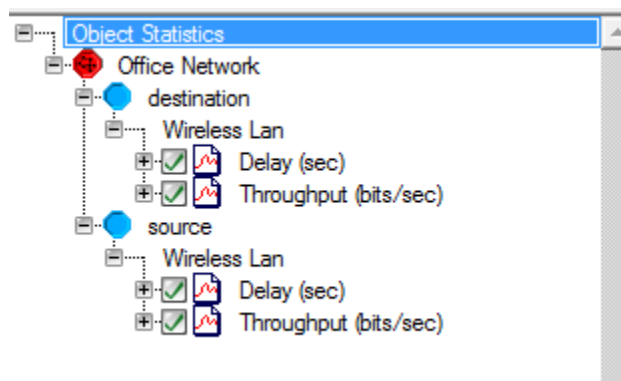
The simulation will then start. It will take a few minutes to complete. Once it has finished you will see the prompt below; click **OK**.



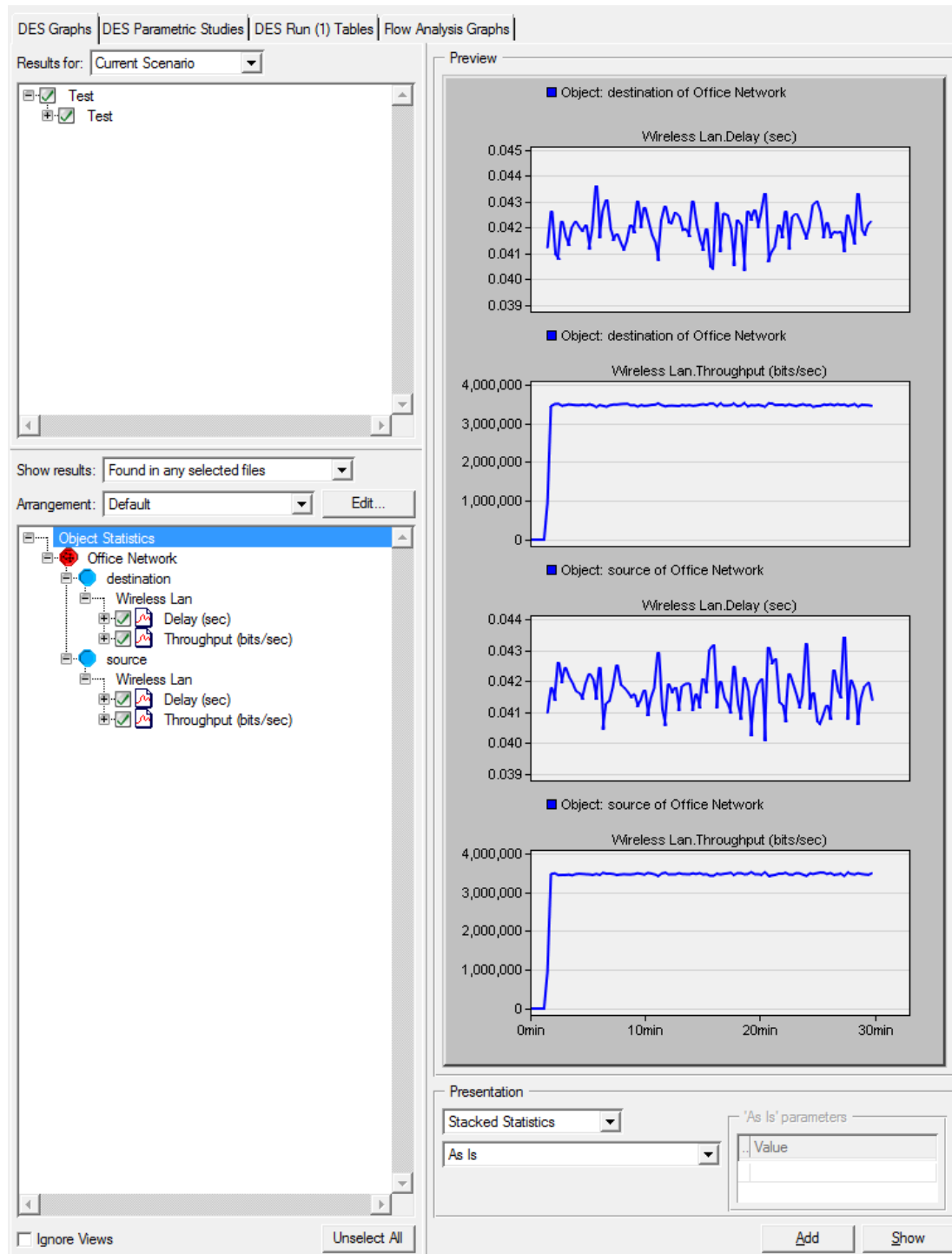
You will then see the screen below; click on **Results Browser**.



Expand *Object Statistics* and check the boxes next to *Delay* and *Throughput* for both the source and the destination nodes, as shown below.

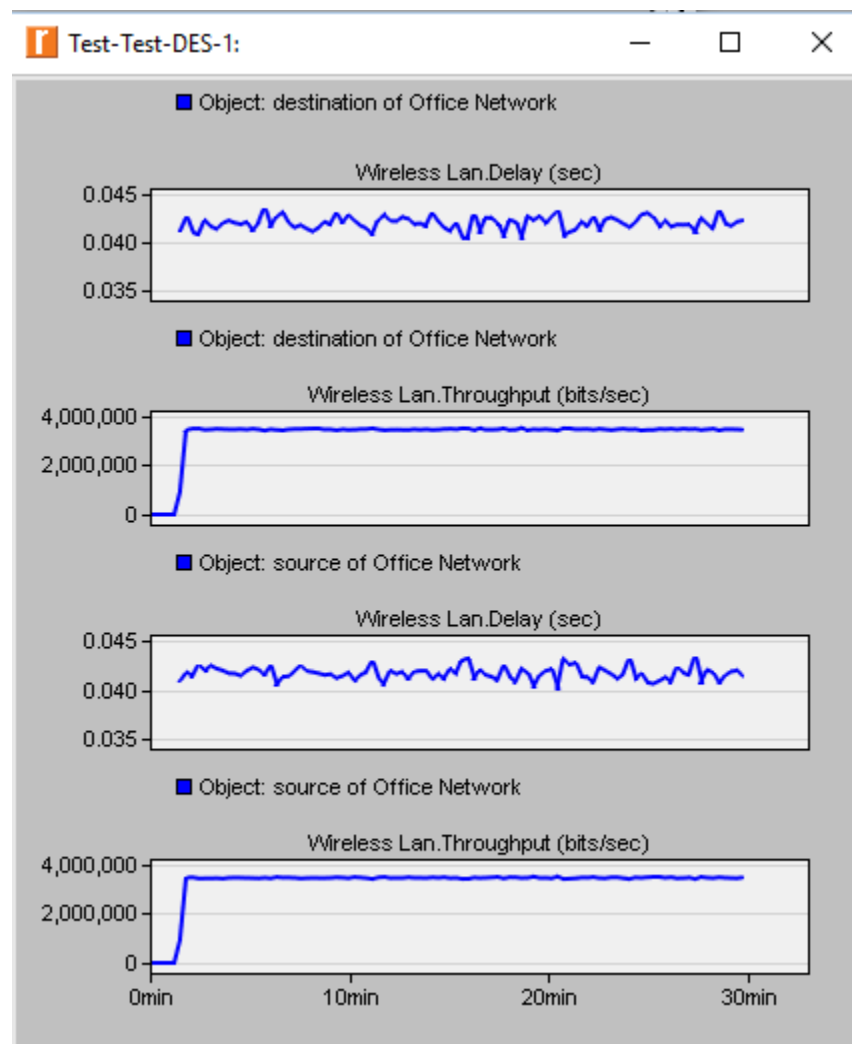


The results browser should now look like it does below:

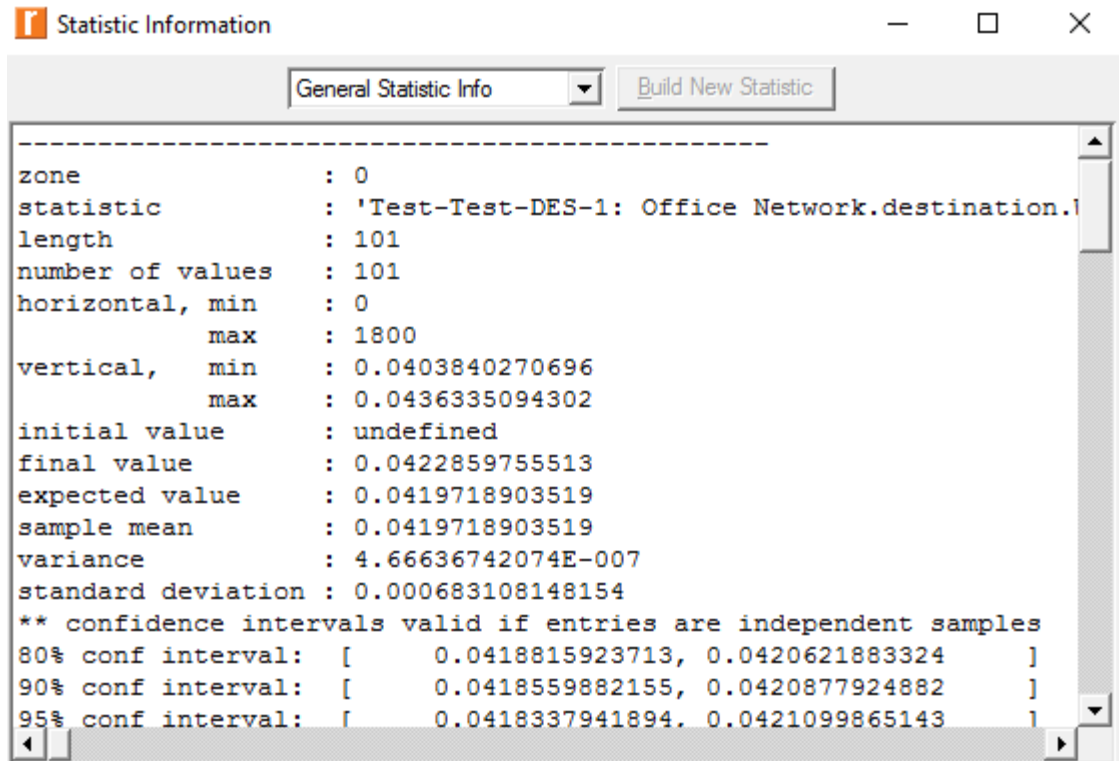


To view average values for delay and throughput, select this option from the drop down menu which is set to **As Is** by default.

Click the **Show** button and you will get the following window:



Keep the mouse pointer over the window but outside the area into which the graph is plotted and click the right button of the mouse. Choose **Show Statistic Data** in the list and the following window will appear.



Write down the sample mean and the standard deviation for the delay and the throughput. You can copy and paste the numeric values from the window by marking them with the left mouse button and pasting them into a text editor by pressing the middle mouse button.