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Mestrado em Engenharia Informática (MEI)

Arquitectura, Sistemas e Redes
Sistemas Móveis (SIMOV)

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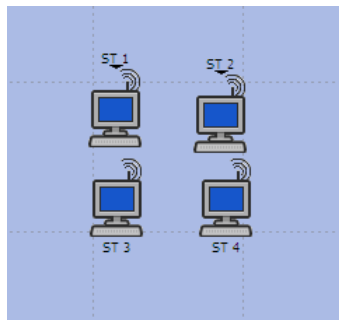
Wireless Local Area Network (WLAN) – Ad Hoc

1.Introduction

Stations in an *independent BSS* (IBSS) communicate directly with each other and thus must be within direct communication range. The smallest possible 802.11 network is an IBSS with two stations. Typically, IBSSs are composed by a small number of stations set up for a specific purpose and for a short period of time. IBSSs are referred to as *ad hoc* BSSs or *ad hoc* networks.

2.Network scenario

The network scenario is an ad hoc network composed by four wireless stations. These stations communicate between them establishing several traffic flows. Each traffic flow is characterized by start time, interarrival time and packet size.

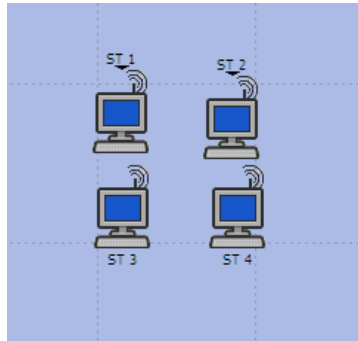


3.Objectives

In the final of this lesson the students must be able to identify the impact of RTS threshold, Fragmentation Threshold and BER parameters in the network behaviour.

4.Getting Started

- 1.Create a project (see *Basics of OPNET* document)
- 2.Create an Object Palette (see *Basics of OPNET* document) with the following elements:
 - Node models:
 - o wlan_station_adv
- 3.Create a Network
 - 3.1. Build a network
 - 3.1.1. Drag the node models according to the network scenario presented in the following figure.
 - 3.1.2. Name the objects with the names presented in the figure. Right-click on the object and select **Set Name**

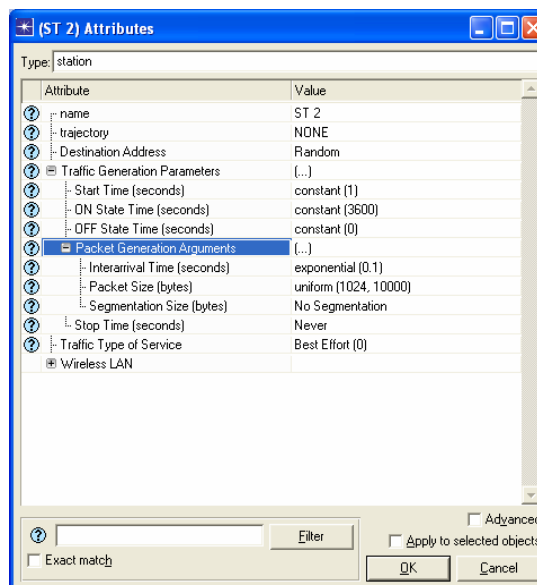


3.2. To Configure the network objects Follow these steps

3.2.1. Configuring the **station** applications. Select one station, right-click on the station and select **Edit Attributes**.

3.2.2. Set the **Traffic generation Parameters** station parameters according to the following table.

	ST1	ST2	ST 3	ST 4
Start Time	Constant(1)	Constant(900)	Constant(1800)	Constant(3700)
ON State	Constant(3600)	Constant(2700)	Constant(1800)	Constant(900)
OFF State	Constant(0)	Constant(0)	Constant(0)	Constant(0)
Packets generation Arguments				
Interarrival	Exponential(0.1)	Exponential(0.1)	Exponential(0.1)	Exponential(0.1)
Packet Size	Normal (1024,10000)	Normal (1024,10000)	Normal (1024,10000)	Normal (1024,10000)

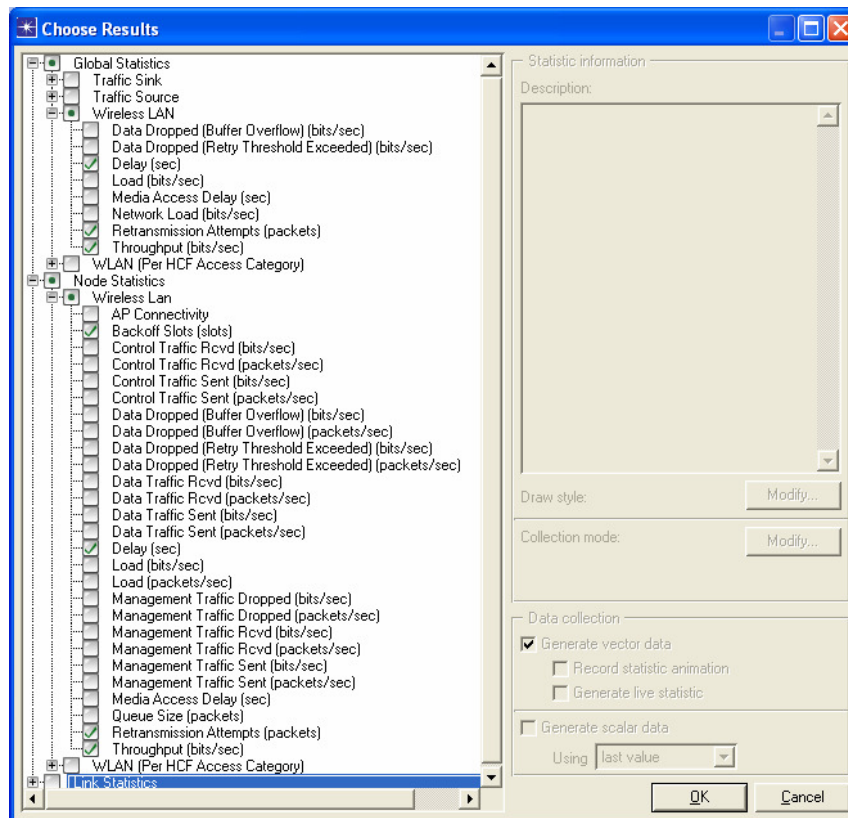


4. Collecting Statistics

4.1. Global Statistics

4.1.1. Right-click in the workspace (but not on an object) and select **Choose Individual DES Statistics** from the Workspace pop-up menu.

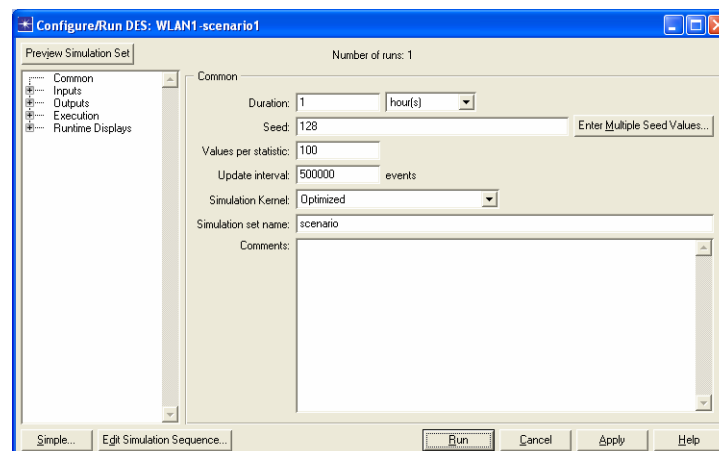
4.1.2. Select the data collection according to the following figure.



5.Run Simulation

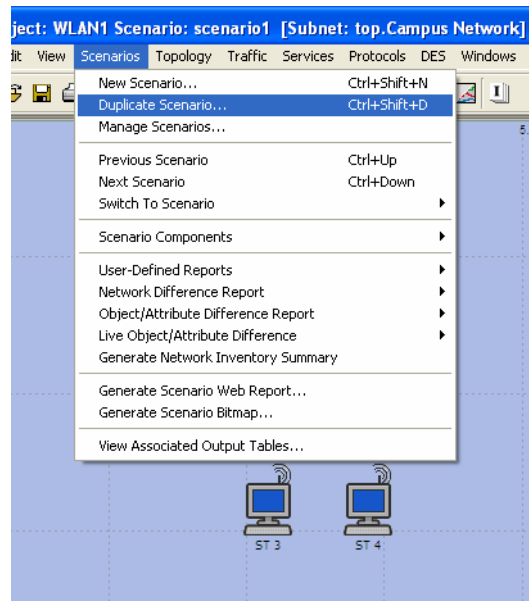
1.Run a simulation

- 1.1. Select DES > Configure/Run Discrete Event Simulation....
- 1.2. Type **1** in the **Duration:** field to simulate 1 hours of network activity.
- 1.3. Type **10000** (events) in the **Update interval:** field to specify how often the simulation calculates events/second data. In this case, the simulation calculates and displays events/second data at 10,000-event intervals. The default setting for this is 500,000 for larger network simulations.
- 1.4. Set the Simulation Kernel to **Optimized**. You can use one of two types of kernels to run your simulation. The development kernel collects simulation data you can use to debug your models, but the optimized kernel runs faster.
- 1.5. Click the **Run** button to begin the simulation. While the simulation runs, a dialog box appears showing the simulation's progress.



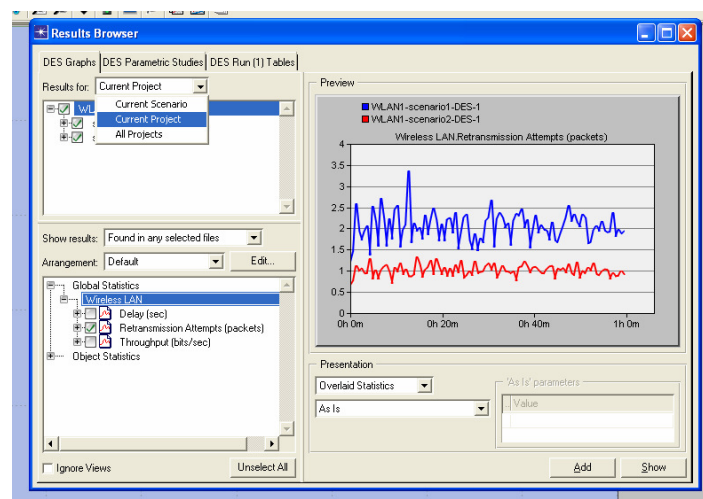
6. Duplicate Scenario

1. Duplicate Scenario
 - 1.1. Choose **Scenarios > Duplicate Scenario...**
 - 1.2. Enter expansion as the name for the new



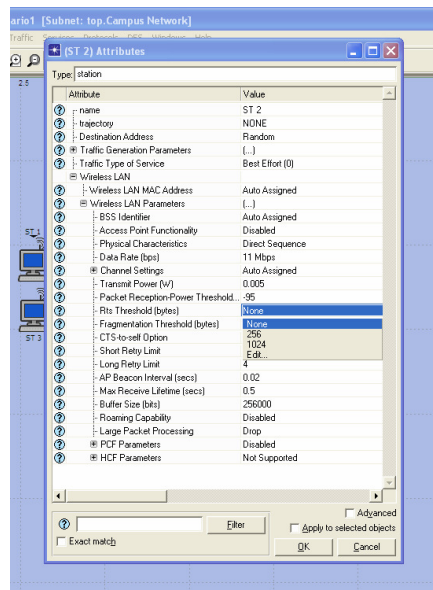
7. Comparing Results

1. Comparing results from several scenarios
 - 1.1. Right-click on the workspace and select view results.
 - ↳ The Results Browser window opens.
 - 1.2. Select **Current Project** on the **Results for** pull down menu.
 - 1.3. Check all scenarios and choose the statistics



8. Changing Station's Parameters

1. RTS Threshold/ Fragmentation Threshold
 - 1.1. Select one station, right-click on the station and select **Edit Attributes**.
 - 1.2. Set the **RTS Threshold/Fragmentation Threshold** according to the following figure.



2.Noise figure

2.1. Select one station, double-click on the station.

↳ The Node Editor opens as a new window within Modeler.

2.2. Right-click on the *wlan_station_rx* process and select **Edit Attributes**.

2.3. Set the **noise figure** according to the following figure.

