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Arquitectura, Sistemas e Redes
Sistemas Móveis (SIMOV)

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Mobile IP

Introduction

Mobile Internet Protocol (MIP) is a standard protocol that allows users to maintain nonstop connectivity with their home IP addresses regardless of physical movement.

We want to keep our IP addresses wherever we are, but a traditional IP design does not support mobility. So, whenever we change our location, we also need new IP addresses. Changing IP addresses is undesirable for several reasons. As we know, most Internet traffic is TCP, and changing the IP address forces TCP to establish a new connection. As a result, packets might get lost during this change.

Moreover, a mobile node will be assigned a foreign IP address instead of a local IP address. Then, using the foreign IP address makes it difficult for users to gain access to their private or local networks, such as local printers.

The first attempt was to use the Host Specific Route, so a mobile node could keep its IP address permanently. However, whenever the mobile node changed its location, numerous host specific updated routes might be created to propagate throughout the Internet. Also, most importantly, this technique raises security concerns since all packets may be forwarded to the new location over an unknown network.

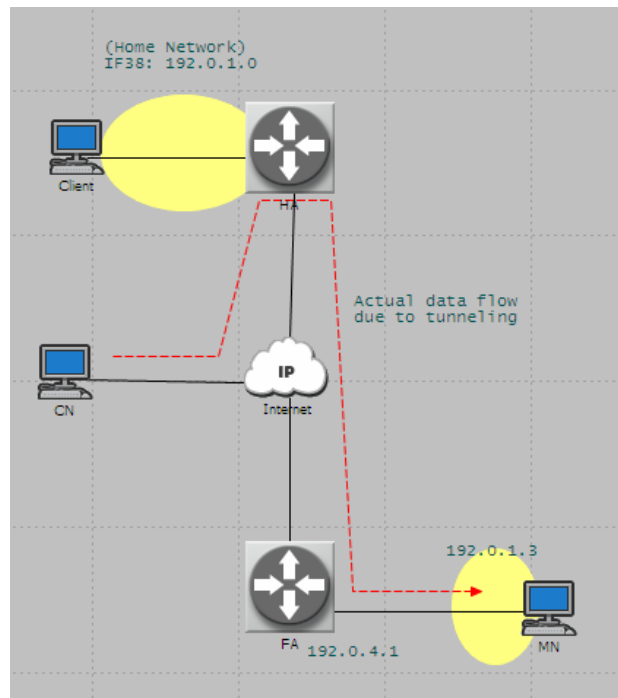
Mobile IP was designed to solve all these problems. Mobile IP (MIP) is an Internet Engineering Task Force (IETF) standard protocol which allows users to keep their own IP addresses even though they move from one network to the other. Users can use their local IP addresses permanently regardless of having a link-layer point of attachment. Mobile IP supports a current Internet Protocol in both wired and wireless networks. There is no need to make a modification for other nodes in order to communicate with the nodes with Mobile IP functionality. Mobile IP is scalable for large number of users, and users can be confident that no one can read their messages or use their resources.

Network scenario

The network scenario is composed by two networks (net mask 192.0.1.0 and 192.0.4.0) connected to the Internet.

In this network scenario, MN (Mobile Node) with the IP address of "192.0.1.3" is attached to the FA interface "192.0.4.1".

CN (Correspondent Node) sends traffic to the MN node. Traffic gets routed to HA (Home Agent for the "192.0.1.0" IP network). HA then tunnels the packet to the FA (Foreign Agent) which decapsulates the original packet and forwards it to MN.



Objectives

The objective of this lesson is to study and to understand the Mobile IP functionalities and agent roles. For that, the students must build the mentioned network scenario. Considering this network scenario as network scenario base, the students must duplicate it, change network parameter settings and analyse the simulation results.

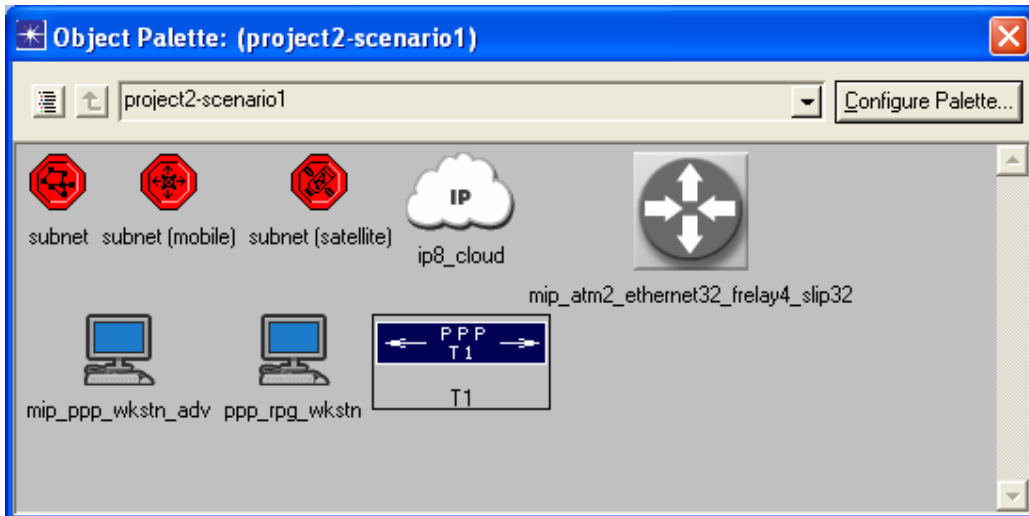
Getting Started

1. Create a project (see *Basics of OPNET* document)

1.1. A Campus scenario

2. Create an Object Palette (see *Basics of OPNET* document) with the following elements:

- Node models:
 - o ip8_cloud
 - o mip_atm2_ethernet32_frelay4_slip34
 - o mip_ppp_wkstn_adv
 - o ppp_rpg_wkstn
- Link models:
 - o T1

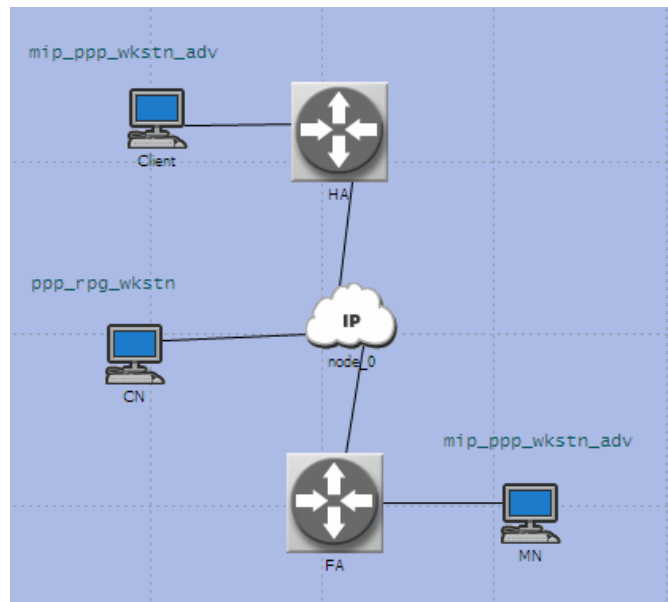


3. Create a Network

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**

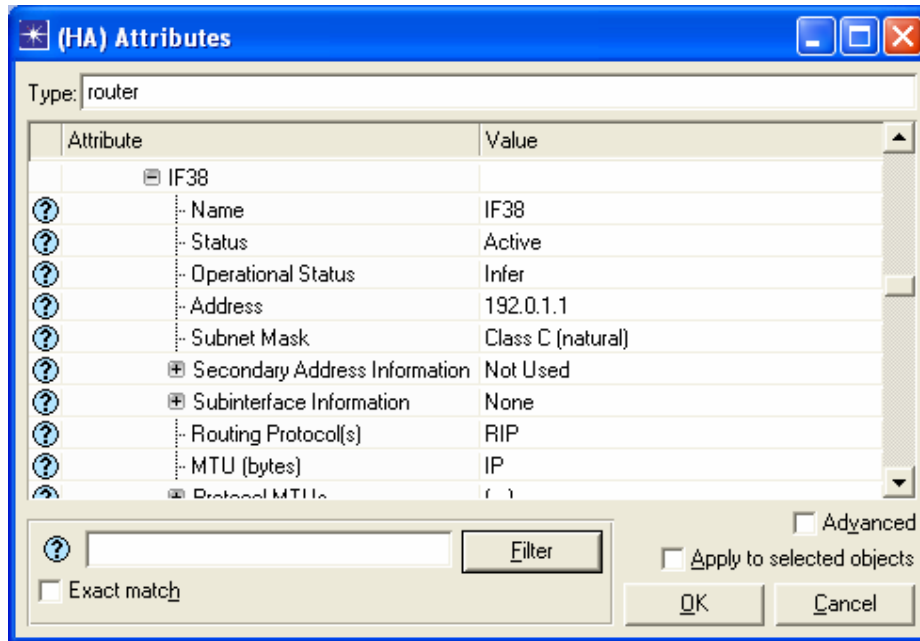


3.2. To Configure the network objects Follow these steps

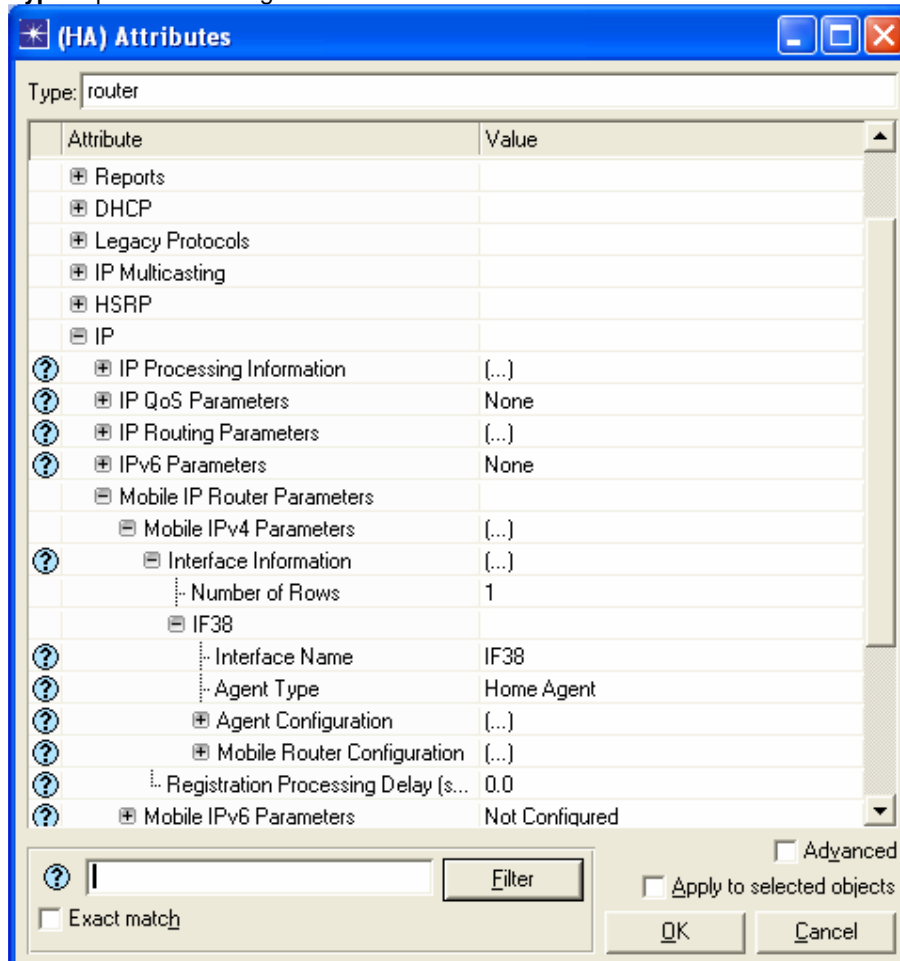
3.2.1. Configuring the HA.

Select the HA, right-click on it and select **Edit Attributes**.

Set the **IP->IP Routing Parameters->Interface Information (70 rows)->IF38 -> Address** equal to 192.0.1.1 and **Subnet Mask** equal to Class C (natural)



Set the IP->Mobile IP Routing Parameters->Mobile IPv4 Parameters->Interface Information-< Number of Rows equal to 1, Interface Name equal to IF38 and Agent Type equal to Home Agent



3.2.2. Configuring the FA.

Select the FA, right-click on it and select **Edit Attributes**.

Set the **IP->IP Routing Parameters->Interface Information (70 rows)->IF38 ->Address** equal to 192.0.4.1 and **Subnet Mask** equal to Class C (natural)

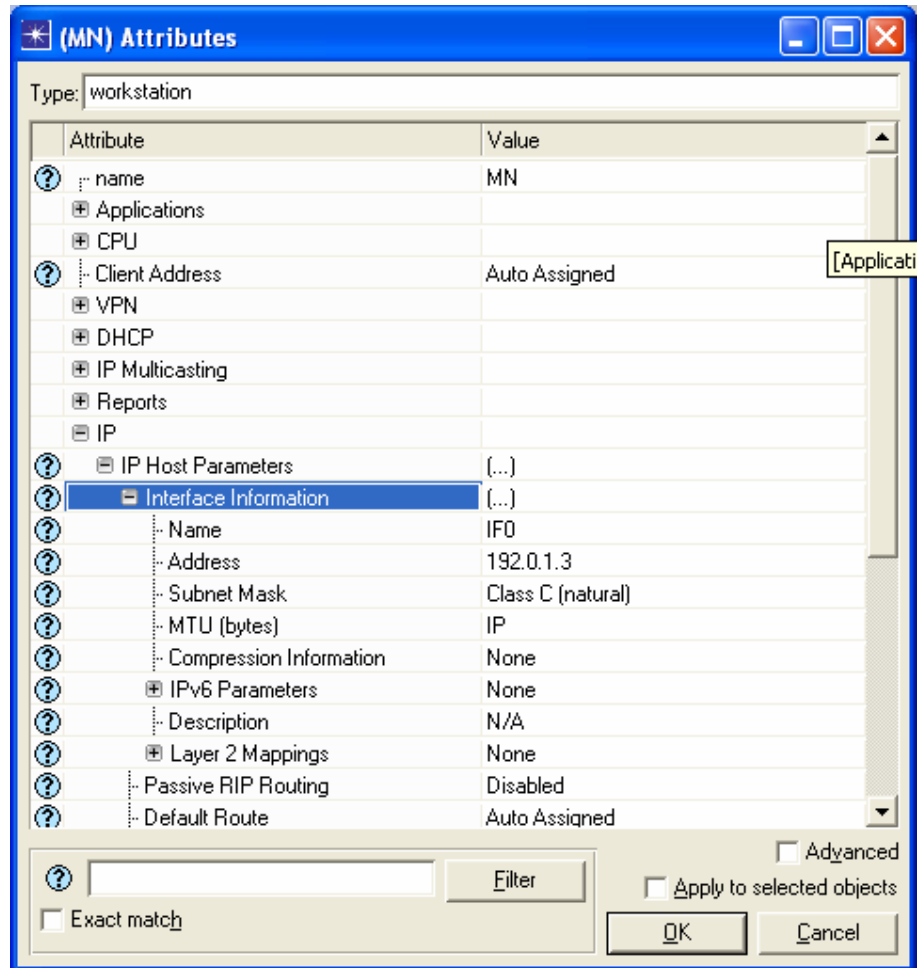
Set the **IP->Mobile IP Routing Parameters->Mobile IPv4 Parameters->Interface Information-< Number of Rows** equal to 1, **Interface Name** equal to IF38 and **Agent Type** equal to Foreign Agent

3.2.3. Configuring the MN.

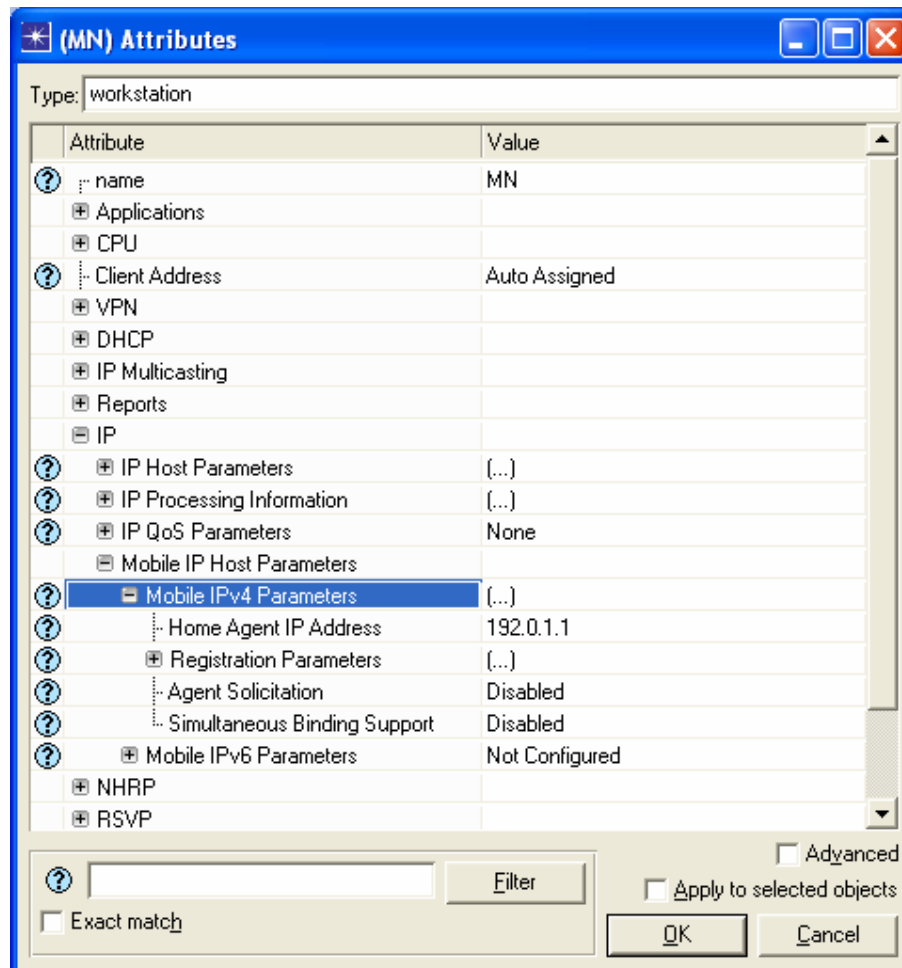
Select the MN, right-click on it and select **Edit Attributes**.

Set the **IP->IP Host Parameters->Interface Information ->IF0 ->**

Address equal to 192.0.1.3 and **Subnet Mask** equal to Class C (natural)



Set the **IP->Mobile IP Host Parameters->Mobile IPv4 Parameters->Home Agent IP Address** equal to 192.0.1.1



3.2.4. Configuring the Client.

Select the Client, right-click on it and select **Edit Attributes**.

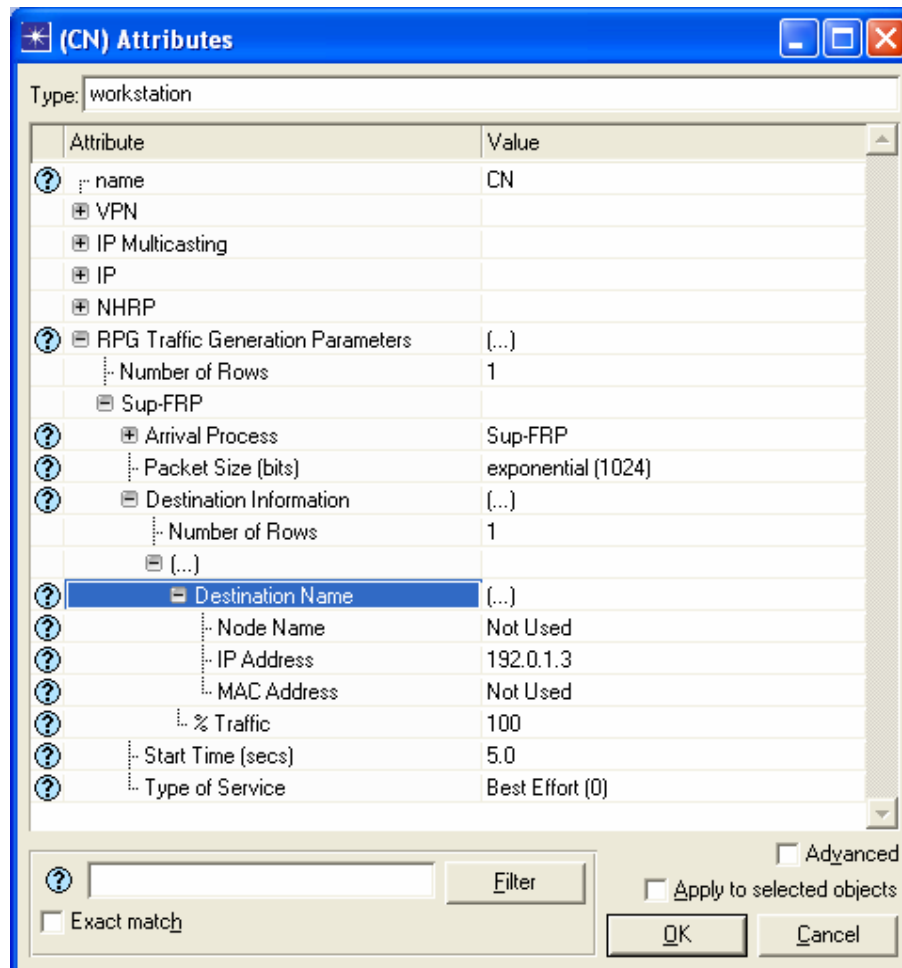
Set the **IP->IP Host Parameters->Interface Information ->IF0 ->**

Address equal to 192.0.1.2 and **Subnet Mask** equal to Class C (natural)

3.2.5. Configuring the CN.

Select the CN, right-click on it and select **Edit Attributes**.

Set the **RPG Traffic Generation Parameters->** according to the figure



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: **Mobile IP**

Run Simulation

1. Run a simulation

1.1. Select DES > Configure/Run Discrete Event Simulation....

1.2. Type **5** in the **Duration:** field to simulate 5 minutes 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.