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## GNS3 on Windows 7 the IPExpert Way

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### A brief introduction of GNS3 and Dynamips:

GNS3 is a front end for **Dynamips**. **Dynamips**, which was written by Chris and released at <http://www.ipflow.utc.fr/blog/>, is the backend that emulates the router platforms. Sadly the final version released is 2.8 RC2. Reportedly Chris had worked on some enhancements after this release but those enhancements never made it into public hands.

**Dynagen**, written by Greg, was the first non-gui interface made for Dynamips to make life easier. It has a very nice command line interface and is quite stable. It also has a slight performance edge over GNS3. But the ease of use with GNS3 still makes it more attractive than a slight performance enhancement.

If you would like to use Dynagen, it can be downloaded from <http://dynagen.org/>

### GNS3

GNS3 started as a project for university students. And it is the most successful graphical interface for Dynamips. Although some Chinese authored a few GUI interfaces they never took off. They are also out of scope for this guide to discuss those reasons.

GNS3 is maintained at following site: <http://gns3.net/>

**Important Note:** In this IPExpert Guide, GNS3 is used as a collective word for the combination of the backend software (Dynamips) and the frontend software (GNS3 itself).

GNS3 is well known as the non official Cisco emulator; it can run Cisco IOS on the platforms supported by the program. It's important to note that, GNS3 is not a simulator it is an emulator. It can support all the commands and features supported on the hardware it emulates. When people say, GNS3 cannot emulate switching; they are misunderstanding the purpose of GNS3. GNS3 support's switching based on the capabilities of the supported platforms. Restrictions in switching are not because GNS3 doesn't support it. The limitations are put on the hardware platform that is supported, namely the NM-16ESW.

## Platforms and modules supported by GNS3.

- 1- 1700 routers
- 2- 2600 routers
- 3- 3600 routers
- 4- 3700 routers
- 5- 7200VXR series
- 6- NM-16ESW switching module
- 7- WIC modules
- 8- NM-CID
- 9- NM-NAM
- 10- NM-xT/ NM-xFT
- 11- Native Etherswitch support and Frame-Relay support

## Some important GNS3 components:

**Autostart** = False/True

This setting allows you to automatically start all the devices when you load your topology if it is set to "True". We recommend this value be set to "False".

**Ghostios** = True/False

This allows GNS3 to run multiple copies of a single image, reducing resources on the workstation. We highly recommend setting it to "True", in all situations.

**Sparsemem** = False/True

This setting allows GNS3 to control memory handling. In case this feature is set to "True", GNS3 will only utilize memory as needed by each running device and unused memory will be swapped to hard disk. This feature is good for machines which lack memory.

But this feature makes your overall performance much slower. This is because excessive swapping of virtual memory with the hard drive. If your computer can handle the memory required by to run all the devices (memory required by one device x number of devices) then you should set this to "False".

**IDLEPC** = 0x????????

Many consider this "THE" most important part of GNS3 configuration. It can dramatically change your overall experience. Basically, this value defines the resources the emulated Cisco Routers will use. The IDLE PC value instructs devices to release resources and go idle during while the router is running idle. This then allows resources to be freed up and made available to the other devices. It is kind of co-operative multi-tasking being done among the emulated instances. You should spend sufficient time to find a good combination of IDLEPC value suited for his/her IOS and computer platform.

It is important to understand that our goal is for you to have smooth GNS3 experience. If you can emulate the IPexpert topology with your PC's CPU running around a scale of 60-70% when all of your devices powered on and you have a handful of configurations loaded, then don't waste more time on finding better values. This is the performance you should expect. Don't waste additional time trying to tweak GNS3 settings to get better performance. Just like in the actual lab you need to meet the requirements of the questions, no more, no less.

Image files: GNS3 supports (like normal routers) booting from compressed IOS images. During IOS initialization, routers being emulated have to decompress the image every time it boots and this takes a lot of time. The best way to save time during the initial boot process is to use GNS3 with decompressed images. The IOS can be decompressed by simple winrar software (<http://rarlab.com>). Only tricky part is to right click on the IOS and choose open with winrar, after that normal decompression process will apply.

Enough talking, let's move on to the actual setup!!!!!!

## **Gns3 Installation**

### **Step 1: Software**

You need to download GNS3, the "all in one package". This includes all software required to successfully run GNS3, (Besides the IOS images). At this time, when this IPexpert guide was authored, the latest version released is 7RC1. The current download location is:

<http://downloads.sourceforge.net/gns-3/GNS3-0.7RC1-win32-all-in-one.exe?download>).

### **Step 2: Installation**

Use the default installation directories, this will keep things simple.

**Note:** when you will launch setup, most likely, windows will give you warning about "unknown software publisher", please select yes to proceed for installation.



Fig-1

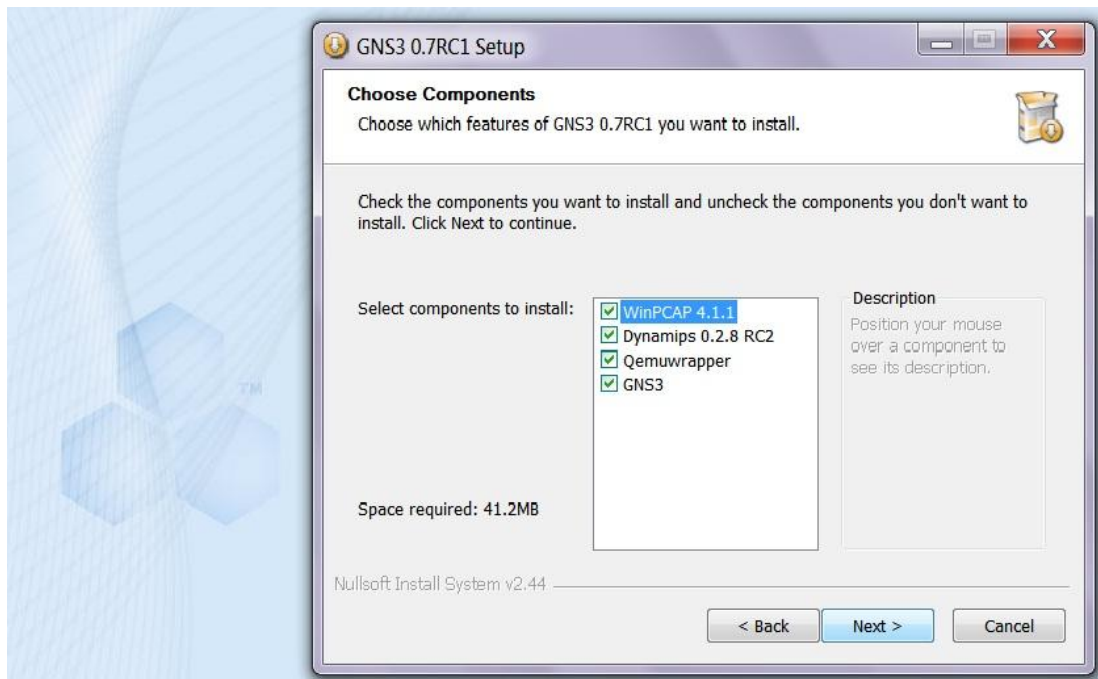


Fig-2

In Fig-2, it's important to note you must select WinPCAP, Dynamips, and GNS3. The Qemuwrapper is only required if you are planning on emulating the ASA or PIX.

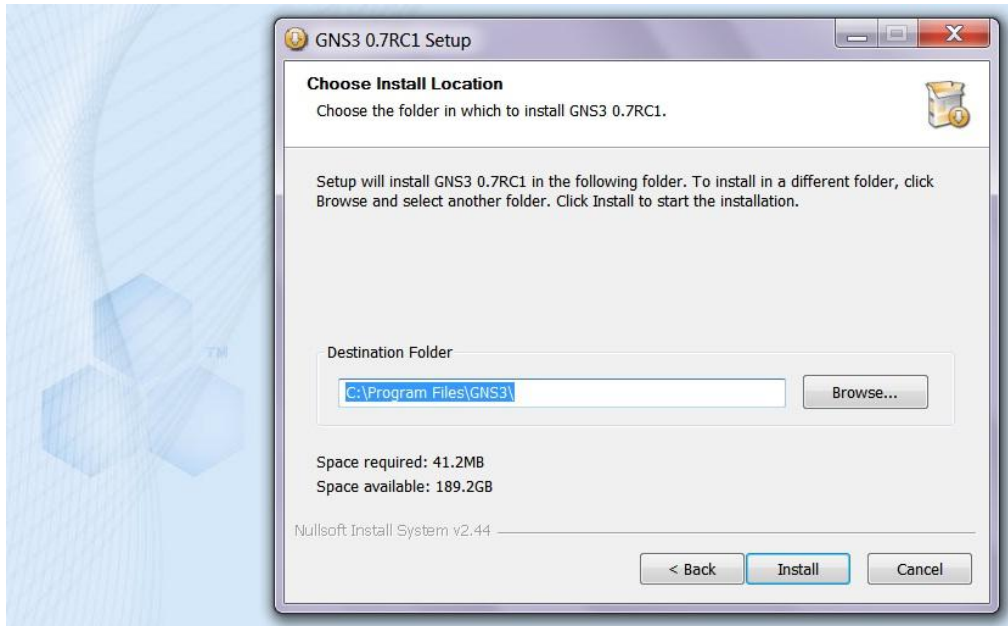


Fig-3

We recommended to leave the default installation location (This will say “C:\Program Files x86\GNS3” if you are running a 64 bit operating system). Click **Install**.

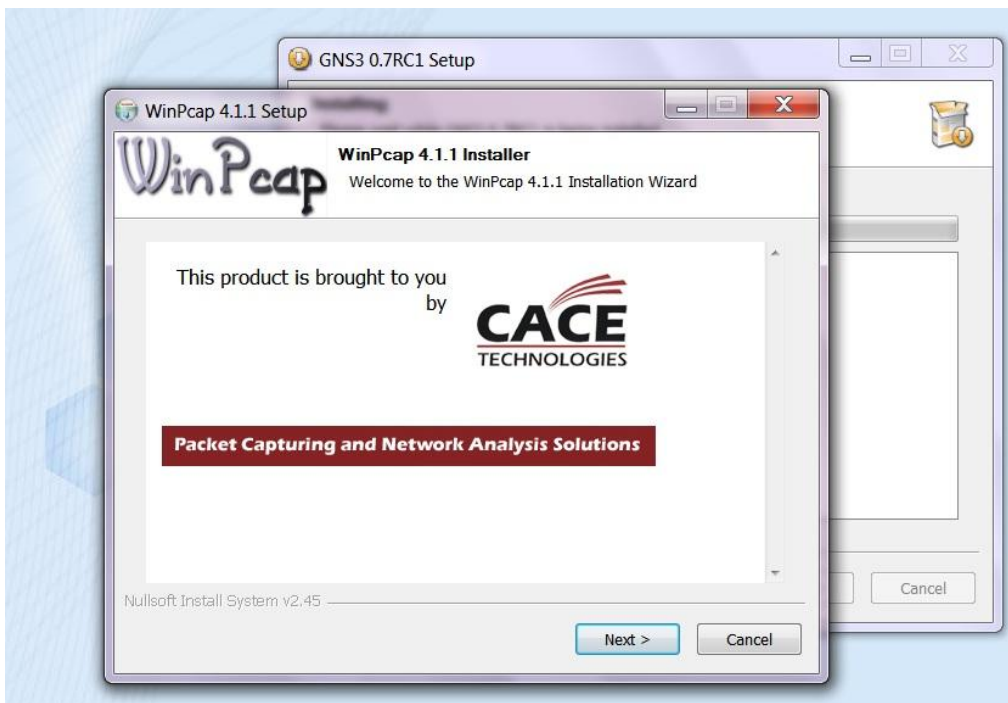


Fig-4

A New installation screen will open for the WinPcap installation, proceed with this software installation. This installation is required; without WinPcap GNS3 will not function.



Fig-5

Click **Finish**, to complete installation.

### **Configuring GNS3 for first time**

You should now have GNS3 installed.

If you would like, you can add a shortcut to it on your Desktop for ease of use. Locate GNS3 in your Start Menu, right click on the icon and select Send to > Desktop (Create Shortcut). You will now have a shortcut on Desktop.

Open GNS3, either by launching it from the Start Menu or by double clicking on the shortcut you made on the Desktop.

**Note:** After opening GNS3 Depending on your Windows Configuration, Windows Firewall or other Antivirus/Internet Security software may warn you about GNS3 requesting network access. It is important to allow this access; otherwise GNS3 communication with devices, in a best case scenario will be unreliable, in most cases will not function.

Now when GNS3 opens for the first time you will see the following Window:

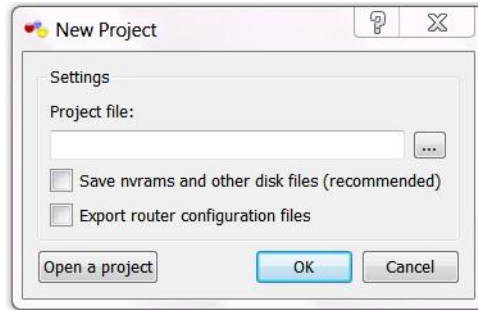


Fig-6

For now just press **Cancel**, we need to configure and fine tune GNS3 before we do anything else.

## GNS3 Configuration

You must configure a supporting File Structure for the IPexpert topology.

**Note:** Included with the .zip file you downloaded to read this guide, is the compressed form of the IPexpert GNS3 topology and file structure.

Before starting configuration, please expand your zipped file “IPexpert\_structure\_expand\_at\_c\_drive\_root.zip” to C:\. After unzipping it here you will see the structure shown in Fig-7.

If you chose not to use the included rar file and prefer to do the configuration manually; use Fig-7 as a guide to create the file structure. Otherwise you can move on to Fig-8 after verification.

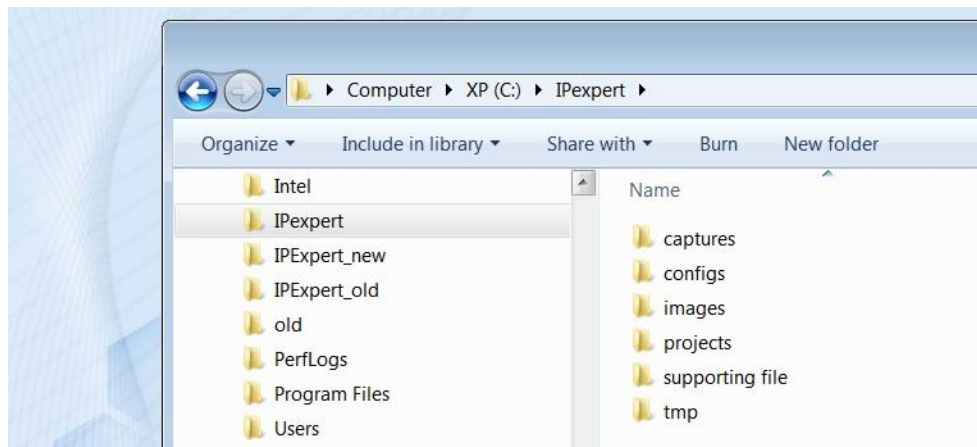


Fig-7

Above is shown the file structure we will use for the GNS3 configuration. You can manually create the folder named IPexpert (C:\IPexpert). You will then need to create the folders as shown above in Fig-7 in the window to the right.

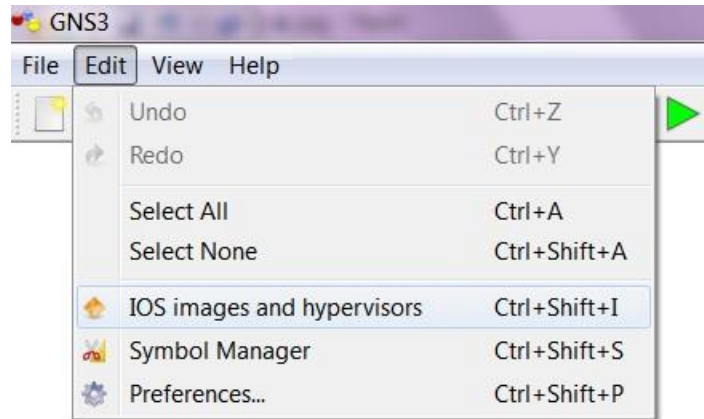


Fig-8

Now configure ISO images and Hypervisor. Click on **Edit > ISO Images and hypervisors**

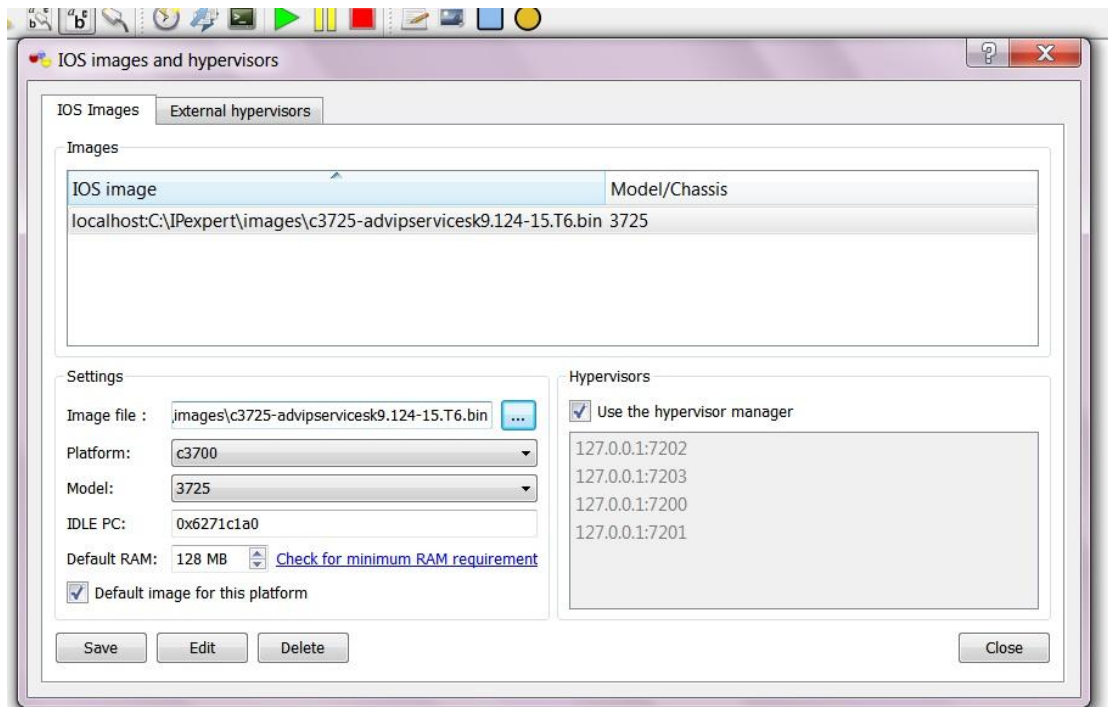


Fig-9

Use the following steps for IOS Images:

- 1- Image file: Select the image you have placed in the C:\IPexpert\images folder. You must have at least one image for the platform you will be using in the topology. (We are using C:\IPexpert\images\c3725-advipservicesk9.124-15.T6.bin) image.
- 2- Choose Platform, this should match with the IOS image you provided in the previous step. (We used the 3725 image so will choose the 3700 platform)

- 3- Choose the correct Model of your selected platform.
- 4- Provide the IDLE PC value, if you have one. (We used 0x6271c1a0. For the 3725 with the selected IOS image above, this value has shown promising results. But you may find this not to work so be aware this may need to be adjusted).
- 5- Select the Default RAM for the Platform. For best results use Cisco feature navigator to seek recommended RAM for the particular model. This model's recommended RAM is 256 MB, but our experience has shown giving 128MB is sufficient. Our Topology uses 15 devices so using 128MB for each device,  $128 \times 15 =$  just shy of 2GB. So your laptop/PC should have a minimum of 3GB. With 4GB or more you will have smooth sailing.
- 6- Put the check in Default Image for this platform. And Click **Save**.

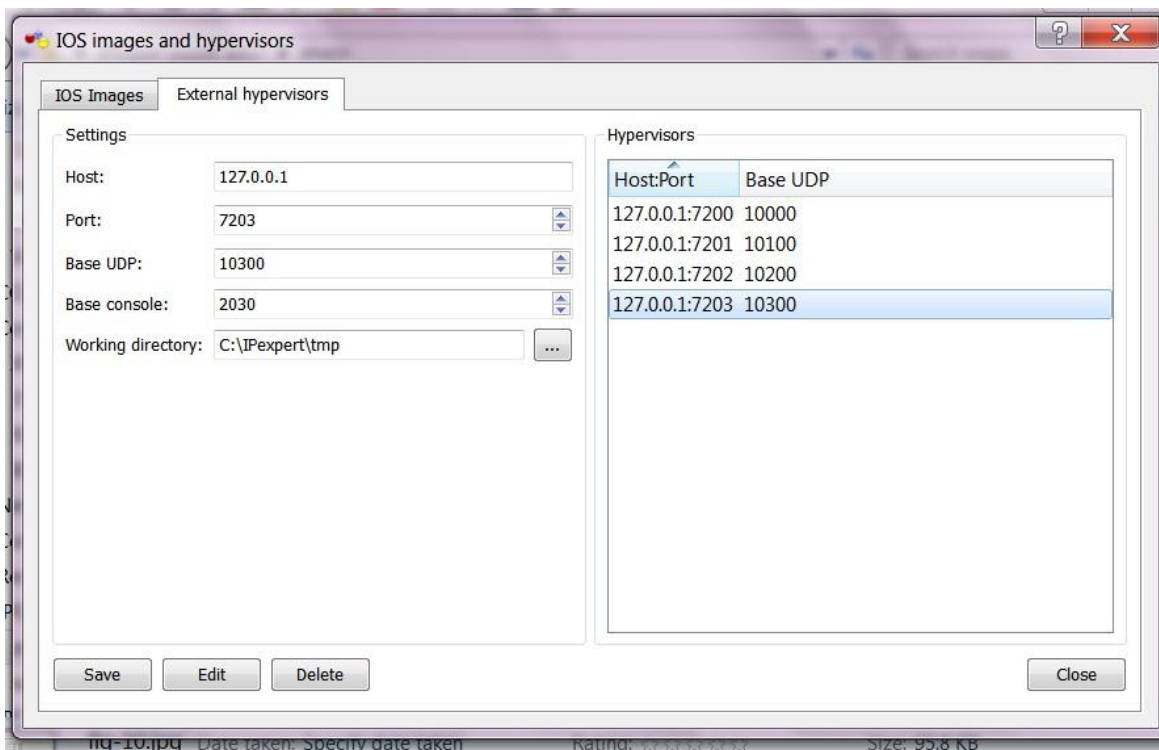


Fig-10

Click on External hypervisor and duplicate the Settings as shown in Fig-10.

- 1- Host 127.0.0.1
- 2- Working directory c:\IPexpert\tmp

**Note:** Click **Save at least 4 times to create 4 Hypervisors**. You should see four instances when finished in the right window as shown above. Using four instances will make these settings optimal for Intel's Core Ix processors, which support Hyper-Threading.

Click **Close**.

## Configuring Preferences

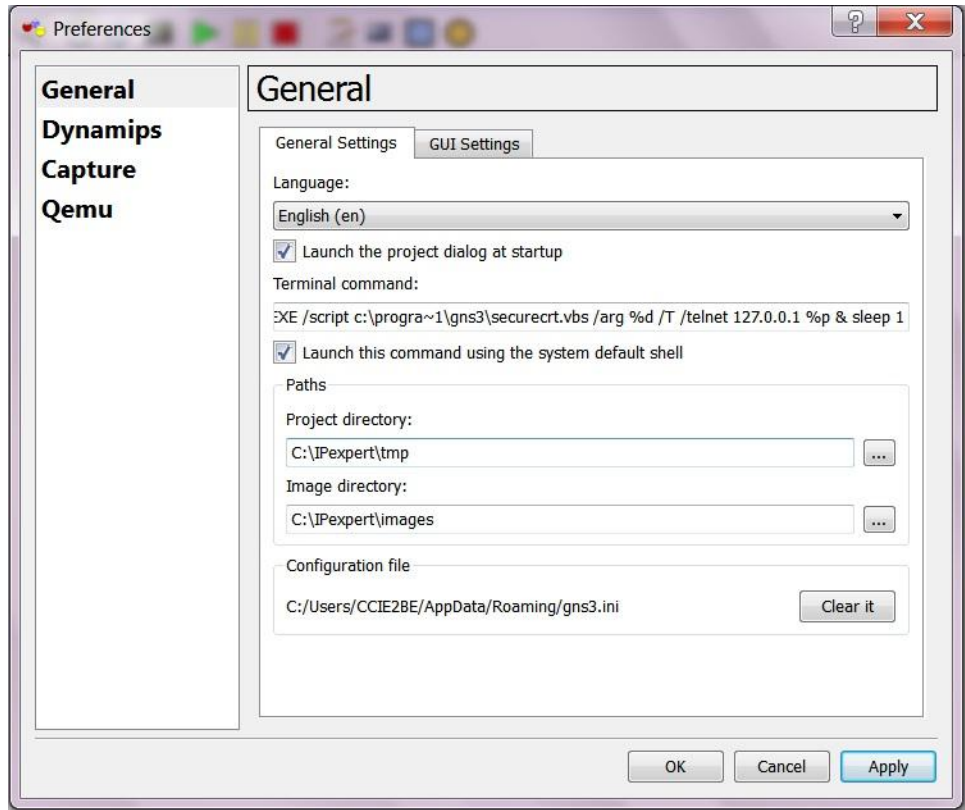


Fig-11

Click on **Edit -> Preferences** you will see a dialog box as shown in Fig-11

### **Click on General**

Change Terminal Command to following line:

```
c:\progra~1\SecureCRT\SecureCRT.EXE /script c:\progra~1\gns3\securect.vbs /arg %d /T /telnet 127.0.0.1 %p & sleep 1
```

**Note:** This setting is only required if you want to use SecureCRT as the default terminal software. SecureCRT is used in the CCIE exam. If you want to simulate the lab you can use the current version of SecureCRT without the use of tabs. We have found the benefit of tabs for doing practice labs far outweighs the benefit of duplicating the actual lab. Of course you will have your own opinion on this as well.

**Note:** The securect.vbs script used in the above command is provided with the IPexpert archive file you have downloaded with the pre-build structure.

An alternative to SecureCRT is PuttyCM: For those who believe in best breed of free software, there is one, PuttyCM. Details for this software installation and configuration are provided at the end of the document.

**Using windows default Telnet Client:** You do not have to use Secure CRT. But by default, Windows 7 does not install the Telnet Client. To install the Telnet Client go to the Control Panel > Programs and Features > Turn Windows features on or off > and select the Telnet Client. You may also use Putty or some other Terminal Emulation Software.

Last change the Project directory and Image directory settings as shown in Fig-11, then Click **Apply**.

### **Dynamips settings:**

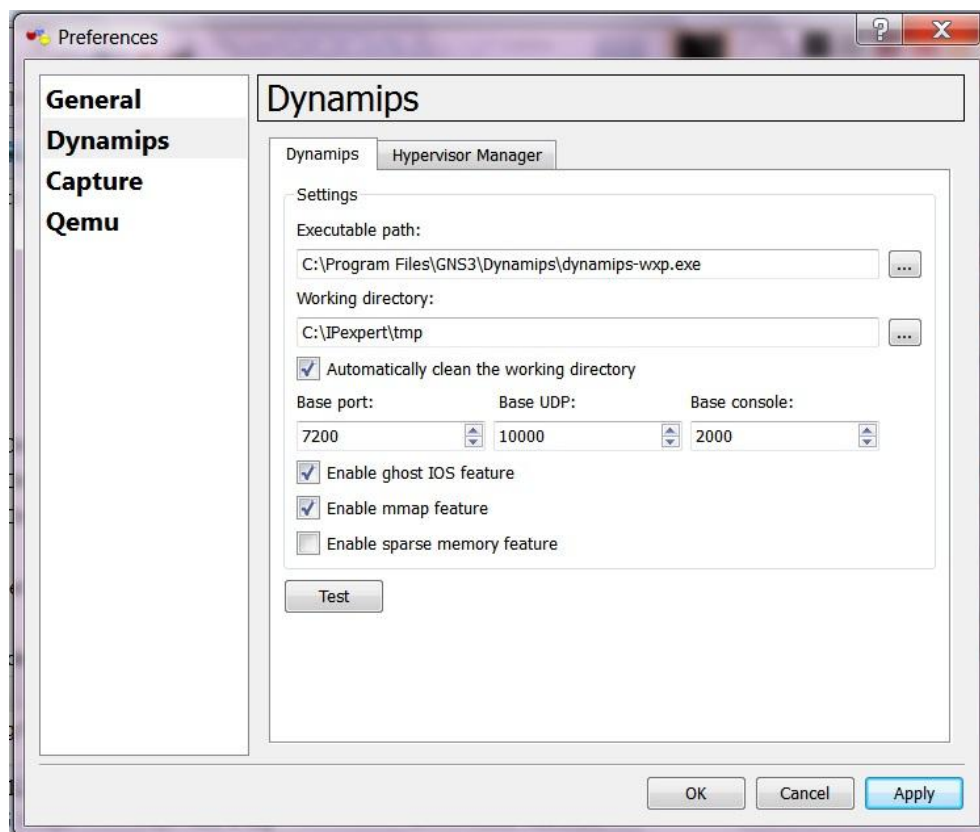


Fig-12

- 1- Change the Working directory to C:\IPexpert\tmp
- 2- Leave “Enable ghost IOS feature” and “Enable mmap feature” checked.
- 3- Uncheck “Enable sparse memory feature”.
- 4- Click **Apply**.
- 5- Click **Test**. If everything works well you will see “Dynamips successfully started” in green as shown in Fig-12.

**Note:** this test will only be successful if you have completed all the steps and already have software that supports a telnet client.

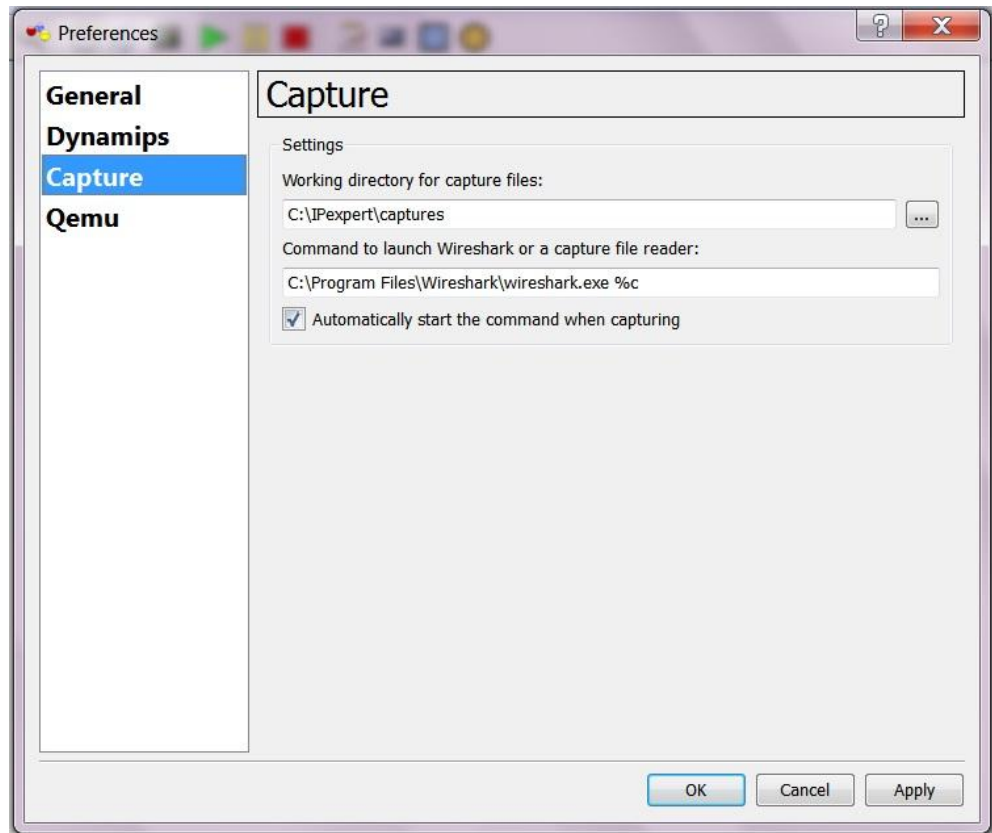


Fig-13

If you want to use packet captures, which is supported by GNS3 with no extra software or settings, you can use the settings as shown above. You should have Wireshark or some other capture reader installed prior to configuring this. Instructions for this are beyond the scope of this document.

**Define path for captured packets, C:\IPexpert\captures**

Click **Apply** and **OK** to close this dialog box.

## Loading the IPexpert Topology

We will load the IPexpert topology now to see how it all works. This topology is shipped with the zip file, and should be located in the folder “C:\IPexpert\projects\” if you used our file to create your folder structure.

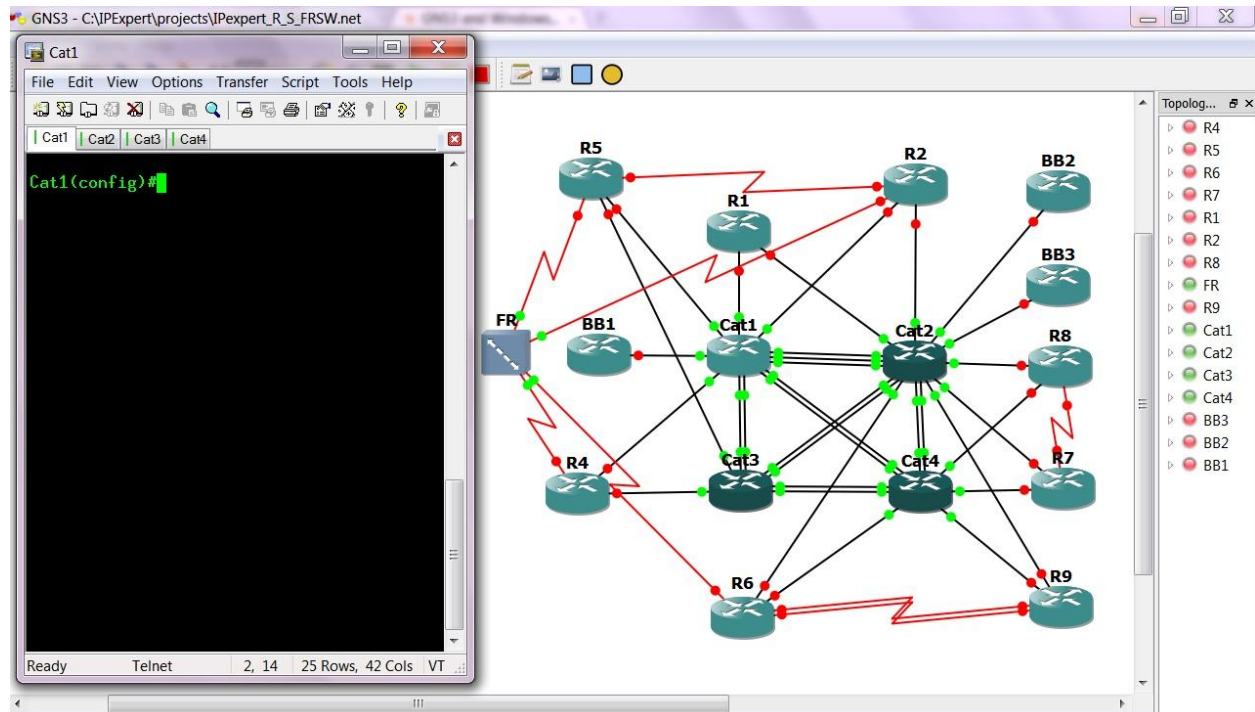


Fig-14

### **Important Notes:**

This guide **recommends** using GNS3 IPexpert topology on at least an **Intel Core i”x”** processor and we recommend a minimum RAM of **4GB** for optimal performance.

When loading the topology, load a set of four routers at a time. Then login into those routers consoles and wait until you get to the exec prompt. Then load another set of four routers, and repeat these steps until you have successfully loaded all the routers.

### **On a Side Note:**

Windows is not the optimal platform for running. When using GNS3 you will find x64 versions of Linux, like Ubuntu to better perform with the intense computing requirements of GNS3. These performance differences are easily noticed when comparing Windows to Linux. We highly recommended for serious GNS3 users to use Linux to run your virtual environment. The Linux version of this IPexpert guide can help you in setting up your environment even if you are not comfortable with running a Linux platform.

## Putty CM

Putty is a nice terminal software, its freely available under GNU license. Putty can be downloaded from <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

Putty is a good alternative of SecureCRT if candidate cannot afford SecureCRT price. Only issue involved with Putty is lack of native support for Tabbed sessions. Fortunately this support can be added to Putty by software called Putty CM. This software can be downloaded from [http://puttycm.free.fr/cms/index.php?option=com\\_content&view=category&layout=blog&id=41&Itemid=55](http://puttycm.free.fr/cms/index.php?option=com_content&view=category&layout=blog&id=41&Itemid=55)

PuttyCM needs .net frame work, which can be downloaded separately if your computer doesn't have it. Also site given above provide a setup which can download .net framework as part of installation, if one is missing.

**Note:** PuttyCM itself is not a terminal emulator software, instead its just a connection manager front end for putty. **We need Putty** to work as terminal software. Before proceeding for installation of PuttyCM, please download Putty and place it under **c:\IPexpert\supporting files** directory or any other directory you are comfortable with.

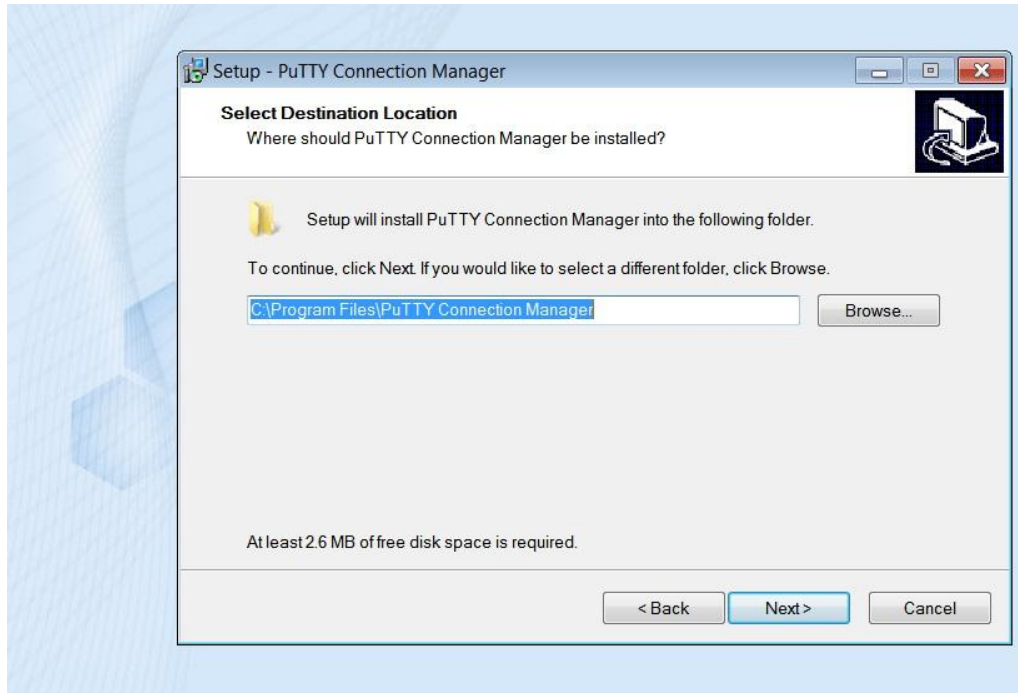
PuttyCM Installation:



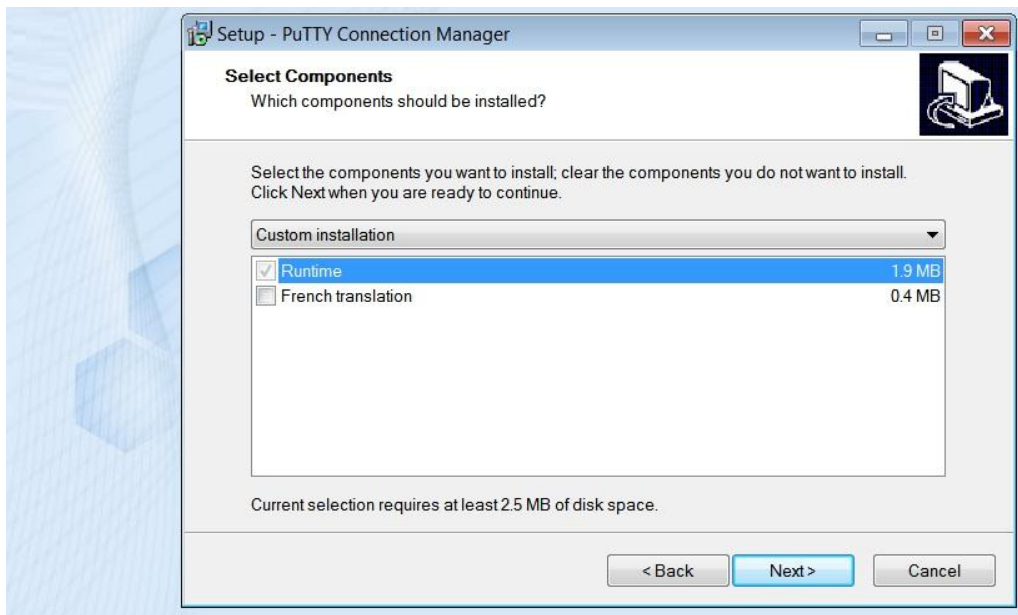
PuttyCM-1

Please click **Next** to initiate installation process. We will use default setting for installation.

## PuttyCM-2

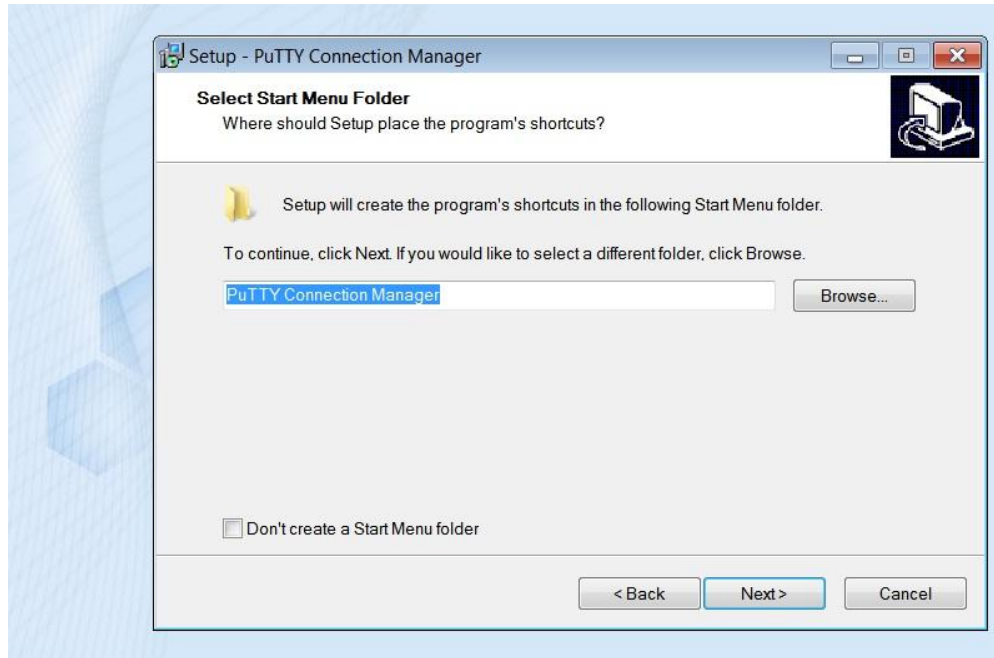


After accepting license agreement we will reach above step, keep default settings and press **Next**.



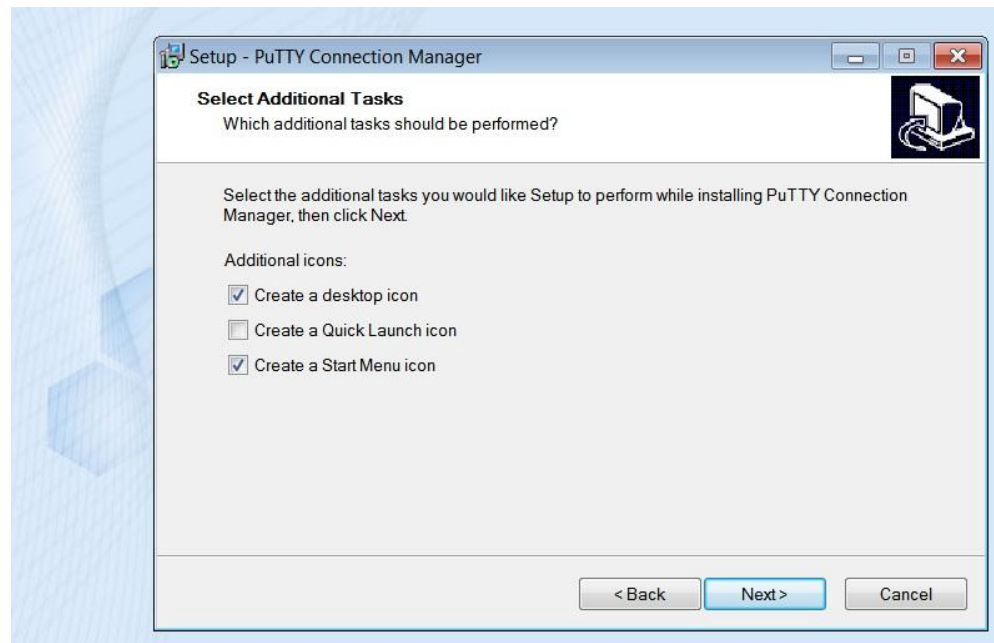
## PuttyCM-3

This dialog box gives us a chance to select French version of PuttyCM along with full/compact and custom installation. Default is custom installation. Please click **Next**.



PuttyCM-4

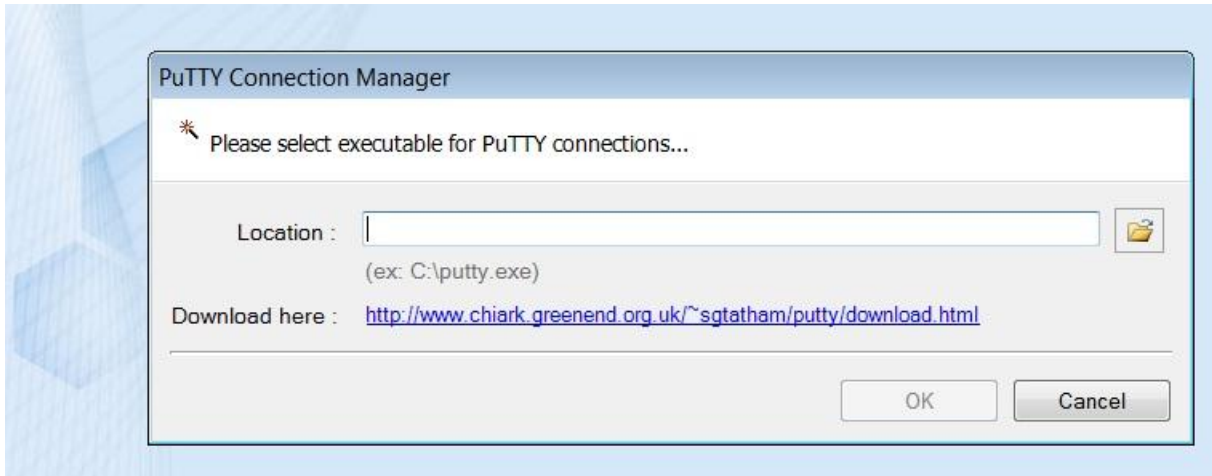
Click **Next** to finalize the setup.



PuttyCM-5

Click **Next** to finish Installation.

When setup will be finished, and in case you have selected to launch the software, you will see following dialog box, which asks for location of putty software.

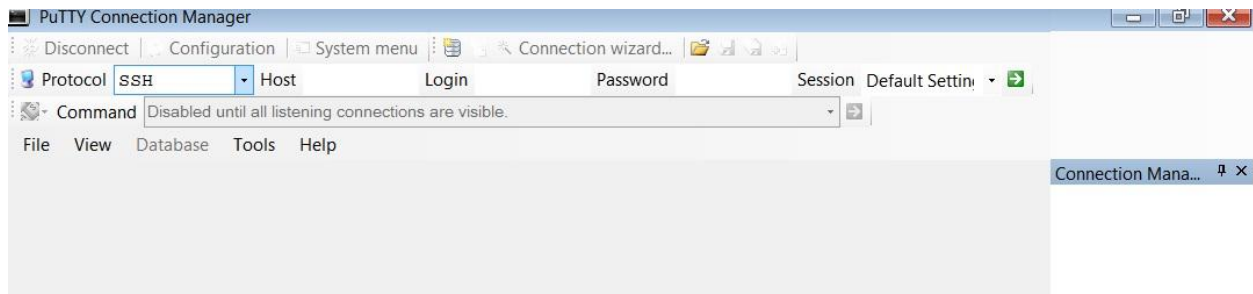


## PuttyCM-6

In case you have copied putty.exe file to **c:\IPexpert\supporting files** then navigate to that location and press ok, else provide the location you have selected other than above.

**Note:** It is very important that you must provide location for putty on first launch; failure to do so will create issues and may be you have to uninstall PuttyCM and reinstall it again.

**Important:** You should right click on PuttyCM icon and run it as administrator for at least once; this will help to register some required registry key values.



## PuttyCM-7

This is the first screen of PuttyCM without any configurations.

PuttyCM works with the concept of a database, it means you can setup PuttyCM once and save that database. Then you can utilize that database again and again, and even on different computers if connection information for your devices doesn't change.

Such a database/xml file is provided within the shipped zip file.