
net*TIMS GUIDE

Telecommunications Instructional Modeling System for
Internet Delivered Hardware Experiments

Emona TIMS Information: www.qpsk.com
visit net*TIMS live: www.webtims.com

net*TIMS Guide

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net*TIMS OVERVIEW

- Installing net*TIMS and setting-up net*TIMS experiments is easy.
- There is no programming involved.
- There is minimal setting-up, which primarily involves point-and-click actions with a mouse.
- Running net*TIMS experiments is also very easy with the net*TIMS graphical point-and-click interface. There is no programming involved.

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1.0 Overview of Emona TIMS and the net*TIMS System

Emona TIMS System – important background information

TIMS is laboratory hardware equipment used by students and professors to carry out experiments in telecommunications theory and concepts. The name "TIMS" stands for "Telecommunications Instructional Modeling System".

TIMS implements the block diagrams found in telecommunications text books. Experiments are implemented by patching together functional building blocks, called "TIMS modules", according to telecommunications block diagrams. Figure 1.1, below, shows a student implementing a simple modulation scheme using three plug-in modules and one fixed module.



Figure 1.1: TIMS-301 System Unit

Note that each module has knobs and switches: these are used by the student to vary parameters such as frequency, phase, amplitude and timing. These parameters must be adjusted so that the experimental results relate back to the theory and mathematical calculations.

Practically any telecommunications coding or modulation scheme can be patched together with TIMS. TIMS is a true mathematical modeling system as it implements the actual mathematical equations using real electrical signals rather than simulating equations using computer programs and numerical methods.

The only difference between a TIMS experiment and "real-world equipment" is that TIMS scales-down the carrier and sampling frequencies to make it easier for students to view and understand the signals they are viewing.

Emona net*TIMS – TIMS Experiments via LAN & Internet

net*TIMS allows students to carry out real TIMS hardware experiments "at a distance". Net*TIMS maintains the **TIMS block diagram approach** for implementing telecommunications theory and concepts using real hardware building blocks – "TIMS modules".

net*TIMS experiments function identically to the standard TIMS-301 experiments.

In net*TIMS, experiment control and manipulation is the same as with standard TIMS-301: students are able to vary parameters such as frequency, phase, amplitude and timing so that the experimental results relate back to the theoretical and mathematical calculations.

The key difference between standard TIMS-301 and net*TIMS, is that in net*TIMS each module's knobs and switches are adjusted via a graphical display on the user's computer screen.

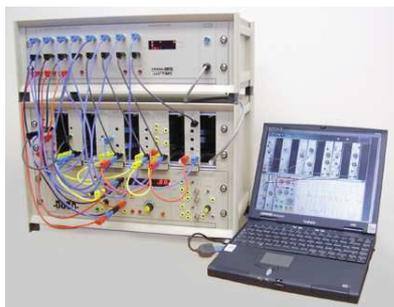


Figure 1.2: net*TIMS System & a laptop logged-on to the experiment

It is important to note that in net*TIMS, students actually **manipulate real hardware and view real electrical signals.** They are able to control the TIMS experiment from across a LAN or the Internet via an experiment control panel/screen displayed in their browser.

Figure 1.2 shows a net*TIMS System and experiment as it could be set-up at the College campus. The display on the computer is the same display a student would see via their browser, from home or another lab.

The net*TIMS screen layout viewed by the student closely resembles an actual hardware TIMS System in both appearance and operation in order to maintain the hands-on feel of TIMS as much as possible.

Getting net*TIMS Working

To get net*TIMS working in your lab, net*TIMS needs to be installed on your LAN or the Internet. This is described in detail in Chapters 2 and 3 of the User Manual. Once installation is completed, TIMS experiments can be edited and loaded onto net*TIMS. This is described in detail in chapters 4 and 5 of the User Manual. Chapter 6 describes how to interface net*TIMS to your LAN or the Internet.

Following is a summary of the steps involved in INSTALLATION and EXPERIMENT LOADING:

Installation of net*TIMS

Installation of net*TIMS involves three basic steps:

1. Set-up net*TIMS with a single computer to gain familiarity and verify the correct operation of the net*TIMS System;
2. Set up and connect net*TIMS to the LAN or Internet;
3. Enter student log-in information manually or upload a student file into the net*TIMS class list via the professor's secure net*TIMS Administration Web Page.

Setting-up net*TIMS experiments

Any TIMS experiment is easily set-up in only 3 steps:

1. The experiment is patched together on-screen using TutorTIMS simulation software (or the net*TIMS-Editor. Either application will perform the same task.). The completed experiment is saved as a ".tut" file;
2. The ".tut" file is uploaded to net*TIMS via the professor's secure net*TIMS Administration Web Page. It is this file which provides the display screen that students will see when they log-on to net*TIMS;
3. Insert the TIMS plug-in modules into the net*TIMS System and patch inputs and outputs together exactly as per the on-screen experiment of the ".tut" file which has just been loaded.

Net*TIMS is now ready for students and professors to log-on and perform the TIMS experiment.

1.1 Familiarization with net*TIMS Terminology

The following section will help you identify the important component parts of the net*TIMS System.

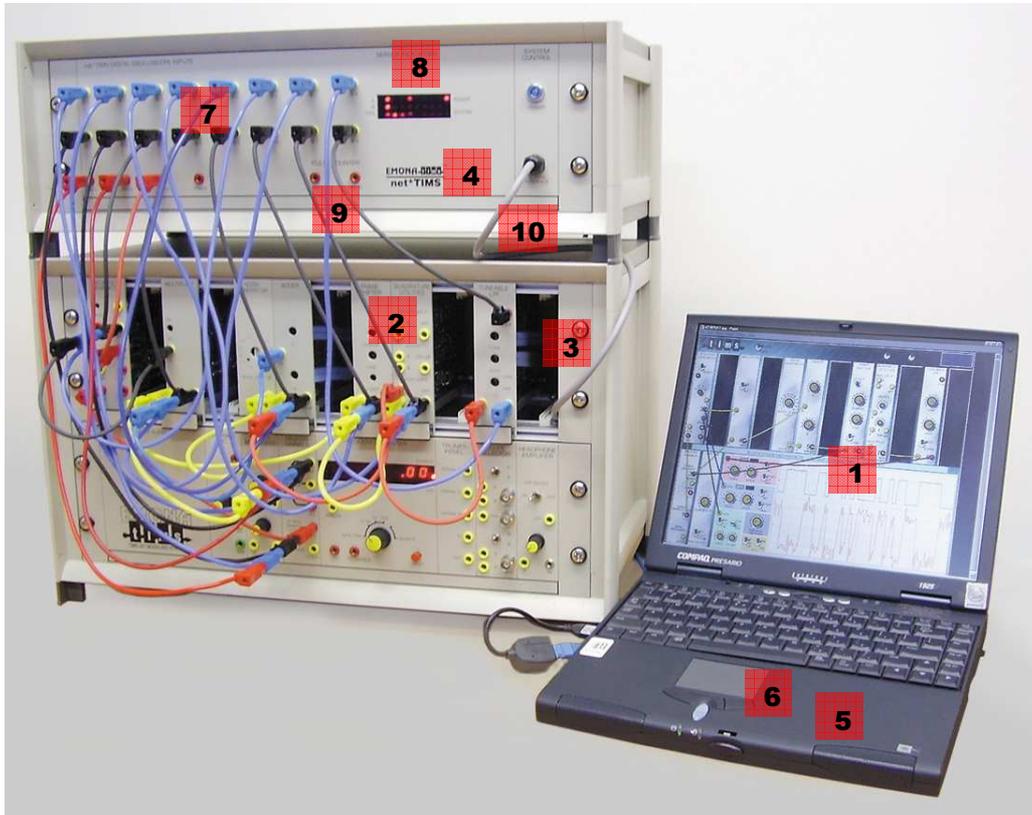


Figure 1.3: Basic net*TIMS experiment set-up

1. net*TIMS EXPERIMENT SCREEN: the graphical user interface which is a full screen representation of the patched plug-in and fixed modules, along with a virtual scope with spectrum (FFT) function.

An example of a BPSK experiment (modul., demod. & noisy channel) on net*TIMS is shown below:

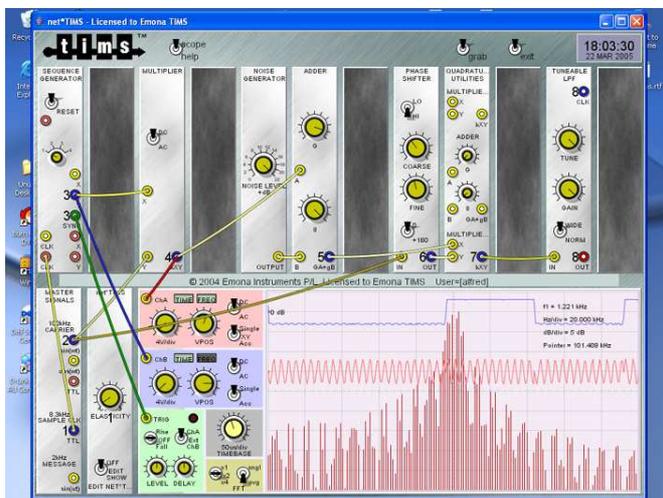


Figure 1.4: net*TIMS experiment screen

2. net*TIMS MODULES: TIMS plug-in modules which have been **net*TIMS-enabled**. This means that their knobs (potentiometers) and switches have been replaced with equivalent remote-controllable electronic devices and an interface daughter board added to control the communications interface with the net*TIMS SERVER.

3. net*TIMS RACK: the top plug-in rack of the TIMS system unit for net*TIMS modules. (This rack must be a net*TIMS-compatible version and can be retrofitted to existing TIMS Systems.)

4. net*TIMS SERVER: a web server unit which 'serves' the net*TIMS EXPERIMENT SCREENS to each user 'client' software, as well as housing the digital scope and multiplexer interface unit used to capture the actual signals for display. This unit also controls student access, monitoring and administration functions.

5. net*TIMS CLIENT: the application software used by a student on their personal computer to view the net*TIMS EXPERIMENT SCREEN and interact with the net*TIMS SERVER and net*TIMS experiment. This software may run in a **web browser window** or as a **stand-alone application** on the user's personal computer: both options are available from the net*TIMS SERVER home page.

The browser option requires automatic downloading of the client application into the browser every time the student logs into the experiment and then runs in the browser window.

The stand-alone option requires once only, manual downloading and saving of the application from the net*TIMS SERVER onto the user's personal computer. The stand-alone net*TIMS CLIENT is then run in its own larger window. To initiate contact with the net*TIMS SERVER the user needs to enter the IP address of the net*TIMS SERVER at runtime (done via a dialog box).

The stand-alone option is independent of the user's web browser and is recommended.

The net*TIMS CLIENT application is written in the JAVA programming language and requires that the user has the JAVA Runtime Engine installed on their computer. This application handles all display and FFT functions on the user's local computer, with no burden on the net*TIMS SERVER.

6. JAVA™ runtime environment: JAVA™ software is developed by SUN MICROSYSTEMS. The Java Runtime Environment (JRE) enables your computer to run applications and applets that use Java technology. The runtime engine is available as a download from www.java.com free of charge.

7. net*TIMS server SCOPE INPUTS: provides a total of 20 oscilloscope inputs for the net*TIMS experiment, including:

- 8 x channel A inputs – labeled A-1 to A-8;
- 8 x channel B inputs – labeled B-1 to B-8;
- 4 x trigger channel inputs – labeled TRIG-1 to TRIG-4.

8. net*TIMS server “SERVER INDICATORS”: SERVER INDICATORS is an array of LED displays which provide real-time indication of user activity and system diagnostics.

9. net*TIMS server “PULSE COUNTER”: allows Bit Error Rate (BER) measurements to be easily implemented in net*TIMS experiments. Two inputs are provided, CLK (bit clock) and PULSE (error pulse input – usually the output of the Exclusive-OR gate of the ERROR COUNTING UTILITIES module).

10. net*TIMS server “SERVER INTERFACE” cable and circuit board”: provides control and communications between the net*TIMS SERVER and net*TIMS MODULES.

2.0 Log on to a net*TIMS Experiment

2.1 ACCESS THE net*TIMS SERVER HOME PAGE

- Launch your web browser.
- Go to the Emona web site <http://www.webtims.com> Browse this web site for net*TIMS information.
- Click the links to the LIVE ! Experiment. These links will take you to the actual net*TIMS Server box located at our offices. (**The actual IP address of the net*TIMS Server is http://202.129.82.254**).
- The home page displayed below in figure 2.1 comes directly from the on-line net*TIMS Server.

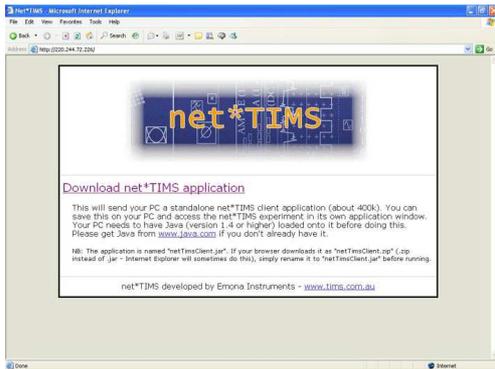


Figure 2.1: net*TIMS web home page

2.2 BEFORE ACCESSING THE net*TIMS EXPERIMENT

To access the net*TIMS experiment you need to download a net*TIMS application.

Note that the net*TIMS Experiment is **accessed directly without a web browser**.

2.3 DOWNLOAD THE net*TIMS STANDALONE CLIENT

- Click on "Download net*TIMS application".
- Save the application to your computer hard disk drive. See figure 2.2

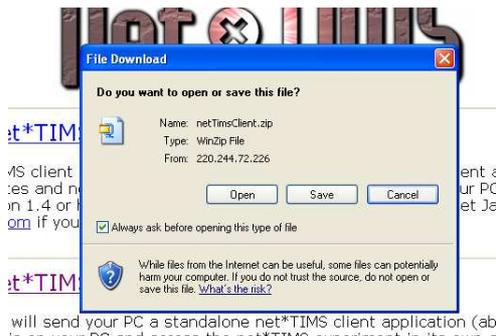


Figure 2.2: net*TIMS CLIENT standalone application download window

IMPORTANT: if your web browser adds a "ZIP" file extension, as shown above in figure 2.2, then you must do the following:

Rename the ".zip" to become ".jar", so that the file name is "netTimsClient.jar".

2.4 ACCESSING THE net*TIMS EXPERIMENT

An experiment has been uploaded into the net*TIMS Server for the purposes of this demonstration.

The professor has the flexibility to create practically any TIMS experiment on the net*TIMS System that can be implemented on the TIMS-301 Standard System.

To access the current experiment, you must be connected to the Internet. Run (double click) the standalone net*TIMS CLIENT you have just downloaded in the step above. If it doesn't run, check the file association is set to "Opens with: javaw" - right click the saved file, select PROPERTIES.

The net*TIMS CLIENT will ask for the IP address of the net*TIMS experiment in a dialog box.

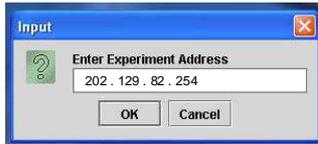


Figure 2.3: net*TIMS CLIENT IP address window

Enter the live Server address: <http://202.129.82.254> (it is not necessary type the complete IP address prefix "http://") and you will be connected 'live' to the net*TIMS Server.

Next, the net*TIMS CLIENT will ask for user name and password. Use the default user name and password. See figure 2.4 below:



Default user name: user



Default password: visitor

The experiment will now be displayed. The following is an example of a net*TIMS EXPERIMENT display on a computer:

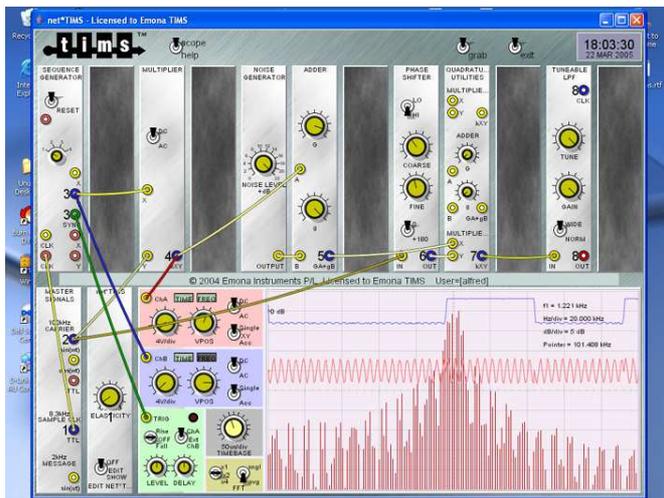


Figure 2.5: example net*TIMS EXPERIMENT display

NOTE: IT IS IMPORTANT TO REALIZE THAT THESE EXPERIMENTS WILL NOT FUNCTION UNLESS THE ACTUAL HARDWARE MODULES HAVE BEEN PLUGGED INTO THE net*TIMS RACK and PATCHED TOGETHER, EXACTLY AS DISPLAYED ON THE USER'S SCREEN. net*TIMS IS REAL HARDWARE AND IS NOT A SIMULATION.

3.0 RUNNING THE net*TIMS EXPERIMENT

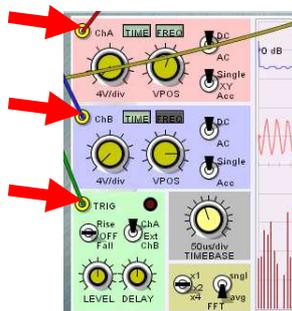
Users who are familiar with using the TutorTIMS simulation software, will find that net*TIMS experiments function in exactly the same manner.

 **SWITCHES:** to control SWITCHES
click over the switch with your left mouse button.

 **KNOBS:** to control variable KNOBS
click over the knob to highlight and either:

- (i) use the LEFT or RIGHT arrow keys to rotate the knob in small steps, or
- (ii) click the LEFT MOUSE button and drag the knob to the left or to the right to rotate. Alternatively, click on either side of the knob.

3.1 SCOPE INPUTS



To select a SCOPE INPUT
click on the scope input terminal "**ChA**", "**ChB**" or "**TRIG**" and the available viewing points in the experiment will be displayed with a number from 1 up to 8 (or 1 up to 4 for "TRIG").

Note that the scope also offers spectrum (FFT) display by clicking on the "**FREQ**" button. This signal is generated locally on the user's PC from the real signal captured and displayed.

"SCOPE" updates when and only when any switch or knob is adjusted. Otherwise the previous display is held.

3.2 ON-SCREEN HELP

- For detailed User Information, click on the **HELP** button.



3.3 GRAB – SCREEN CAPTURE TO JPEG FILE

To capture the current experiment screen, with all settings and displays, click on **GRAB**. This will generate a JPEG file of your screen which can be saved on your local hard disk drive.



3.4 EXIT - TO CLOSE

To close the net*TIMS CLIENT application, click **EXIT**.



3.5 MULTIPLE USERS

net*TIMS is a multi-user system, which shares the hardware with many users, serving each user independently. Number of current users currently logged-on is displayed for your information.