
net*TIMS GUIDE

Telecommunications Instructional Modeling System for
Internet Delivered Hardware Experiments

Emona TIMS Information: www.emona-tims.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 NOT SIMULATION.

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-301C experiments.

In net*TIMS, experiment control and manipulation is the same as with standard TIMS-301C: 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-301C 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.

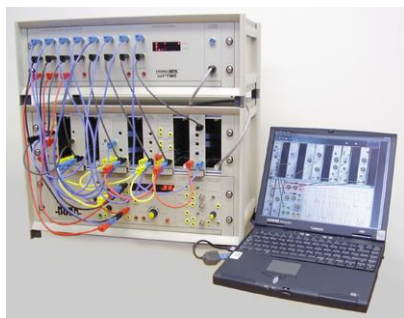


Figure 1.2: net*TIMS System & a laptop logged-on to the experiment

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 – how to set-up a net*TIMS System

To get net*TIMS working in your lab, net*TIMS needs to be connected to 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 Server 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 Rack 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.

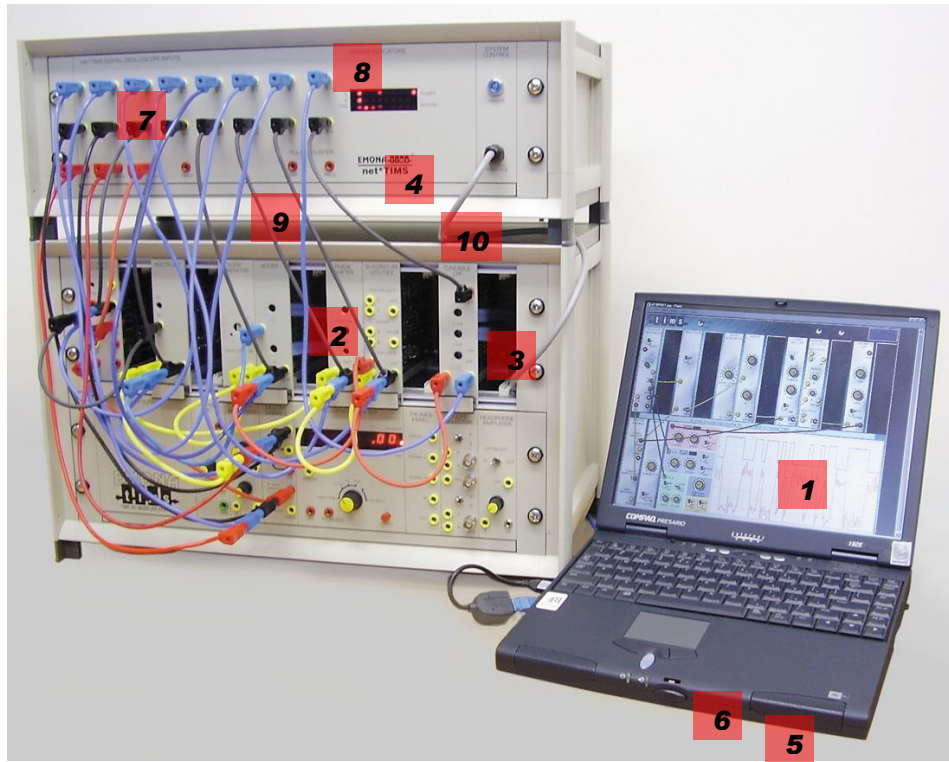


Figure 1.3: Basic net*TIMS experiment set-up

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 real scope with spectrum (FFT) function.

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

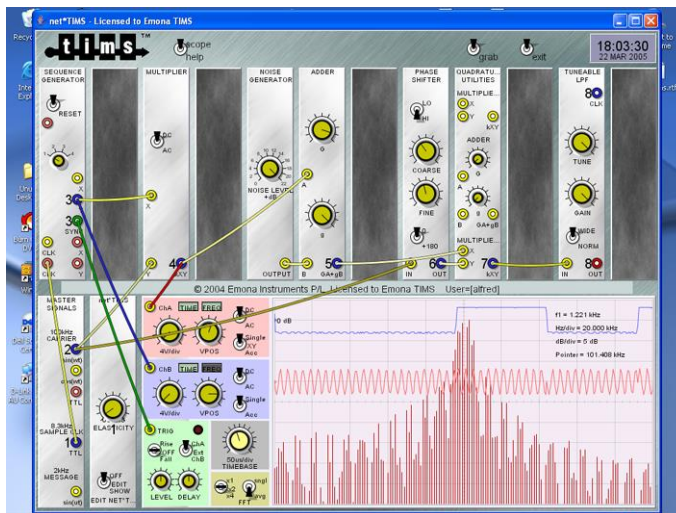


Figure 1.4: net*TIMS experiment screen

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 is run in a **web browser window, such a Chrome**, on the user's personal computer.

No installation of software is required. The user/student needs only to enter the IP address of the net*TIMS Systems into the web browser. The user/student logs into the experiment via a username and password (user/visitor for the Emona demo systems).

The net*TIMS CLIENT application automatically runs in the browser and handles all control, display and FFT functions on the user's local computer, with no burden on the net*TIMS SERVER.

6. 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.

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

8. 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).

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

2.0 Accessing 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.emona-tims.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.

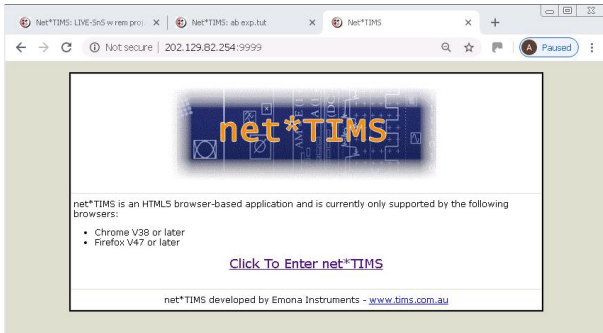


Figure 2.1: net*TIMS web home page

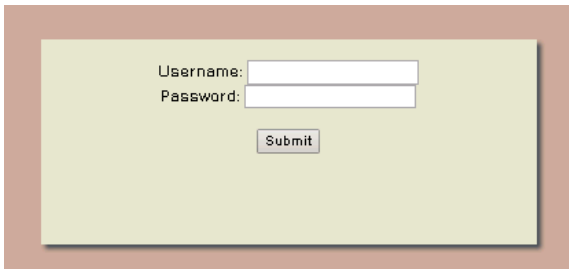
Click on the hyperlink “**Click To Enter net*TIMS**”, then click on the language of choice, ENGLISH or CHINESE.

2.2 LOGGING ONTO 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-301C Standard System.

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:

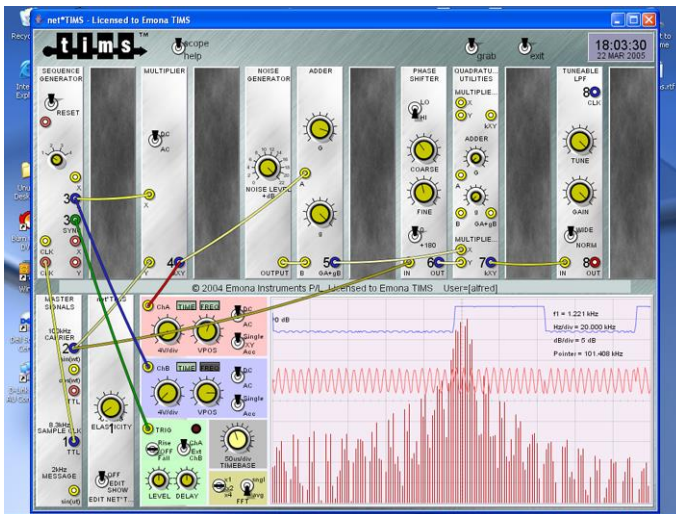


Figure 2.3: example netTIMS EXPERIMENT display

NOTE:

IT IS IMPORTANT TO REALIZE THAT THESE EXPERIMENTS WILL NOT FUNCTION UNLESS THE ACTUAL HARDWARE MODULES HAVE BEEN PLUGGED INTO THE netTIMS RACK and PATCHED TOGETHER, EXACTLY AS DISPLAYED ON THE USER'S SCREEN.

netTIMS IS REAL HARDWARE AND IS NOT A SIMULATION.

3.0 RUNNING THE net*TIMS EXPERIMENT

3.1 CONTROLLING SWITCHES AND POTENTIOMETERS

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

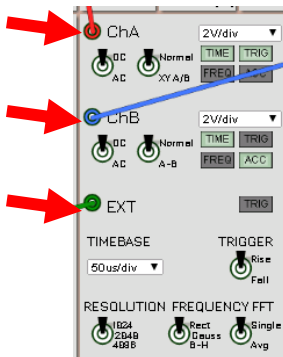
Hover the mouse pointer over the switch and click the LEFT mouse button.



KNOBS: to control variable KNOBS

Hover the mouse pointer over the knob, press 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.

3.2 CONTROLLING SCOPE INPUTS



OSCILLOSCOPE DISPLAY

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".)

SPECTRUM DISPLAY

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.

ACCUMULATE/PERSISTENCE DISPLAY

Accumulate mode, "ACC" is also available for viewing eye diagrams.

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

3.3 MULTIPLE USERS

net*TIMS is a multi-user system, which shares the hardware with **MORE THAN 30 USERS** simultaneously, serving each user independently. Number of current users currently logged-on is displayed for your information. See below "2 users" is displayed.

