Application Note
Remote Control

Overview

For a number of years now, manufacturers of broadcast equipment have used remote controlled test installations to allow them to test systems and modules for compliance against a huge array of broadcast and non-broadcast video formats and test patterns. Remote control is one tool that allows manufacturers to quickly check if the equipment under test meets its specification as well as providing documented test results. In this type of test installation scripts are used to select functions (such as video format and test pattern choice) and control the test equipment without the need to manually set up each test in turn.

The PHABRIX Sx hand held range and Rx rack mount range of test and measurement equipment provide a sophisticated range of remote control tools and applications to allow the remote access, remote control and remote automation of these units.

With over 400 different format combinations in broadcast and production worldwide, manufacturers have to design and test equipment that may need to support all or a large subset of these combinations. These have to be tested both in development and in production to ensure that they are compliant with SMPTE and EBU specifications. To do this the tools available within products such as the PHABRIX Sx and Rx instruments can be used. Automated scripts and remote control can be used to make systematic selection of generator test patterns, video formats, line rates, frame rates, colour spaces, bit depths, etc while the equipment under test is monitored and errors reported using the in-built logging system.

Away from the factory, however, the equipment under test may be down in the depths of the building and being temperamental. You need to find out what is going wrong but you don't want to spend the whole day standing over it waiting for it to go wrong. Here automated remote controlled testing does not help you.

Browser Control

The PHABRIX Sx range of hand held instruments can be controlled via a web browser that accesses the built-in web server. To connect to the Sx handheld instrument, find out the IP address (displayed in the Main Menu) and Enter it into the web browser.

The PHABRIX Rx 2000 instrument can be controlled via a web browser that accesses the built-in web server. To connect to the Rx2000 instrument, find out the IP address (displayed in the bottom right corner of the Monitor output and in the System - Network menu from the front panel) and Enter it into the web browser.

Clicking on the buttons works exactly like the instrument that you are connected to (note that autorepeat doesn't work due to browser speed limitations). The menu screen on the browser image is updated every 10 seconds but may be refreshed manually by clicking the screen area on the browser.

The "HDMI" link displays a copy of the HDMI output in the browser. Clicking on the position where a menu box appears on the browser HDMI display will control the corresponding menu on the actual Rx HDMI menu.

Image of Sx displaying Picture Instrument
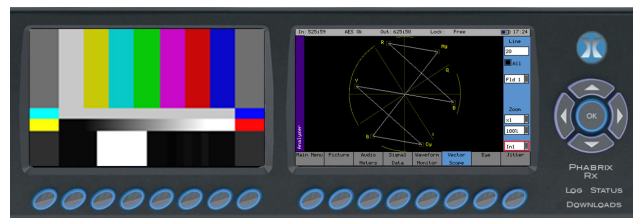
Remote Control Protocol

The software used on PHABRIX products is object oriented and each function of the system is given a unique Command ID to identify it and parameters to control it. A large number of these functions are exposed via the Remote Control and accessed via the network connection in the form of a series of Get and Set functions.

There are over 2000 different commands available, covering the generation of test patterns, audio tones, video format, analyser measurements, input status, system status and error conditions all of which are directly accessible via remote control.

There is a common subset of commands that operate both on the PHABRIX Sx hand held and PHABRIX Rx rack mount systems. This allows common remote control instructions to be used in installations where both these systems are present and also allow migration from Sx to Rx as businesses expand their operations.

A number of Windows-based applications are available to access these Command IDs, by number and by command name. These allows an Sx hand held or a Rx rack mount instrument to be controlled by the selection of individual commands and values.

PHABRIX Remote Control Interface Application

The PHABRIX Remote Control applications allows individual commands to be selected to get values or text from the specified objects or to set values or text on the specified object.

This application is ideal for learning the command structure and testing the individual commands of the PHABRIX Remote Control Protocol.
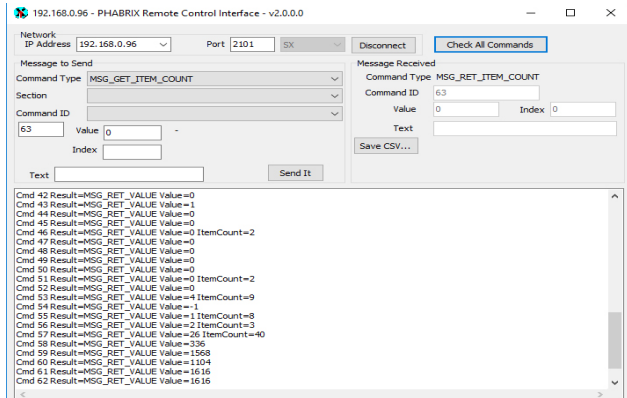

PHABRIX Remote Control Demo Application

The PHABRIX Remote Control Demo application is effectively a command sequencer that replays a series of command Gets and Sets on specified objects on specified PHABRIX units.

This application allows a Sx hand held or a Rx rack mount instrument to be controlled by an automate sequence of the selection of individual commands and values. This is a powerful tool for the automation of repetitive tasks in a development or manufacturing environment.

This application is available with a selection of examples that can be adapted by end user to perform a comprehensive range of automatic system configurations, test cases and measure results.

This application can be used to easily build sophisticated automated scripts which can be run repeatedly or continuously controlling up to 4 Sx or Rx units at the same time.
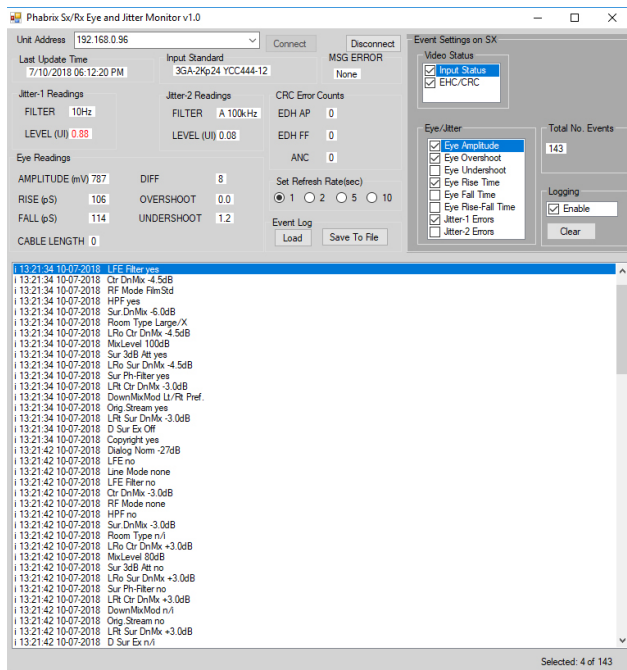
PHABRIX Remote Control SDK

The PHABRIX Remote Control Protocol is provided with example source code, classes and DLLs for Visual Basic, C# and Dephi for those wishing to develop their own bespoke remote control or to integrate testing using PHABRIX products into the own existing test automation installation.

The Remote Control SDK and applications are available at the following address:

https://phabrix.com/support/software-downloads/

Remote Controlled Testing

For a number of years now, manufacturers of broadcast equipment have used remote controlled test installations to allow them to test systems and modules for compliance against a huge array of broadcast and non-broadcast video formats and test patterns.

Remote control is one tool that allows manufacturers to quickly check if the equipment under test meets its specification as well as providing documented test results. In these types of test installations scripts are used to select functions (such as video format and test pattern choice) and control the test equipment without the need to manually setup each test in turn.
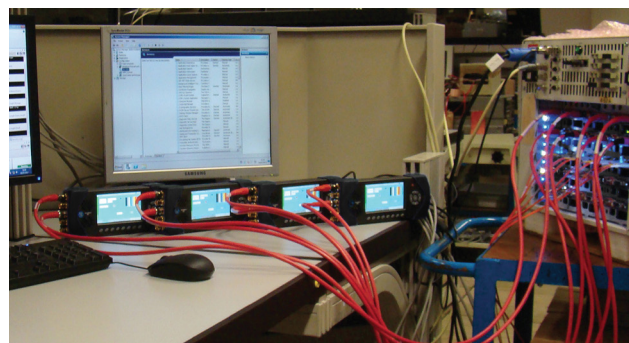

Grass Valley Sx Servers under automated test

With over 400 different format combinations in broadcast and production worldwide, manufacturers have to design and test equipment that may need to support all or a large subset of these combinations. These have to be tested both in development and in production to ensure that they are compliant with standards.

Automated scripts and remote control can be used to make systematic selection of test patterns, video formats, line rates, frame rates, color spaces, bit depths, etc while the equipment under test is monitored and errors reported using the inbuilt logging system. This approach to large scale testing for compliance has been adopted by many manufacturers.
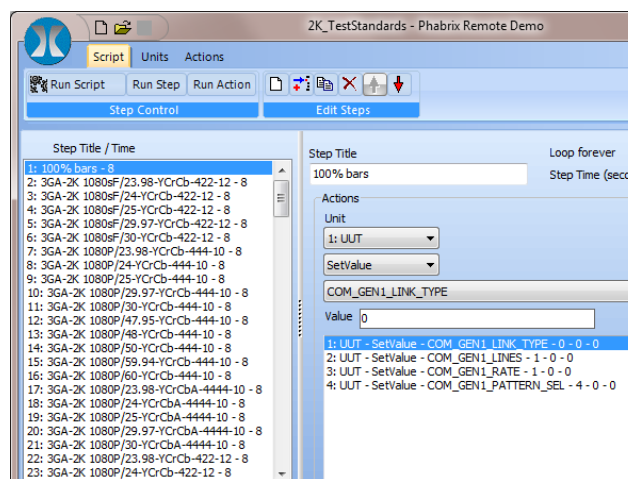

One typical approach to automated testing used by manufacturers is to setup specific parameters in the Sx or Rx (for example a specific test pattern and video format) for the generated video signal to the equipment under test while monitoring the equipment's output using the Sx or Rx analyzer.

A large amount of analytical information provided by the Sx and Rx analyser circuitry is accessible via the remote control link and includes checks for SDI transport errors, metadata errors, PCM audio levels, Dolby metadata information, video timing information and physical layer analysis (eye waveform and jitter).

The power of remote control only becomes evident when large numbers of different

variables combine to make the manual testing of such combinations impossible. For example testing all 140 different Dolby programme combinations via 450 different video formats which gives 63000 different possible and viable combination that a piece of equipment may need to process correctly.

Tools such as the PHABRIX Remote Control Demo application can be used to quickly construct comprehensive test routines that can systematically and repeatedly test defined aspects of any equipment under test.

This is ideal for production environments and even in the development lab, where a single change to software or hardware may have unforeseen consequences.

Remote Monitoring

With tools like SNMP you can only detect issues or error conditions that have been programmed to be trapped. This doesn't help you if the problem is with video signal itself or with equipment stability especially as most SNMP implementations are for unmanned computer automation and therefore can be difficult to operate manually. Ideally you need to place a piece of test equipment next to the problematic equipment and remotely monitor the findings of the test equipment and change parameters on the fly.

Depending on the type of problem, you may want to log issues over time or you may want an alert when some parameter fails. Being able to remotely monitor the test equipment allows you to keep an eye on it while you go about your normal activities.
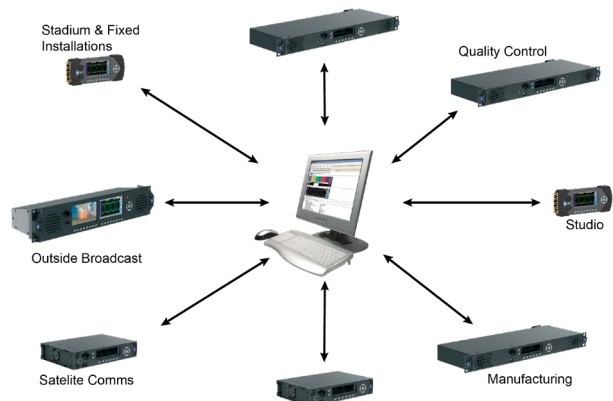
In many organizations remote monitoring of equipment has become an essential activity for keeping the studio running and programs on air. Video test systems need to allow you to remotely capture video data and deliver it locally for analysis via a standard network cable. This, however, only goes some way to help diagnose issues remotely.

Being able to intuitively control the test equipment remotely, including changing test patterns, analyzing specific waveforms, checking data and viewing error logs as well as having a graphical view of the equipment is a significant advantage.

Clicking with the mouse on the on-screen buttons controls the test equipment itself allows the selection of individual instruments, the selection of test parameters and displays a snap shot of the actual waveform display.

In some cases remote monitoring allows different functional areas of the equipment to be investigated and can allow video waveform analysis, video metadata analysis, input timing, audio levels, audio loudness and error logging which can have enormous advantages.
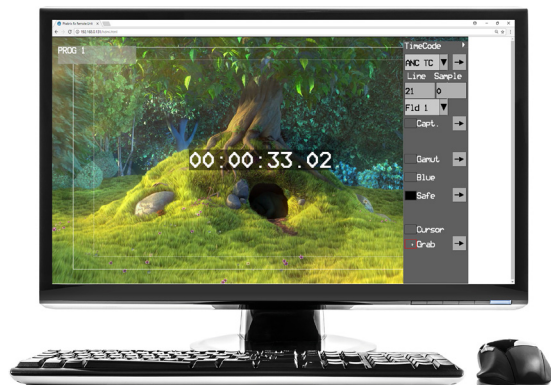
Being able to remotely check input timing can identify locking reference issues and mistiming

Remote Control of Multiple PHABRIX units

Logging of Events

Rx HDMI Display available via browser

between video sources. When there are audio problems, having access to the audio levels and to loudness measurement is essential for compliance. If there are intermittent issues, then being able to remotely setup different event triggers and logging the events to see if there was any effect can identify an elusive error.