

# H.323 Simulation & Testing

Simulation Suite for H.323 Calls & Traffic Generation

Application Note

## Sunrise Telecom H.323 Simulation Platform Solutions



NeTracker

### Introduction

One of the key features of a protocols test tool is the ability to generate phone/video calls or service oriented traffic to simulate conditions that occur in a real network. This feature, usually called Simulation or more appropriately Calls or Traffic Generation, meets the needs of potential users engaged in:

- Testing the correct functioning of new products before release
- Validating and debugging software
- Load testing during Test and Verification
- Measuring & setting Quality of Service (QoS) and Service Level Agreement (SLA) values
- Interoperability testing between devices and services from different manufacturers and carriers before activating new services
- Verifying and controlling the billing system.

### The Sunrise Telecom Solution

Sunrise Telecom has developed a comprehensive set of emulation suites to test different protocols for VoIP, including H.323, and SIP. Test Suites are also available for ISDN, SS7, and Analog. This application note covers the H.323 simulation suite. The current hardware platforms that support the H.323 Simulation suite are:

- NeTracker® 1000-DX and 6000-QX

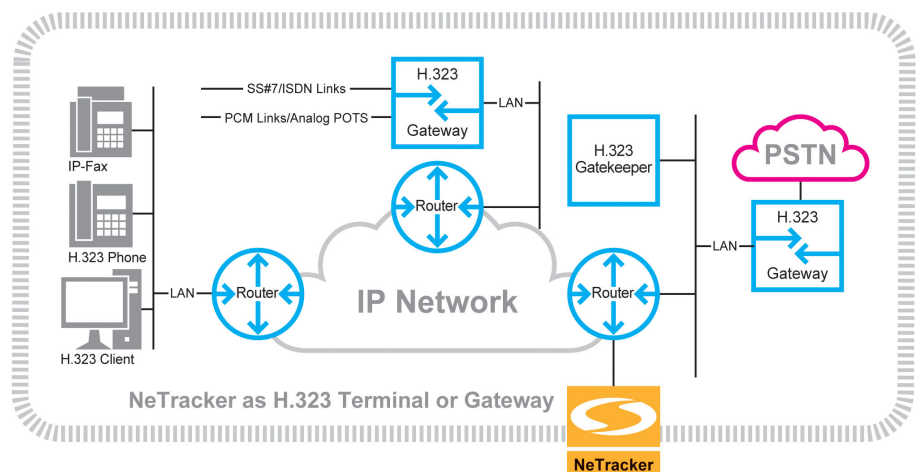
### H.323 Simulation Suite

The H.323 Simulation suite provides complete coverage of ITU-T H.323 v.2 & v.4. It allows simulation of different network elements such as:

- Single and multiple terminals
- Single and multiple gateways

### Supported Protocols

- RAS/Q.931
- H.225, H.235, H.245
- RTP/RTCP



## Simulation Modes

The following simulation modes are available:

- Registration only for a gatekeeper-stress test
- Call signaling only (H.225, Q.931, and RAS) with or without gatekeeper registration; with the "sig-naling only" mode users can generate voice, and video calls
- Call signaling with H.245 channel initiation, with or without a fast connect procedure
- Call signaling with H.235 (Security and Authentication) protocol. This allows Users to test the security part for the H.323 calls and registrations. Custom versions of the Authentication part are available as options
- Call signaling with RTP: transmission of pre-recorded voice or video file for path testing
- Call signaling with MOS (Mean Opinion Score) measurement based on either PESQ or NiQA algorithms
- RTP Transmission only (i.e. without signaling)

## Inter-Networking Testing

In conjunction with other simulation suites such as SS7, ISUP, ISDN, H.323, Analog, or SIP suites, users can perform simultaneous simulations on the VoIP and PSTN sides, for a complete inter-networking test.

## Configuration

An intuitive drag and drop interface makes test configuration fast and easy for non-expert users. There is no need for scripting or similar programming languages. Configuration is performed through 3 main steps:

- Set-up of the elements being simulated
- Set-up of the devices involved in the system being tested (such as router-gateways and gate-keepers)
- Traffic Models configuration

## Elements to Simulate Set-Up

The H.323 simulation suite allows simulation of hundreds of terminals or gateways, (depending upon the platform) in any combination, singly or in groups.

- Terminal configuration allows single or multiple IP addresses. If a simulated terminal has multiple IP assignments, it becomes a group of terminals.
- Gateway simulation allows one IP address to support multiple phone numbers.
- Multiple terminals or gateways may be configured to register themselves to a gatekeeper to carry out stress tests.

## Phone Numbers Set-Up

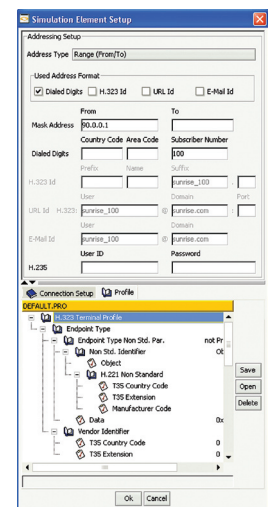
Phone number set-up supports both the ITU E.164 numbering notation and the H.323 Identifier format. A wild-card system allows the creation of ranges of addresses.

## Messages Parameters Configuration

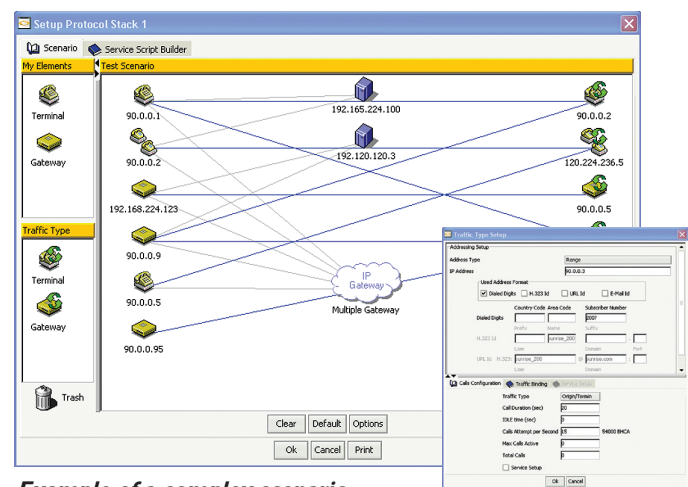
Thanks to an easy to use tree-view system users can set all the most significant parameters in the H.225, RAS, Q.931, and H.245 protocols messages and save them in libraries for an easy load and run test.

## Gatekeeper and Gateways in the System Being Tested

Single or multiple gatekeeper connections are possible. Users can configure entities (terminals or gateways) connected to different gatekeepers. The simulator allows simulation of elements located over different IP sub-networks by supporting multiple router/gateway addressing systems.



Phone numbers & protocol parameters set-up



Example of a complex scenario

## Traffic Models Configuration

Once the simulated entities (Terminals or Gateways) are set, the suite allows users to configure traffic models by setting the following parameters:

- Traffic type: either Terminated or Originated Calls
- Call duration
- Idle time between Calls
- Calls per seconds
- Enable or Disable Service Script function (allowing to generate RTP Traffic)

## Sending Voice: Service Script Function

The Service Script function allows users to generate voice traffic using pre-recorded files or customized audio files in RTP packets to simulate real voice conversation. The same audio file can be transmitted several times in the same call. Audio files can be transmitted and received back for path testing.

Voice samples are based on G.711, G.729 or G.723 codecs,. DTMF tones can be transmitted and received over RTP/RTCP for testing automated voice services like IVR, Call Centers or Voice Mails.

Jitter and packet loss values can be configured to introduce IP network impairments intentionally during packet transmission and analyze the reaction of the system being tested.

### Intrusive QoS Measurement

The Service Script allows also intrusive Quality of Service measurements. Loop-back voice calls are generated so that audio files are sent and received back. With the comparison between the source and the received audio files voice quality can be evaluated using PESQ algorithm, thus providing a QoS score for each call.

### Non-Intrusive QoS Measurement

VQmon/SA E-Model algorithm: Sunrise's implementation is based on the well-established ITU-T G.107 E Model, with extensions to support time-varying network impairments. It provides call quality metrics, including listening and conversational quality scores and detailed information on the severity and distribution of packet loss and discards due to jitter.

NiQA (Non-intrusive Quality Assessment) algorithm is designed to assess the listening quality of live customer traffic.

### Using Several Traffic Models For Complex Scenarios

Thanks to the flexible configuration, users can combine different elements to simulate (Terminals and Gateways) and traffic models to create scenarios from simple tests with one call type only, up to complete network simulations with multiple users generating different calls with heterogeneous types of voice traffic.

## H.323 Simulation Results

When the simulation is running, the H.323 simulation suite provides a unique set of analysis tools that includes:

### Trace

Protocol Trace with full message decoding, custom trace, and graphical format (ladder diagram).

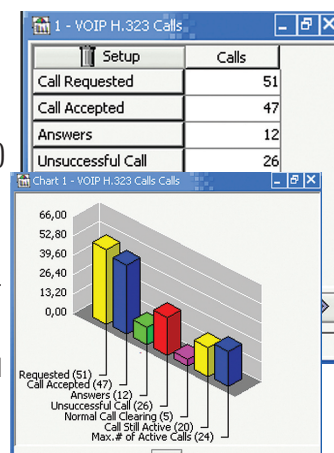
### Call Detail Record

CDRs are provided for each call (generated/received); CDRs include QoS measurement based on Jitter, latency, packets lost and MOS scores. The CDR-to-frame function automatically recovers all the related signaling frames and shows the entire call flow in a graphical format (Arrow Diagram); while the Frame-to-CDR function automatically recover the CDR related to a selected signaling message. Audio Playback function is available for each call for which the recording was enabled.

### Statistics

A complete set of statistics (in tabular and graphical formats) covers all the main protocol events:

- Signaling messages: a dedicated statistic is provided for every signaling protocol stack (H.225 RAS, Q.931, H.245, and H.235)
- Calls: a dedicated statistic allows for call completion analysis
- Disconnection causes: several dedicated statistics provide the reason why some calls or sessions were not successfully established
- QoS: statistics on Jitter and MOS scores are based on programmable thresholds.

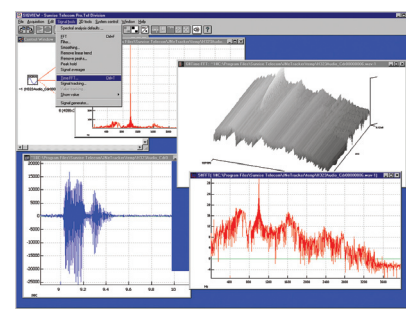


Statistic and chart

### Signal Analyzer

The Signal Analyzer Package allows a post analysis of the audio files recorded over the unit. The package includes:

- Complete signal spectrum analysis
- Signals Comparison functions
- 3D signal representation
- Scripting language for programming analysis



Audio signal analysis

## Analysis Tools: filters and triggers

Filters are available for both Trace and CDRs. Any number of filters with multiple conditions can be set.

Triggers allow the creation of an advanced traps system that combines protocol events, counters, and timers.

Triggers are based on a Graphical Editor.

## Applications

The H.323 Simulation suite has several potential applications for product designers, manufacturers, and service providers. The main applications include:

- Media gateway testing
- IP Terminal and IP-PBX testing
- Gatekeeper load testing
- Product qualification
- Interoperability testing
- In service QoS

## Ordering Information

### Suites and Protocol Packages

Part Number	Details
OPT-H323-TT	H.323 Simulator with RTP Traffic Generation. It includes the service script environment to create interactive tones and audio files send and receive sequences

### Options

Part Number	Details
OPT-PESQ	Intrusive QoS Analysis based on ITU P.862 (PESQ) algorithm
OPT-NiQA	Non-Intrusive Impairments Measurement and Analysis over PSTN (TDM flows) and VoIP (RTP flows) with an algorithm based on Psytechnics' technology used in ITU P.563
OPT-SIG-AN	Signal Analyzer Package for post analysis of the audio files recorded over the unit

### All other suites, protocol packages, options & accessories:

Please contact your local Distributor or Sales Representative.