KEY FEATURES

Feature, negative, load, regression, interoperability and scalability testing

Negative and proprietary messages and call flow definition

IMS and Class-5 services simultaneous emulation

Large-scale and high-performance solution

IMS AKA with IPSec support

IKEv1, IKEv2

Media security with SRTP/SRTP and IPSec

Device response latency measurements in real-time

Comprehensive media test capabilities

Testing of the following devices:

› Security gateways
› Session border controllers
› P/I/S-CSCFs
› Conference servers
› Presence servers
› VoIP proxy servers
› Voice and video mail servers

Line-rate generation and analysis of RTP/SRTP streams

Generation and analysis of MSRP

Dual-port Gigabit Ethernet interface

Thousands of registrations per second

Thousands of calls per second (signaling and media)
OVERVIEW

Next-generation networks are being deployed to enable network operators to provide differentiated services to their customers. These networks consist of several network elements that when interconnected, should provide a reliable and robust network infrastructure, supporting several feature-rich and high-quality services. Developing and deploying these networks present significant challenges to network equipment manufacturers, system integrators and network operators. These challenges include the ability to design and build against specifications that are evolving, get network elements from several vendors to interoperate, verify that the network will be able to support several types of IMS and VoIP services simultaneously and be robust under abnormal and normal network scenarios.

The sipFlex Test Suite is designed to alleviate all of these challenges with a single, very easy-to-use test application that provides comprehensive test capabilities to enable IMS and VoIP network and service testing during the various stages of development and deployment.

KEY TEST FEATURES

IMS Network Cloud Routing Emulation
› Emulates IMS network cloud consisting of two or more elements in the IMS network
  Example: UE→PCSCF, UE→PCSCF→ICSCF, UE→PCSCF→ICSCF→SCSCF, UE→PCSCF→ICSCF→SCSCF→ICBF

IMS and VoIP Feature Testing
› Tests Class-5 services at high rates and scale
  Example: Call forward, call transfer, call hold, 3PCC, presence, conference and instant message
› Creates traffic consisting of a mixture of features so as to simulate real-world subscriber behavior
  Example: Generation of thousands of calls per second with the following mix of services: 30% basic calls, 20% call hold, 20% call forward, 10% three-way conference, 10% 3PCC, 10% call transfer—while 50% of the registered subscribers are subscribing to presence services—publishing, subscribing to and updating presence information

Security Testing—IMS AKA, IPSec, IKE, SRTP and TLS
› Determines the capacity of simultaneous security tunnels supported by the network or device under test
› Determines the tunnel establishment and tears down rate of secure tunnels
› Emulates IMS AKA registrations at high rate along with IPSec tunnels with P-CSCF
› Establishes IPSec tunnels with security gateways using IKEv1 and IKEv2
› Uses static or dynamic IPSec
› Customizable IPSec/AKA parameters
› Establishes TLS session for all endpoints

Call Completion Rates and Causes of Failure Simulation
› Simulates call completion rates by simulating user response behavior
  Example: 70% of calls are responded to normally, 20% of users are busy, 10% of users do not answer (keep ringing), 5% of calls are redirected and 1% of calls are responded to with a user-selected error
**Message Floods**
- Simulates any SIP message flood consisting of one or more SIP messages
- Simulates registration floods
- Mixes several streams of message floods simultaneously
- Analyzes the impact of message floods on call/service completion rates and network/device response latency

**Key Performance Indicators Measurements**
- Measures user-defined intervals within each call flow
- Measures network/device response latency under load
- Hardware-based time stamping allows for accurate measurements even under load
- Collects and presents response latency in real-time

**Default Protocol Behavior Customization**
- Customizable default (spec-defined) protocol behavior
  - Example: Handling of re-invites, clearing calls, subscriptions, publications and protocol errors

**Protocol Timers Customization**
- User-configurable timer values for all protocol timers
- Customizable application behavior once timer has expired
  - Example: Do not refresh registration and generate a call once registration has expired

**Media Security**
- Secures media streams with SRTP/SRTCP and IPSec/IKEv2
- Key negotiation through SDP security description (RFC 4568)

**COMPREHENSIVE MEDIA TEST CAPABILITIES**
- Negotiates and transmits several codecs simultaneously
- Negotiates one codec but generate another type with higher bandwidth to test the theft of service protection function of the device under test
- Detects in real-time and at line speed whether the device under test is penalizing RTP streams that do not conform to their negotiated codecs/bandwidth
- Verifies path for every established stream to verify whether:
  - Media was detected
  - Media packets were misrouted
  - RTP codec received was not as negotiated
  - ToS/DSCP value for received packets was not as expected
- Measures quality of service (QoS) for delay, loss, inter arrival jitter, mean opinion score (MOS) and perceptual evaluation of speech quality (PESQ) with user-defined thresholds
- Provides records for each call that fail the path verification test or exceed the QoS thresholds
- Up to 15 statistics views for 15 combinations of codec, VLAN and ToS values
- User-defined wave files and packetization intervals
- Tests rogue media
- DTMF in SIP info and RFC 2833
- Messaging using MSRP
Automation and Troubleshooting
› TCL command line interface
› Built-in Ethereal monitor for each Ethernet port
› Detailed call records for user-defined thresholds violation

Real-Time Signaling Statistics
› Provides results in tabular and graphical formats
› Summary and detail statistics per entire system or per group of endpoints
› Signaling statistics per group of endpoints or per flow
› Registrations: successful and unsuccessful registrations with and without authentications
› Calls: successful and unsuccessful calls with and without media
› Session-timer: refreshed, requested, in-progress, successful and unsuccessful
› Event-notification: subscriptions, subscription state and reason code
› Messages: incoming, outgoing and retransmitted
› Errors: incoming and outgoing errors count
› TCP or SCTP connections: active, attempted, successful, unsuccessful and retransmitted
› User-defined customizable statistics view; displays focused statistics from any category in a convenient single view
› TLS connection states: handshake records and errors
› IPSec security associations: active, added, deleted and expired

Real-Time Media Statistics
› Analyzes performance for each individual media/codec type
› Measures quality of service (QoS) for delay, loss, inter arrival jitter, mean opinion score (MOS) and perceptual evaluation of speech quality (PESQ) with user-defined thresholds
› Validates path of RTP/SRTP and RTCP/SRTCP packet, detecting teardown time, misrouted, unexpected or multiple codecs
› RTP DTMF and signaling DTMF sessions active or failed and the reason for failure
› Validates MSRP message transmission and reception

PERFORMANCE AND SCALE PER PLATFORM

<table>
<thead>
<tr>
<th>Platform</th>
<th>QualityAssurer QA-604</th>
<th>InterWatch R14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique endpoints/IP addresses</td>
<td>2 048 000</td>
<td>2 560 000</td>
</tr>
<tr>
<td>RTP/SRTP streams</td>
<td>128 000</td>
<td>320 000</td>
</tr>
<tr>
<td>TLS sessions</td>
<td>512 000</td>
<td>640 000</td>
</tr>
<tr>
<td>IPSec sessions</td>
<td>256 000</td>
<td>320 000</td>
</tr>
<tr>
<td>Unique MAC addresses</td>
<td>2 048 000</td>
<td>2 560 000</td>
</tr>
<tr>
<td>Unique default gateways</td>
<td>2 048 000</td>
<td>2 560 000</td>
</tr>
<tr>
<td>Registrations per second</td>
<td>14 400</td>
<td>18 000</td>
</tr>
<tr>
<td>Calls per second</td>
<td>3400</td>
<td>4250</td>
</tr>
</tbody>
</table>
### Protocol Specifications

**Transport**
- TCP, UDP, SCTP

**Network**
- IPv4, IPv6

**SIP**

**IMS**
- 3GPP TS 24.229
- 3GPP TS 33.203
- 3GPP TS 33.210
- Gm, Mw, Mr, Mg, ISC interfaces

**Security Protocols**
- TLS
- IPSec
- IKEv1, IKEv2
- SRTP

**MSRP**
- RFC 4975

**RTP/RTCP**
- RFC 1889, RFC 1890, RFC 2190, RFC 3388, RFC 3551, RFC 3268

**Audio/Video**
- ITU-T G.711 (PCMU, PCMA)
- ITU-T G.721
- ITU-T G.722
- ITU-T G.723
- ITU-T G.726
- ITU-T G.728
- ITU-T G.729
- AMR
- AMR-WB
- ILBC
- H.264
- H.263
- EVRC, EVRC-B
- GSM-EFR, GSM-FR, GSM-HR

**DTMF**
- RFC 2833

**Voice and Video Quality Analysis**
- ITU-T G.107 E-model
- ITU-T P.800.1 mean opinion score (MOS)
- ITU-T rec. P.862 (PESQ)

### Ordering Information

For ordering information, please contact isales@EXFO.com

---

EXFO serves over 2000 customers in more than 100 countries. To find your local office contact details, please go to www.EXFO.com/contact.