# SS7 ISUP and Converged Networks

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-	3/ 1	HSL H10	1	002-002-00	001-001-00	SS7 ANSI ISUP IAM	227	HDLC	Called Party=4690000228	_
-	3/ 1	HSL H02	1	002-002-00	001-001-00	SS7 ANSI ISUP IAM	227	HDLC	Called Party=4690000228	
4	3/ 1	HSL H02	1	001-001-00	002-002-00	SS7 ANSI ISUP ACI	M 226	HDLC		
-	3/ 1	HSL H10	1	001-001-00	002-002-00	SS7 ANSI ISUP ACI	M 226	HDLC		
-	3/ 1	HSL H02	1	001-001-00	002-002-00	SS7 ANSI ISUP AN	M 177	HDLC		
-	3/ 1	HSL H10	1	001-001-00	002-002-00	SS7 ANSI ISUP AN	M 177	HDLC		
4	3/ 1	HSL H02	1	001-001-00	002-002-00	SS7 ANSI ISUP RLC	75	HDLC		
	3/ 1	HSL H10	1	001-001-00	002-002-00	SS7 ANSI ISUP RLC	75	HDLC		100
-	3/ 1	HSL H10	1	002-002-00	001-001-00	SS7 ANSI ISUP REL	76	HDLC	Cause=Normal clearing	
4	3/ 1	HSL H10	1	002-002-00	001-001-00	SS7 ANSI ISUP IAM	228	HDLC	Called Party=4690000229	
	3/ 1	HSL H02	1	002-002-00	001-001-00	SS7 ANSI ISUP REL	76	HDLC	Cause=Normal clearing	
-	3/ 1	HSL H02	1	002-002-00	001-001-00	SS7 ANSI ISUP IAM	228	HDLC	Called Party=4690000229	
+	3/ 1	HSL H02	1	001-001-00	002-002-00	SS7 ANSI ISUP ACI	M 227	HDLC		
	3/ 1	HSL H10	1	001-001-00	002-002-00	SS7 ANSI ISUP ACI	M 227	HDLC		
-	3/ 1	HSL H02	1	001-001-00	002-002-00	SS7 ANSI ISUP AN	M 178	HDLC		
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Our Spectra2 SS7 ISUP support provides VoIP users with an integrated platform for testing and analysis of converged networks. Spectra2 can monitor, test, and generate SS7 ISUP signaling at the point of ingress or egress from any Media Gateway Controller or Signaling Gateway. Test legacy and next-generation networks with one Diagnostic solution.



Application Brief

# Spectra2 SS7 ISUP Solution

As SS7 systems designed for the PSTN (Public Switched Telephone Network) converge with IP-based networks carrying voice, data, and video, carriers and equipment manufacturers must be able to test calls that are converted from the PSTN to VoIP at the point of call conversion.

Spectra2 includes test cases, protocols, and analysis tools in one integrated solution. Users can Monitor, Test, and Generate, from a single test script on one test box, saving time, money, and development costs. Spectra2 supports ANSI, ETSI, ITU, and country-specific variants for Japan, Brazil, China, UK, Hong Kong and Israel protocol stacks, offering multi-protocol analysis for real-time visibility into converged networks.



Figure 1. Spectra2's Network Configurator provides a graphic representation of Level 3 network elements. Drag and drop network elements into place, connect the elements through link sets, then configure accordingly.

# SS7 ISUP: Monitor

Spectra2's SS7 ISUP Monitoring supports low- and highspeed SS7 signaling links (SS7 over ATM and HDLC). Users can monitor ISUP traffic at the point of ingress or egress from any Media Gateway Controller or Signaling Gateway.

Support for multi-protocol analysis of H.323, SIP, MGCP, Megaco, RTP, RTCP, and now SS7 ISUP provides visibility into your testing environment. Tektronix' VoIP solution for SS7 ISUP uses all Spectra2 monitoring tools, including:

- ► Call Trace Quickly reconstruct all captured calls, including call status and associated messages.
- ► Message Filtering Apply pre- and post-capture filters.
- ► Text Export Easily export call trace information and PDUs in an open text format.

Users can also monitor ISUP and SCCP/TCAP applications running over M3UA transport.

# SS7 ISUP: Test

Spectra2's Tester lets users put SS7 ISUP and VoIP call legs in the same test script. This allows testing of both sides of a signaling gateway and multi-protocol analysis. Users can also test ISUP bearer paths and RTP voice streams in the same test script. Spectra2's SS7 ISUP Testing application also supports low- and high-speed SS7 signaling links (SS7 over ATM and HDLC).

Spectra2's easy-to-learn, easy-to-use scripting interface lets users configure pre-packaged test suites for ISUP based on ANSI, ETSI, ITU, China, UK, Japan, Brazil, Hong Kong, and Israel protocol standards.

#### Spectra2 also includes:

- ► Spectra2's simple and clear "ping-pong" editor. Write and edit test cases with minimal effort.
- ► Inject and detect media and associated signaling (single frequency, DTMF, WAV, and QoS with PESQ).
- ISUP trunk testing capabilities that work in Test or Generator mode. Users can validate signal and media performance using SS7 ISUP.
- A graphic-based network configuration tool that lets users drag and drop network elements into place, connect the elements through link sets, and configure the network accordingly.
- Scheduler, an integrated application that lets users automate conformance testing and generation.
- Support for scripting of ISUP applications running over M3UA.



 Figure 2. Spectra2 can test ISUP and TCAP applications running over the M3UA protocol from a single test system.

# SS7 ISUP: Generate

Spectra2's Generator application allows bulk call generation of ISUP Signaling with associated media. Spectra2's SS7 ISUP Generator also supports low- and high-speed SS7 signaling links (SS7 over ATM and HDLC).

Users can write their own test scripts and perform call set up and voice path validation across T1, E1, and DS3 trunking interfaces. Spectra2's Generator tools and features simplify performance testing and provisioning of call models.

- Generate up to 450 ISUP calls per second per board, bringing the BHCA total to 25.92 million on a fully configured system.
- ► Support for call processing statistics and network signaling quality of service (QoS).
- ▶ Basic statistics for MTP2 and MTP3.
- ► The Answer Seizure Ratio (ASR), which provides a more comprehensive look at network service and signaling.
- ► Support for scripting ISUP and SCCP/TCAP applications running over M3UA transport.

# BICC Transport and Media Options for Converged Networks

The Spectra2 platform supports a BICC Testing Package to address the needs of users who are implementing BICC (Bearer Independent Call Control) in a converged network environment. Spectra2 supports scripting of BICC call models in the Monitor, Tester, and Generator applications with associated RTP media.

The Spectra2 BICC Testing Package also provides the ability to emulate BICC Service Nodes (SNs) for IP media bearer testing and BICC STC transport. The addition of BICC support for Spectra2 lets carriers ensure delivery of existing revenue-generating voice services.

The Spectra2 BICC Testing Package supports the following transports:

- ▶ITU, ANSI, and ETSI BICC over SCTP
- ► BICC over MTP3/MTP3B transport

Associated RTP media testing is also supported in conjunction with BICC, as well as Capture, Statistics, Call Trace, and Network Configuration. BICC over SCTP and BICC over MPTP3/MTP3B signaling use the Spectra2 SNIv3 board and the Spectra2 STI / WTI-RTP board for associated RTP media.



Figure 3. Spectra2's Generator displays ISUP statistics in a graphic format. View calls per second intervals, total intervals, and script completion per interval for both origination and termination scripts.

# SS7 ISUP and Converged Networks

Application Brief

### **Protocol Support**

#### SS7 ISUP

ANSI T1.113-2000, August 2001

ITU-T Q.763, December 1999 Addendum 1, June 2000 Corrigendum 1, July 2001

ETSI EN 300 356-1 v.4.2.1, July 2001

ETSI ES 201 296 v.1.3.1, April 2003

Ministry of Posts and Telecommunications of the People's Republic of China, Technical Specification of ISUP, 1996

Japan ISUP

NTT/TTC JT-Q.701 - 704, April 1992

NTT/TTC JT-Q.707, November 1990

NTT/TTC JT-Q.761 - 764, November 1999

NTT/TTC JT-Q.850, November 1996

Brazil ISUP

ISUP 220.250.732, August 1996

UK ISUP

PD 6623:2000, PNO-ISC Specification Number 007 ISDN User Part BSI, July 2000

Hong Kong ISUP

HKTA 2202, Issue 3, August 2001

Israel ISUP

Technical Requirement Specification for Signaling System No. 7 ISDN User Part (ISUP) in BEZEQ's Network for the national interface (1993)

#### SS7 ISUP Conformance Test Suites

ITU-T Q.784.1, July 1996 ITU-T Q.785.2, March 1999 ANSI T1.236-2000, May 2000 ETSI EN 300 356-32 v.3.0.4, September 2000 ETSI EN 300 356-35 v.3.1.2, September 2000

#### M3UA Transport

IETF RFC 3332

#### BICC

ITU-T Q. 765.5, 2004 ITU-T Q.1902.1, 2001 ITU-T Q.1902.2, 2001 ITU-T Q.1902.3, 2001 ITU-T Q.1902.4, 2001 ITU-T Q.1902.5, 2001 ITU-T Q.1902.6, 2001 ITU-T Q.1950, 2002 ITU-T Q.1970, 2001 ITU-T Q.2150.0, 2001 ITU-T Q.2150.3, 2001 ANSI T1. BICC.1-7, 2000 ETSI EN 302 213, v.1.1.2, January 2004

# SS7 ISUP and Converged Networks Application Brief

# Available Packages for Spectra2

- ► VoIP Analyzer
- ► PSTN Analyzer
- ► ISUP Testing
- ► SIP Testing & Generation
- ► SIP-T Testing
- ► SIP/TLS Testing
- ► H.323 Testing & Generation
- ► MGCP Testing & Generation
- ▶ Megaco Testing & Generation
- ▶ Binary Megaco Testing
- ► Multi-Gateway Support for Megaco and MGCP
- ► Media Testing
- ► Voice Quality Testing
- ► Passive Voice Quality Testing
- ▶ RFC 2833 Testing
- ► Application Programming Interface (API)
- Historical Statistics
- ► ISUP Testing
- ► Japan ISUP Testing
- ▶ BICC Testing
- ► TCAP Generator
- ► M3UA Support for ISUP & TCAP

### **Portable Chassis Specifications**

- ▶ 9.5 kg (21 lb)
- ▶ 41 W x 25 D x 27 H cm
- ▶ 16.1 W x 9.8 D x 10.6 H in
- Flat Panel 35.8 cm (14.1 in) XGA TFT
- ▶ 110-220 VAC

## **Rackmount Chassis Specifications**

- ► 22.7 kg (50.5 lb)
- ▶ 43.26 W x 46 D x 26.5 H cm
- ▶ 17 W x 18 D x 10.5 H in
- Optional Monitor
- ▶ 110-220 VAC
- ► -48 VDC Available

# SS7 ISUP and Converged Networks Application Brief

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#### Contact Tektronix:

USA Richardson, Texas support contact info: 1 (469) 330-4000 Locate your nearest Tektronix representative: www.tektronix.com/contactus

#### For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tektronix.com

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