SPIRENT CS8 MOBILE DEVICE TESTER

CS8 Protocol Tester

The CS8 Protocol Tester is a suite of tools and utilities that help address increasingly rapid evolutions of wireless technology. It expedites Layer 1 – Layer 3 development and prevents low-layer bugs from ever making it out of the R&D lab.

APPLICATIONS

UE and Mobile Device Chipset Development

There are nearly unlimited applications due to the flexible nature of the CS8 Protocol Tester. The following examples illustrate the types of tests that can be quickly created and run:

- IMS & VoLTE protocol tests
- IMS emergency calls
- L1 – L3 protocol testing (including RRC and NAS)
- Conformance testing per 3GPP 34.229
- Data throughput tests with
  - custom Layer 1 parameters
    - multiple code words with different modulation
    - configurable PMI, RI & CQI (to support TM4 development)
  - customized RRC/NAS message flows

Spirent's CS8 Protocol Tester enables fast, efficient integration of customized test cases used for design verification. Intuitive interfaces provide control over details such as interaction with the IMS subsystem, MIMO control, multi-cell/multi-RAT operation and Layer 1 – 3 messaging.

The CS8 Protocol Tester gives developers complete layer 1, 2 and 3 control of an emulated network. Layer 1 and Layer 2 APIs enable efficient configuration of the LTE protocol stack, while a GUI enables customized Layer 3 (RRC and NAS) procedures. Each interface is designed to address the specific needs of the UE design lifecycle, making the CS8 an invaluable tool in chipset and UE development as well as in the verification lab.

Messages are logged and presented in an efficient, straightforward manner to ensure that issues can be immediately caught and corrected.

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CS8 Protocol Tester

BENEFITS:

- *Improved product quality* – Given the complexity of today's wireless devices, "patch-fixing" a design late in the release cycle is prohibitively expensive. The CS8 Protocol Tester helps kill fundamental bugs before they escape from the R&D process.
- *Maximum effectiveness of engineering resources* – Today's design teams are being asked to do more with less. The CS8 Protocol Tester offers better testing with less time spent in the testing process.
- *Reduced development time* – the efficiencies and quality improvements available with the Protocol Tester can shave weeks or months from the development process, getting your product to market faster.

KEY FEATURES

- Multiple purpose-specific UIs (User Interface) and APIs, each tailored for a specific testing task
- Flexible L1 – L3 message flow definition via UI
- Detailed logging to aid in debugging:
  - Real-time graphical representation of SIP message logging and RTP/RTCP statistics
  - RTP/RTCP packets used in IMS testing are logged for further offline analysis

Spirent's CS8 Protocol Tester expedites device development and testing. It helps developers expose and correct bugs early in the design cycle, improving quality and helping to meet time-to-market goals. The Protocol Tester is a suite of tools, each tailored to assist in a specific aspect of device or chipset development.

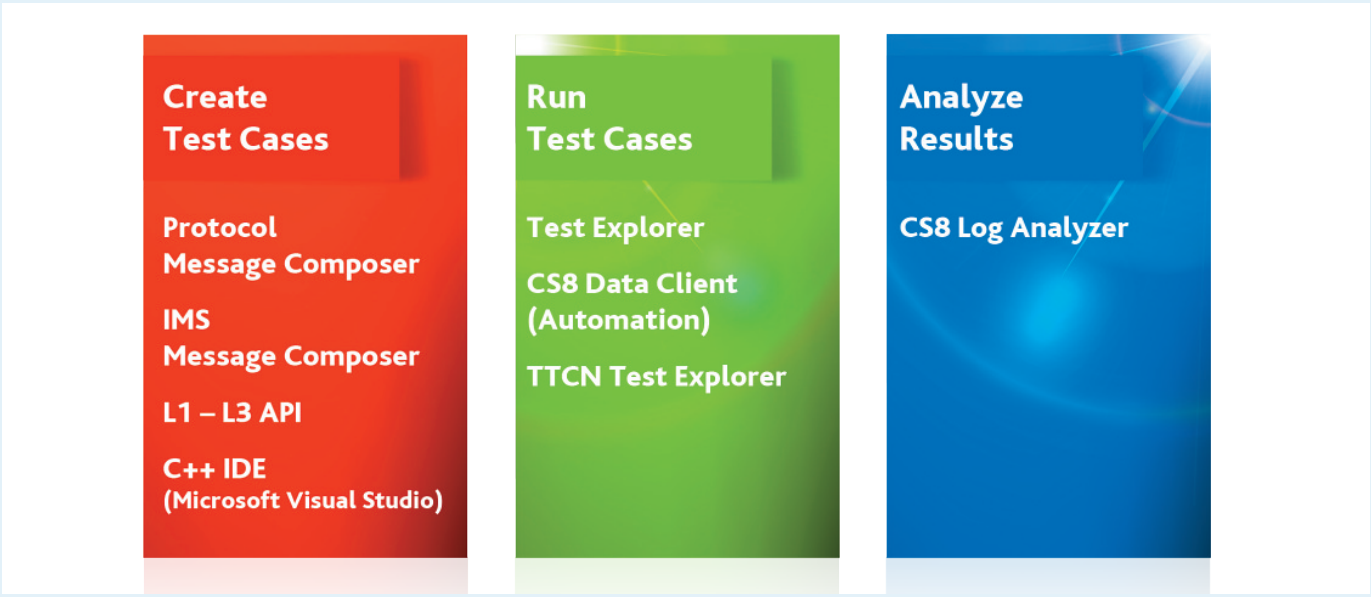

Figure 1 - Components used in protocol testing with CS8

CREATE TEST CASES

CS8 PROTOCOL MESSAGE COMPOSER

Design testing requires customized messaging. The CS8 Protocol Message Composer is a stand-alone Graphical User Interface (GUI) used to create ASN.1 messaging. The tool provides a straightforward way to quickly create and store PHY, RLC, MAC, RRC and NAS messages which can be recalled using either scripts or CS8 Protocol Tester APIs.

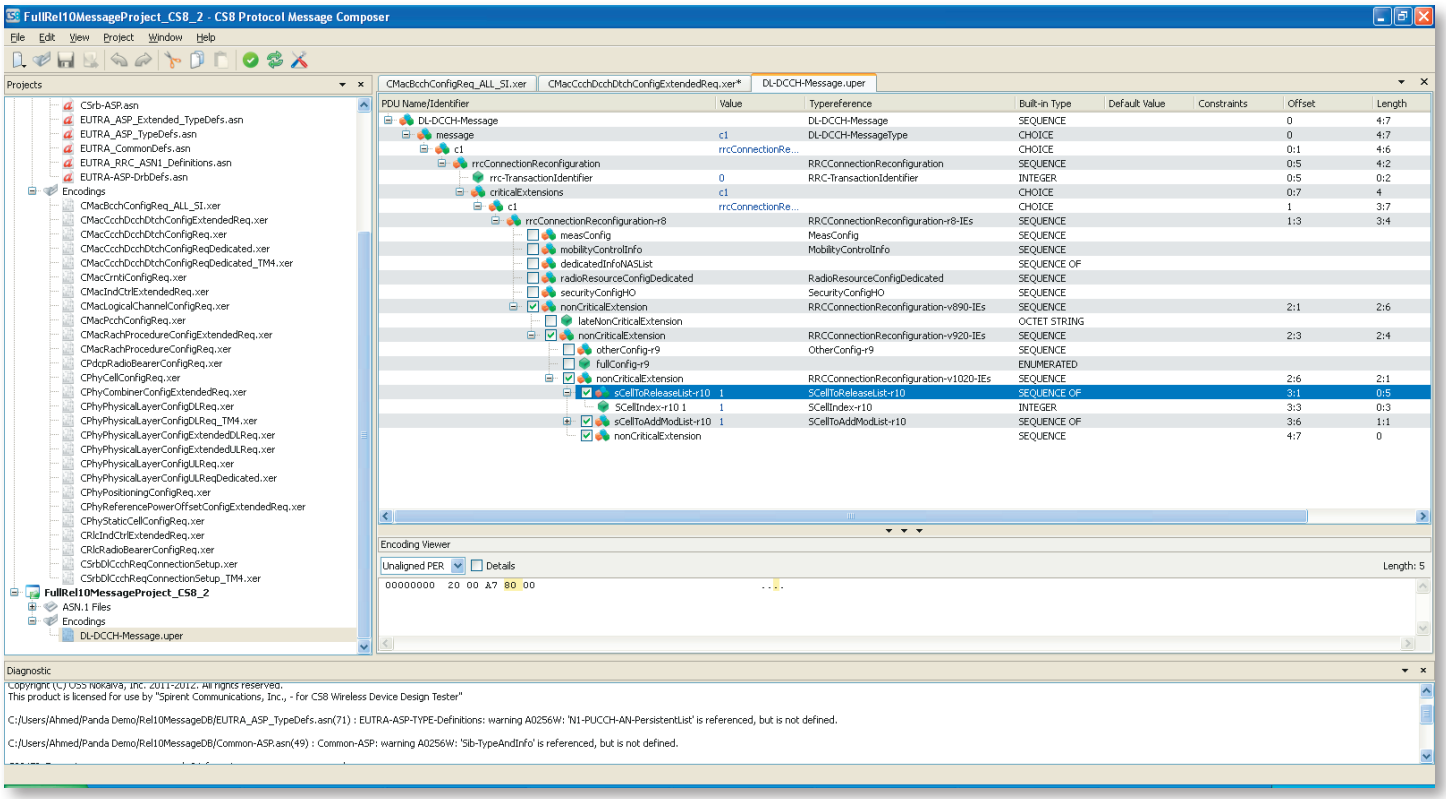

Figure 2 - CS8 Protocol Message Composer

CS8 IMS MESSAGE FLOW COMPOSER

The CS8 IMS Message Flow Composer enables efficient creation of IMS message flows to be used in testing. Developers can programmatically define SIP signaling message flows, define expected messages and their contents and define pass/fail criteria (based on received message types or message fields).

The CS8 Device Tester automatically creates a test scenario based on the message flow created using CS8 IMS Message Flow Composer. The engineer can then use the tool to compare a captured message flow against the expected messaging.

Message Flow Composer makes it easy to configure security (SigComp and IPSec) and IPv6 operation and authentication (e.g. AKAv2). The tool can even import .PCAP traffic-capture files such as those created by Wireshark™ or tcpdump.

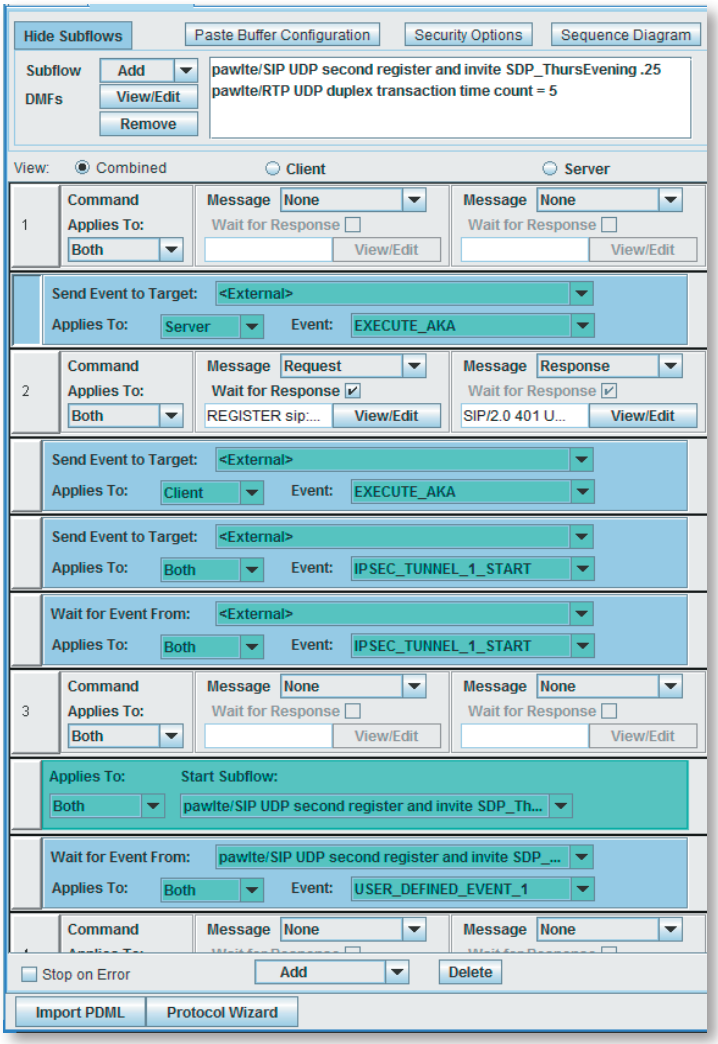

Figure 3 - CS8 IMS Message Flow Composer

VoLTE Support

Developing a VoLTE-ready device is a challenge. The IMS Message Flow Composer helps ensure successful VoLTE deployment by making it easy to emulate the VoLTE/IMS-ready network, including:

- SigComp
- IPv4 or IPv6
- IPSec
- AKAv2
- Audio playback
- Dedicated bearers
  - Multiple dedicated bearers
  - RTP/RTCP traffic mapping
  - TFT configuration
- RAN features to support VoLTE:
  - Semi-Persistent Scheduling (SPS)
  - TTI Bundling
  - RoHC profiles 1 and 2
  - Discontinuous Reception (DRX)

COMMON C++ INTERFACE

Assembling scripts with the CS8 Protocol Tester is done with a common C++ interface; unlike most C++ interfaces, the time-consuming work is already done. In an effort to assist UE developers, the scripting architecture lets the engineer re-use scripts in multiple ways without re-coding. The code simply calls the messages that are configured (and re-configured) using the Protocol Message Composer and Message Flow Composer.

In other words, test cases can be created with a minimal amount of time spent coding even though the options at your disposal are nearly limitless.

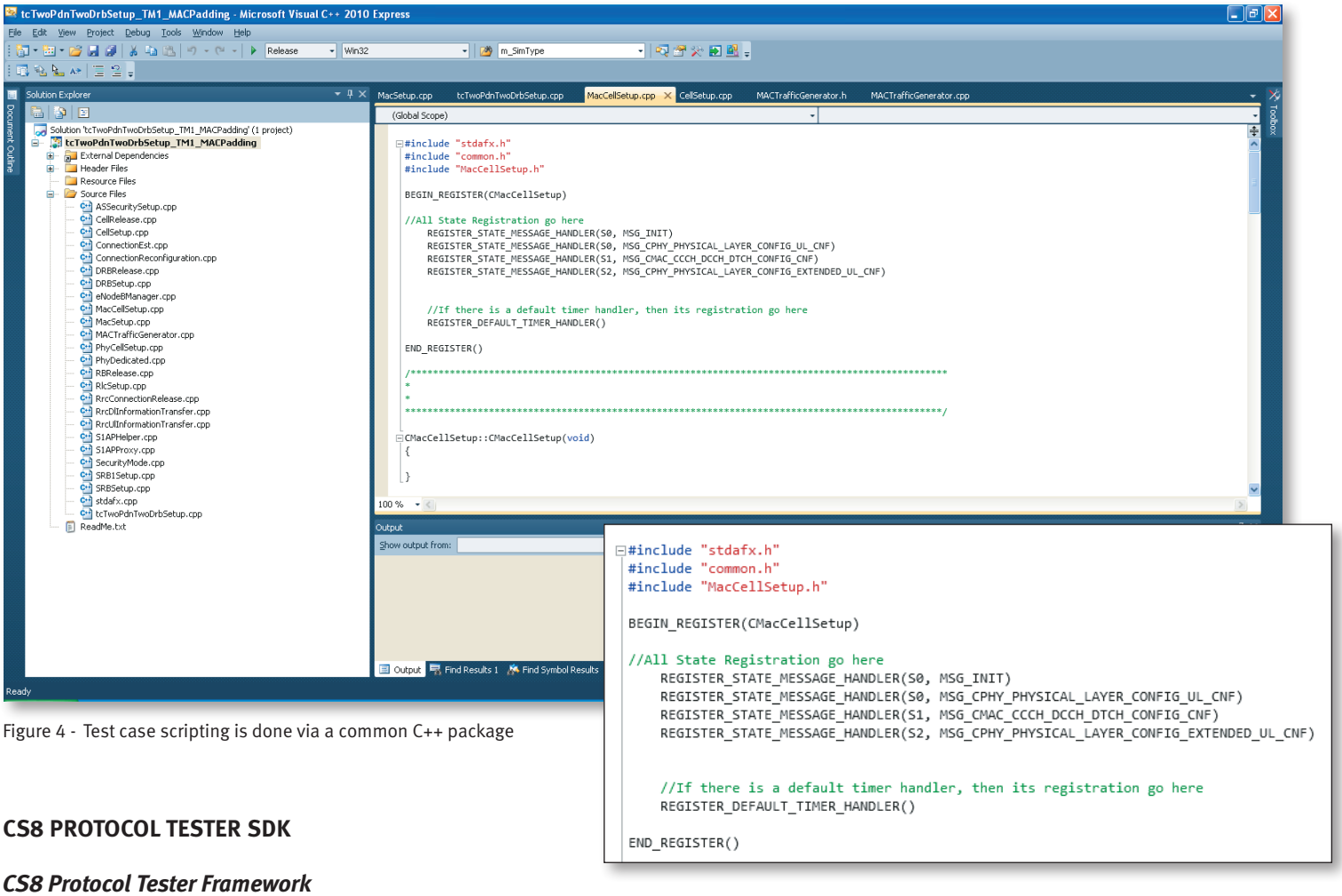

Figure 4 - Test case scripting is done via a common C++ package

CS8 PROTOCOL TESTER SDK

CS8 Protocol Tester Framework

The Protocol Tester Framework is a set of APIs for modifying RRC, IMS, MAC, PDCP and RLC messages at both the control plane and the user plane on as many as four simultaneous cells. The tool includes a set of sample test scripts built on the 3GPP's TS 36.508; scripts reflect both the message content and structure defined in that document.

Sample scripts include the following:

CellSetup	OnePdnAttach	PagingIdle
CellRelease	OnePdnDetach	PagingSystemInformationUpdate
MACSetup	OnePdnDetachFromUE	DataThroughput_OnePdn_FTP
RLCSetup	TwoPdnAttach	DataThroughput_OnePdn_UDP
SRBSetup	TwoPdnDetach	ServiceRequest
SRBRelease	TwoPdnDetachFromUE	VoLTE_MOCall
RRCConnectionEstablishment	CellSelection	ETWS (SIB 10, 11, 12)
DRBSetup	CellReselection	SMS over SGs
DRBRelease	TrackingAreaUpdate	

RUN TEST CASES

CS8 TEST EXPLORER (TEST EXECUTIVE)

CS8 Test Explorer is responsible for sequence and execution of protocol test cases created with the CS8 Protocol Message Composer or with Microsoft's Visual Studio® (C++).

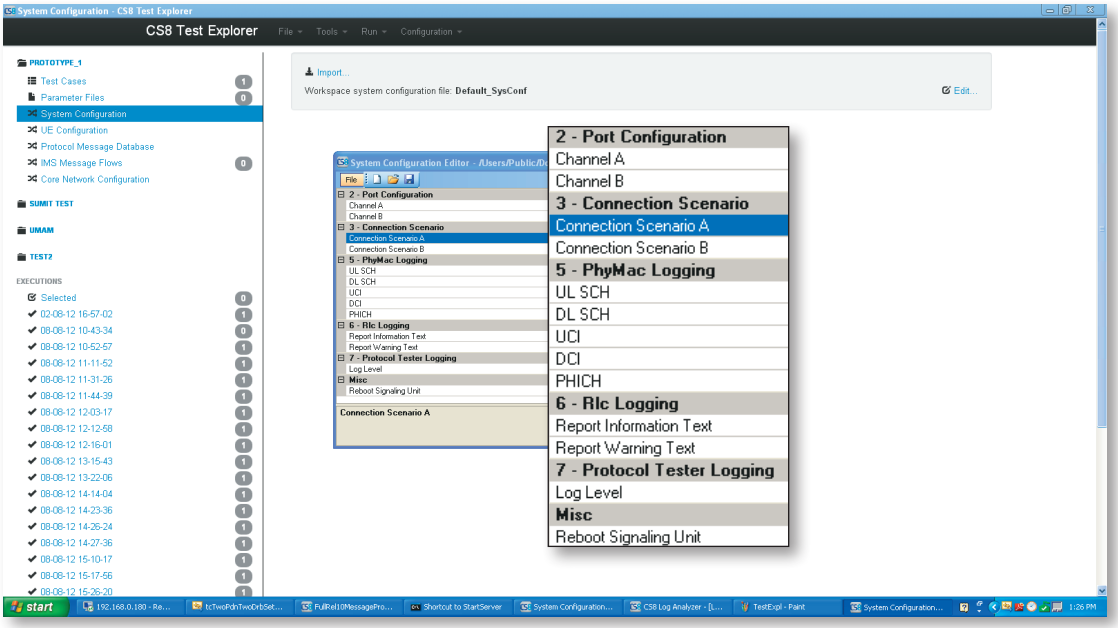

Figure 5 - CS8 Protocol Tester also lets you run TTCN scripts

Test Explorer:

- Configures and initializes hardware. Examples: RAT configuration, RF vs. Digital I/Q interfacing; MIMO vs. SISO
- Downloads and initializes software
- Manages test projects and test cases
- Executes test cases
- Manages logging and report generation

CS8 TTCN SCRIPT EXECUTION

Where TTCN-3 script execution is desired, scripts can easily be created and maintained using a familiar interface. The Protocol Tester integrates this input to the executive so that running scripts is fast and intuitive.

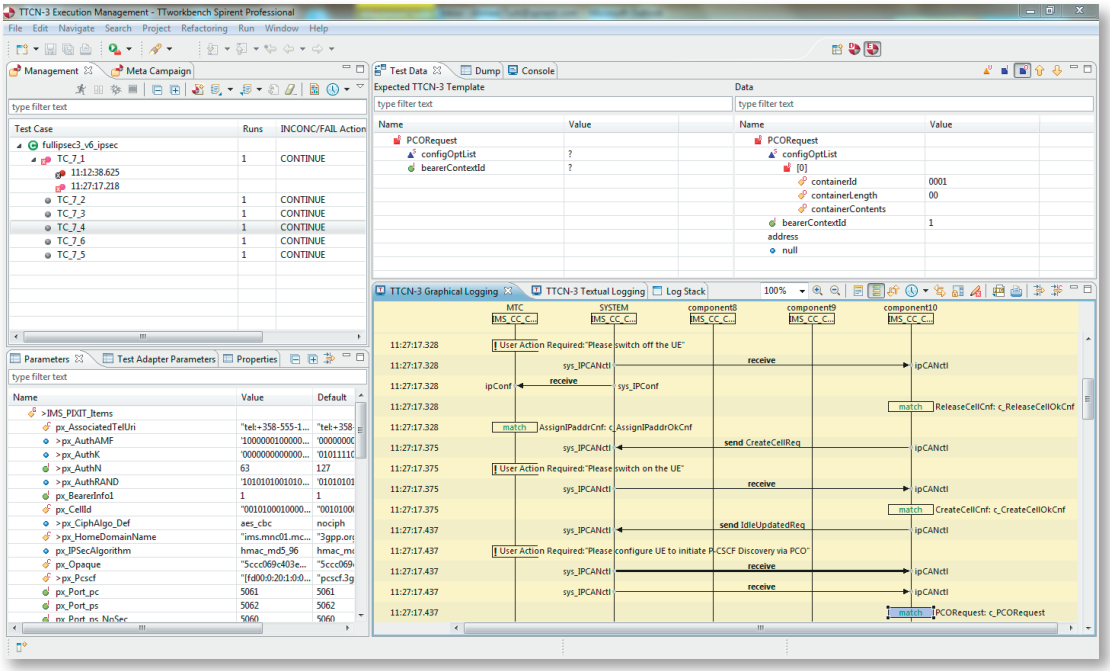

Figure 6 - CS8 Test Explorer Test Executive

CS8 PROTOCOL TESTER DEVICE AUTOMATION

The CS8 Protocol Tester Device Automation tool is a stand-alone application used to configure AT commands (e.g. Power On, Power Off, Set up Voice/Data Call) for automating the Device under Test (DuT) during testing. The tool even manages proprietary messages for those cases where control over the DuT can't be supported with AT commands.

ANALYZE RESULTS

CS8 LOG ANALYZER

The CS8 Log Analyzer goes a long way to ensure against having to patch-fix protocol bugs late in the design cycle. This incredibly intuitive tool helps the engineer isolate protocol errors in seconds, either in real-time or offline.

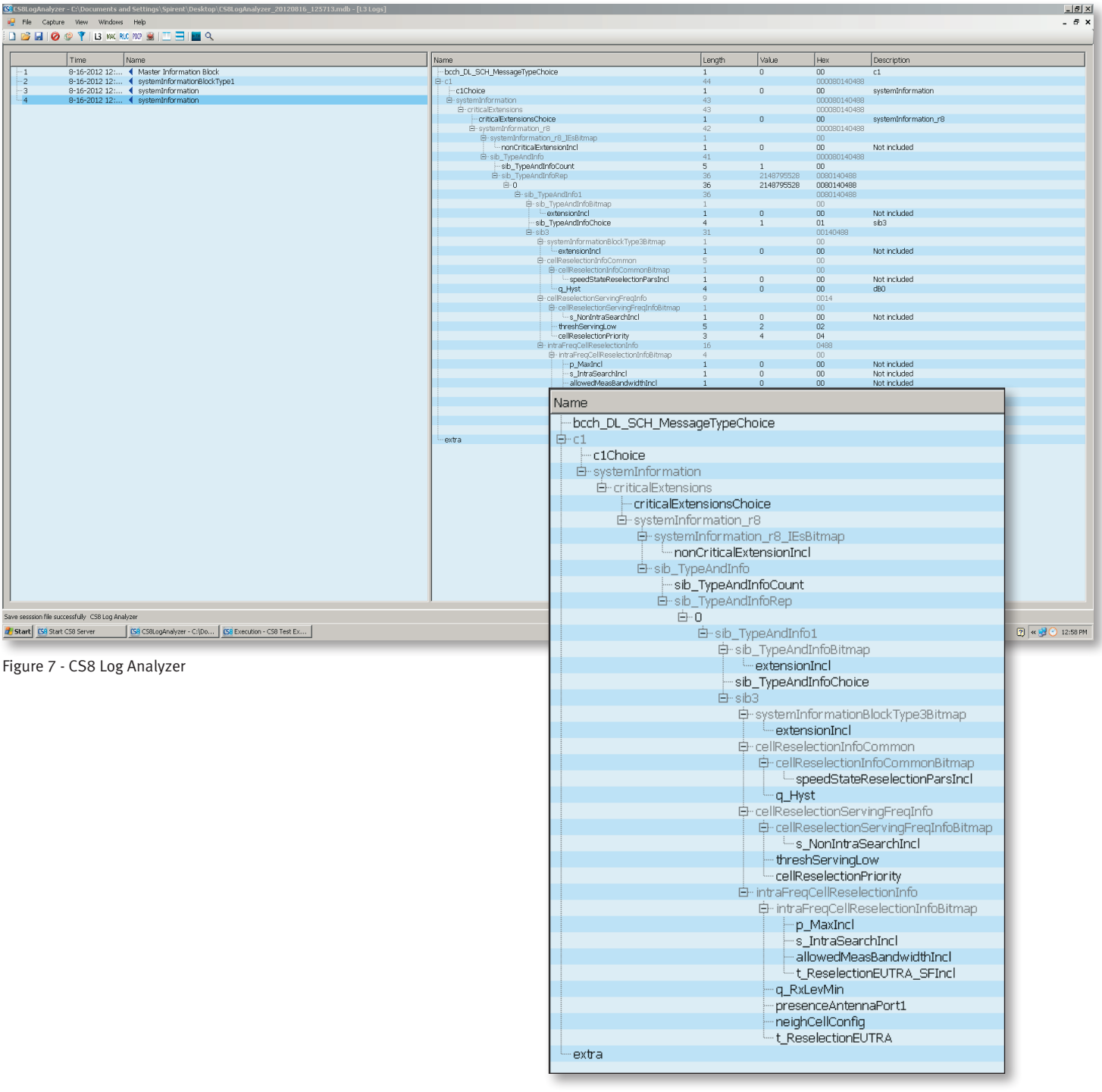

Figure 7 - CS8 Log Analyzer

TEST PACKS

CS8 Protocol Tester test packs get you started with a set of easily configured, ready-to-run test case packages.

IMS CONFORMANCE TEST PACK

The Protocol Tester has been used by Spirent to automate (as part of the 8100 automated system offering IMS Conformance testing) The IMS Conformance Test Pack automates testing based on the 3GPP's TS 34.229 (User Equipment (UE) conformance specification; Part 1: Protocol conformance specification) document. With this test pack you can easily define SIP messaging flow, expected messaging and pass/fail criteria (based on message types and fields). It supports AMR and AMR Wideband codecs.

The test pack gives you a huge head start on implementing your testing. It includes:

- LTE PHY Procedures
- LTE Registration & Bearer Procedures
- LTE RRC & NAS Procedures
- Voice in LTE & IMS Protocol Procedures
- LTE Application & Data Procedures
- LTE Mobility Procedures

SPIRENT GLOBAL SERVICES

Spirent Global Services provides a variety of professional services, support services and education services — all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at www.spirent.com/gs or contact your Spirent sales representative.

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
Network Emulators	
CS8-NE-LTE-INSTR	CS8 LTE Network Emulator (SISO, Single Cell) Instrument
CS8-NE-LTE-2CELL-INST	CS8 LTE Network Emulator (Two Cell) Instrument
CS8-LTE-2CELL-UMTS-INSTR	CS8 LTE/UMTS Network Emulator Instrument
Options	
CS8-PT-FRM-WRK	Adds L1 to L4 Protocol Test Framework for LTE
CS8-PT-IMS-PRE-CONF	Adds Pre-Conformance Tests for IMS (based on 34.229)
CS8-PT-LOG-ANALYZER	Adds Over The Air (OTA) Message Logging & Lower Layer Logs
CS8-PT-MSG-COMP	Adds ASN.1 Message Composer for LTE L1-L4 Protocol Messages
CS8-PT-TTCN3-PRO	Adds TTCN3 Professional Version for Custom Test Creation

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