Spirent **Automotive C50**

Layer 2-7 System

The Spirent automotive C50 offers the power of Spirent's award-winning Layer 2–7 router, switch, application and security test solutions in a 3U form factor delivering the best total cost of ownership in its class. With support for line-rate 10/100 BroadR-Reach® (100BASE-T1), 1000BASE-T1, NBASE-T (100M/1/2.5/5/10G), 1 G and 10 G Ethernet test ports, the C50 offers the power of a professional test tool for deterministic testing of automotive Ethernet products and solutions. A complete Layer 2 to Layer 7 test tool, delivering the perfect blend of realism, scalability and performance, is now available to replace open source utilities and ad-hoc testing methods. Test smarter by moving up to Spirent C50.

Applications

C50 is ideal for Automotive OEMs, suppliers, component manufacturers and service providers performing:

- R&D testing involving technology feasibility studies and performance modeling

- Device and protocol functional testing

- Conformance and certification testing

- Device, sub-system, or services performance characterization, scalability and availability

- Stress testing requiring higher device and traffic emulation scaling capability as well as higher physical interface connection

- Device benchmarking: Test using IETF RFC 2544, RFC 2889 and RFC 3918 methodologies with easy test setup using dynamically bound traffic and automated wizards

- Security and vulnerability testing: Emulate attacks & malware, fuzzing

Solution Overview

Test automotive InCar or Car2X devices and systems with a solution that reproduces a realistic and deterministic environment accelerating product development and improving quality. Spirent's C50 minimizes your risk with its highly accurate emulated traffic and measurements so networks and individual network elements can be quickly validated.

The C50 lowers the barrier to entry and enables companies of all sizes to test smarter and optimize their test investment by leveraging the industry-leading test capabilities Spirent offers. The Spirent Automotive C50 supports the Spirent TestCenter™, and TTworkbench™ Software Test Suites. Whether you are an InCar network engineer, product researcher/developer, or systems engineer—Spirent will empower you to better manage your solutions and deliver on the promise of next-generation automotive services.

Features & Benefits

- Native BroadR-Reach PHY eliminates latency measurement inaccuracies and provides true interoperability testing

- Transceiver based PHY options provide flexibility: 100BASE-T1, 1000BASE-T1, 10/100/1000BASE-TX, NBASE-T (100M/1/2.5/5/10G) and 10GBASE-T

- Hardware-based timestamp measurements for highly accurate latency measurements

- Wizard-driven RFC benchmark suites for push-button, repeatable tests

- Realistic stateful protocol emulation to exercise protocol state machines

- Configurable interface mix and density:

  - BroadR-Reach ports; 4, 8, 12 and 16 port configurations

  - 1 GbE RJ-45 or SFP+/SFP ports; 4 and 8 port configurations

- Full chassis chaining and external timing synch available via direct connect, NTP, PTP, GPS, and CDMA

- Small footprint appliance and quiet operation for benchtop or desktop operation

Realism

- Realistic Layer 2–3 traffic to test Quality of Service (QoS) mechanisms

- Realistic Layer 4–7 user emulation to test applications and application infrastructure

- Security and vulnerability testing: Emulate attacks & malware, fuzzing

Productivity

- Intelligent Results™ allow users to quickly confirm positive results and identify problematic areas

- Real-time traffic and protocol controls enable the tester to validate and troubleshoot problems by altering the test configuration while the test is running

- Real-time results views allow the user to see how the network responds to changes in specific test conditions without having to stop the test and save the results

- Built-in wizards and automated test scenarios reduce test setup and execution times

- Easy NoCode™ Automation for novice programmers

What to test

Automotive Ethernet-
BroadR-Reach®

Test interoperability, functionality,
and performance. Simplify
compliance with network protocols

Testing the In-Car Network

Solutions for Automotive Ethernet

- Protocol Conformance and Functional Testing

- Interoperability Testing

- Device/Network Security and Robustness

- Pre-defined, automated Test Suites (such as IEEE1588v2 or AVB)

- Performance/Stress Testing

- Real-Life Network Traffic Emulation

Testing BroadR-Reach (Ethernet/IP Performance Testing)

- Throughput, Delay, Jitter, Packet-Loss, Packet Out of Order

- Switch Benchmarking (RFC 2544 & RFC2889)

- Quality of Service (Diffserv &IEEE 802.1Q)

- Timing and Synchronization (IEEE 1588v2 & 802.1AS)

- Stream Queuing and Prioritization (IEEE 802.1Qav)

- Stream Reservation Protocol (IEEE 802.1Qat)

- Application Playback (Unicast & Multicast)

Technical Specifications	
C50	
Chassis	• Four to sixteen ports
	• 3U H x 16.53" W x 19.75" D, weight: 32 lbs. (14 kg)
	• 115 V–230 V, 50/60 Hz–750 W max
	• Supports Spirent TestCenter, and TTworkbench
Max ports	Sixteen ports per chassis
Interface media support (based on configuration)	• 10/100 BroadR-Reach: 2 x 2-wire DE9M connectors (2 ports per connector)
	• 1G: 10/100/1000BASE-T (RJ-45), 1GE (SFP): 10/100/1000BASE-T, 100BASE-T1 or Fiber
	• NBASE-T (100M/1/2.5/5/10G) (RJ-45)
	• 10 GE: 10GBASE-T or Fiber (SFP+ Transceiver)
Traffic encapsulations	• Layer 2: 802.3, Ethernet II, 802.1Q, 802.1ad, 802.1ah, 1722
	• Layer 3 and 4: IPv4, IPv6, UDP, TCP
	• Custom PDU builder
Timing	**Internal Tx clock**; optionally synchronized to NTP server or IEEE1588v2 Grandmaster inter-chassis synchronization
Tx/Rx streams	Up to 64k/128k per port depending on configuration
Multi-user	Per port user reservation

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About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks.

We help bring clarity to increasingly complex technological and business challenges.

Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

For more information, visit: www.spirent.com

Layer 2/3 Generator and Analyzer		
Frame transmit modes	• Port based (rate per port) • Stream based (rate per stream)	• Burst • Timed
Min/max frame size (w/CRC)	60 to 10,240	
Min/max Tx rates	1 packet per 3.43 seconds to 101% of line rate	
Real-time Tx stream adjustments	Change rate and frame length settings without stopping the generator or analyzer for truly interactive, cause and effect analysis	
Advanced per-stream statistics available in real-time	Over 35 measurements tracked in real-time for each received stream incl.: • **Real-time loss** and advanced sequencing • Out of sequence • **Latency**: Avg, min, max and short-term avg; first/last frame arrival timestamp • **Latency modes**: LILO (forwarding delay per RFC 4689), LIFO • (store and forward devices per RFC 1242) and FIFO (bit forwarding devices per RFC 1242) • **Data integrity**: IP checksum, TCP/UDP checksum, frame CRC, embedded CRC and PRBS bit errors	
Packet capture	• 4 MB (first 128 bytes of each frame via CPU RAM) • Stateful capture/replay for extended protocol support	
Reporting	• Integrated Test Results Reporter (TM) • Full raw test results in CSV and customizable report generation in PDF and HTML	
Automotive advanced software kit	• IGMPv1/v2/v3 and MLDv1/ v2 protocol emulation • IEEE 1588v2 protocol emulation • IEEE 802.1x protocol emulation • Spirent dynamic protocol generator	• RFC 2544 network device benchmarking suite and wizard • RFC 2889 switching benchmarking suite and wizard • HTTP, SIP, and FTP emulation

TSN/AVB software kits	• Full TSN/AVB emulation of multiple talker or listeners on each port
	• Mixed AVB and non-AVB traffic generation capability on each port
	• Standards supported:
	  – IEEE 802.1BA: Audio Video Bridging (AVB) Systems
	  – IEEE 802.1AS: Timing & Synchronization for Time-Sensitive Applications (gPTP)
	  – IEEE 802.1Qat: Stream Reservation Protocol (SRP)
	  – IEEE 802.1Qav: Forwarding and Queuing for Time-Sensitive Streams (FQTSS)
	  – IEEE 1722/1733: Layer 2/3 AVB Transport Protocol	

Ospirent™
Promise. Assured.