

# POS OC-3c/OC-12c TeraMetrics Modules

# POS-3511A/As

## Product Overview

The SmartBits® POS-3511A and POS-3511As TeraMetrics™ modules are scalable analysis modules capable of simulating the millions of client/server sessions and control protocols required to fully test Packet over SONET/SDH systems. With the POS-3511A and POS-3511As, you can quickly measure all of the key metrics, including true load capacity, latency, and IP frame sequencing using repeatable, industry-standard tests.

The POS-3511A/As TeraMetrics module can perform frame-level generation and analysis at full OC-3c/STM-1c or OC-12c/STM-4c wire rate for Packet over SONET/SDH routers.

## Key Benefits

- Dramatically improves the time to market and reduces the risk of failure at the customer site.
- Increases testing productivity by reducing test setup time, reducing time spent troubleshooting test devices, and providing repeatable tests.
- Provides the ability to stress POS routers with actual OC-3c/OC-12c traffic speeds.
- Provides the ability to perform high load data plane testing while simultaneously stress testing the routing protocols.
- Enables network service providers to stress and commission high speed POS networks prior to actual deployment.

## Primary Applications

- Evaluate key performance parameters of POS routers under typical or extreme traffic load conditions.
- Qualify POS routers during development, quality assurance, and final regression testing.
- Perform comparative analysis of POS routers and re-qualify POS routers after firmware upgrades.
- Use custom and third-party applications, which are enabled by the TeraMetrics architecture.
- Test control plane protocols such as GP4, OSPF (for routing), and RSVP-TE (for MPLS) and analyze their impact on data forwarding.

## Specifications

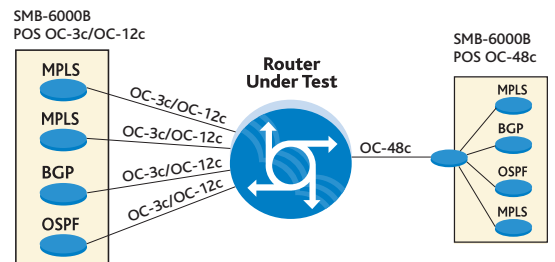
- Line Rate
  - 155 Mbps (OC-3c) or 622 Mbps (OC-12c) line rate.
- Port Density
  - 2 ports per POS-3511A or POS-3511As module.
- Framing
  - SONET OC-3c, OC-12c or SDH STM-1c, SDH STM-4c framing on a per port basis.
  - Internal/external transmitter clock selection.
  - SONET/SDH Error generation: SONET framing errors (A1/A2 byte corruption); Section OverHead (SOH), Line OverHead (LOH), and Path OverHead (POH) BIP errors; Section LOS alarm; Line AIS and RDI alarms; Path AIS alarm.

## Transmit Characteristics

- L2 Encapsulation: PPP and Cisco HDLC encapsulation specified by the user on a per-port basis.
- Optional MPLS label stack encapsulation within PPP frames.
- Rate-based transmission scheduling.
- Gap-based transmission scheduling.
- Inter-frame gap (IFG): (OC-3c) min 53.42 nanoseconds; max. 7.17 seconds. (OC-12c) min 13.35 nanoseconds; max. 1.79 seconds.
- Inter-burst gap (IBG): (OC-3c) min 53.42 nanoseconds; max. 7.17 seconds. (OC-12c) min 13.35 nanoseconds; max. 1.79 seconds.
- Background frame (16 KB Buffer) data fill pattern: user-specified or random (global setting).
- Error generation: CRC, IP checksum, data integrity.
- Payload scrambling enabled under user control ( $x^{43}+1$ ).
- Traffic shaping through random frame length, inter-frame gap, and frame content settings.
- Ability to execute applications on the module under Linux OS.

## Per Stream Features

- Generates up to 512 independent IP streams (peer-to-peer) and analyzes up to 64,000 streams at any given time.
- Frame length: from 42 bytes to 16,384 bytes. The frame length includes the 4-byte PPP header and the frame payload, but does not include the FCS. Capable of generating back-to-back frames separated by a single flag.
- VFD 1, VFD 2: from 1 to 6 bytes (specifiable), anywhere in a packet; static, increment, decrement, random. Cycle: max. 16,777,215; increment and decrement modes only. Stutter: max. 4,095; increment and decrement modes only.
- VFDs 1, 2 are bit-maskable, IP subnet-aware, and can be cascaded using carry chaining.
- IP header checksum generation according to VFDs and/or background.
- Testing capabilities include sequence tracking per stream, latency over time, latency per stream, and latency variation.
- User-selectable Frame Check Sequence (FCS) of 16- or 32-bit.



• SMB-600/6000B OC-3c/OC-12c and OC-48c ports support a variety of technologies including BGP, OSPF, and MPLS.

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- Data integrity validation of L3/L4 payload.
- Unicast, broadcast, and multicast traffic effects can be analyzed.
- **Frame-based Transmit Modes**
  - Continuous: constant frame transmit.
  - Single burst: up to 4 billion packets in a single burst.
  - Multi-burst: up to 4 billion repetitive bursts with user-defined delay between bursts.
  - Continuous Multi-burst: runs multi-burst mode continuously.
- **Frame-based Receive Modes**
  - IP Header checksum and data integrity check.
  - Per-stream statistics mode: QoS based on addressing, protocol type, port number, and frame priorities.
  - Over-time statistics mode: statistics can be maintained for all incoming frames within the specified timeframe.
  - Latency histograms for latency distribution.
  - Sequence tracking per stream.
- **Capture Mode**
  - Full line-rate (155 Mbps (OC-3c) or 622 Mbps (OC-12c) capture and analysis.
  - 16 MB capture buffer per port.
  - Frame Length: 8 to 16,384 bytes.
  - Frame selection: entire frame (up to 16KB), slice of a frame beginning at offset 0 (programmable number of 64-byte slices), or signature field.
  - Pre-capture filtering on: all valid frames, frames with or without a signature field, only signature field, received trigger, data integrity errors, and IP checksum errors.
- **Triggers**
  - Two triggers variable length.
  - Trigger combinations: Trigger 1 only, Trigger 2 only, Triggers 1 and 2, Trigger 1 or 2.
- **Management Frame Transmit and Receive**
  - On the TeraMetrics architecture there is the ability to support many protocol stacks including PPP, ICMP, TCP, RIP, OSPF, IS-IS, BGP, RSVP-TE, LDP, and CR-LDP.
  - Minimum management frame size: 12 bytes containing a CRC-32.
- **SONET/SDH Statistics**
  - Section BIP-8
  - Line BIP-24 or BIP-96
  - Line FEBE
  - Path BIP-8
  - Path FEBE
- **Counters**

	Counter Width	Rates (32-bit)
■ Transmitted and received frames	64-bits	✓
■ Transmitted and received bytes	64-bits	✓
■ Signature Frames (RX and TX)	64-bits	✓
■ CRC errors (Rx)	64-bits	✓
■ IP Header Checksum Errors (Rx)	64-bits	X
■ Triggers (Rx and TX)	64-bits	✓
■ Latency (RX and TX)	32-bits	X

- **Raw Tags**
  - In the Raw Tags test, frames are stored and sent to the application without any calculations or filtering performed on the stream tags received. Up to 64K of records can be stored. Module transmit time, receive time, and delta (in mSec) are recorded per tag.

### Supported Applications

- SmartWindow™
- SmartLib™ Programming Library
- ScriptCenter™
- SmartFlow™
- TeraRouting Tester™

### Interface Specifications

The SmartBits POS-3511A/As TeraMetrics modules are compliant with RFC's 1661, 1662, and 2615, which specify Packet Over SONET (POS) interface requirements. Each SONET interface conforms to ANSI T1.105 and ITU-T G.707 specifications. Each port presents a SC-duplex fiber connector suitable for use with existing single-mode or multi-mode fiber cabling.

	POS-3511A	POS-3511As
Number of ports per Module	2	2
Reach	Multi-mode – up to 500 meters	Single-mode – from 2-15 kilometers
Wavelength	1300nm	1310nm

### Requirements

- The POS-3511A and the POS-3511As modules require one slot in an SMB-600 or SMB-6000B chassis.
- An IBM or compatible Pentium™ PC running Windows 98/2000/NT, with mouse and color monitor.

### Ordering Information

#### POS-3511A

POS OC-3c/OC-12c, 2-port, multi-mode, 1300nm, TeraMetrics module

#### POS-3511As

POS OC-3c/OC-12c, 2-port, single-mode, 1310nm, TeraMetrics module

#### SUS-SMB

12-month Software Update Support Service (includes firmware support)



POS-3511A

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