# BREAKINGPOINT® APPLICATIONS AND SECURITY TESTING



# DATA SHEET

## PROBLEM: REAL-TIME CHALLENGES FOR REAL-WORLD TESTING

These days, organizations rely on a wide variety of security solutions to protect their networks from cyberattacks and traffic anomalies. But the more tools deployed, the more complex a security infrastructure becomes. The result: a hodgepodge of security solutions that are tough to verify and challenging to scale. Worse yet, these complex system interactions pose a serious risk to security performance and network resiliency.

## SOLUTION: AN EASY-TO-USE TESTING ECOSYSTEM FOR MODERN NETWORK NEEDS

To counter such challenges, businesses require an application and security test solution that can verify the stability, accuracy, and quality of networks and network devices.

Enter BreakingPoint. By simulating real-world legitimate traffic, distributed denial of service (DDoS), exploits, malware, and fuzzing, BreakingPoint validates an organization's security infrastructure, reduces the risk of network degradation by almost 80%, and increases attack readiness by nearly 70%.

How might a particular configuration or security setup withstand a cyber-attack? BreakingPoint addresses that by simulating both good and bad traffic to validate and optimize networks under the most realistic conditions. Security infrastructures can also be verified at high-scale, ensuring ease of use, greater agility, and speedy network testing.

BreakingPoint test solutions ensure:

Network security

HIGHLIGHTS

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- Measure and harden the performance of network and security devices
- Validate network and data center performance by recreating busy hour Internet traffic at scale
- Stress network infrastructures with 37,000+ security attacks, malware, botnets, and evasion techniques
- Find network issues and prepare for the unexpected with the industry's fastest protocol fuzzing capabilities
- Emulate sophisticated, large-scale DDoS and botnet attacks to expose hidden weaknesses
- Ensure the always-on user experience in the midst of complexity and exploding traffic volume
- Train staff by simulating highly realistic cyber-range/training environment
- Validate the performance and security resiliency of service provider networks using emulations over 3G/4G/LTE
- Amplify test traffic realism by running TrafficREWIND summary configurations that replicate the dynamic nature of production networks and applications
- o Maximize security investments with onsite network-specific proof-of-concept (PoC) validation
- Optimize next-generation firewalls (NGFWs), intrusion prevention systems (IPS), and other security devices
- Validate DDoS defenses
- o Build networks and cloud infrastructures that are resilient to attacks

- Network performance
  - Ensure the always-on user experience in the midst of complexity and exploding traffic volume
  - Validate and optimize 3G and 4G/LTE networks under the most realistic conditions, using real mobile applications over mobile tunneling and roaming, and get per-user equipment (UE) statistics

#### **KEY FEATURES**

- Simulates more than 300 real-world application protocols
- Allows for customization and manipulation of any protocol, including raw data
- Generates a mix of protocols at high speed with realistic protocol weight
- Supports more than 37,000 attacks and malwares
- Delivers from a single port all types of traffic simultaneously, including legitimate traffic, DDoS, and malware
- Bi-monthly Application and Threat Intelligence (ATI) subscription updates ensure you're are current with the latest applications and threats
- Combined with the CloudStorm<sup>™</sup> platform, BreakingPoint reaches a staggering performance with a fully-populated chassis—2.4 Tbps / 1.44 billion sessions and 42 million connections per second—to emulate enterprise-wide networks to continent-scale mobile carrier networks

# **PRODUCT CAPABILITIES**

#### APPLICATION AND THREAT INTELLIGENCE (ATI) PROGRAM

Ixia's ATI program consists of several engineering units spread across the world, engaging in coordinated research and leveraging years of experience in understanding application behaviors, malicious activities, and attack methods to ensure BreakingPoint software is always updated and always current. The ATI team uses advanced surveillance techniques and cutting-edge research to identify, capture, and rapidly deliver the intelligence needed to conduct meaningful and thorough performance and security validation under the most realistic simulation conditions. Releasing updates every two weeks for more than 10 years, the ATI program comprises a library of 37,000+ attacks (Exploits, Malwares, DDoS, etc.), 360+ popular applications, and over 2,000 canned tests.

Additionally, the ATI program ensures:

- Newer applications and attacks can be incorporated in BreakingPoint without the need of any firmware or OS updates
- Users stay up to date with the ever-changing cyber-world—new applications are added and popular applications are updated to current versions
- Monthly malware packages contain fast-changing malware and botnet attacks
- Well researched, real-world application mixes that emulate traffic patterns of diverse demographics and business verticals.

I WEB APPS			
USERS SYSTEM SETTINGS			
	_	SYSTEM INFORMATION	
Updates	•	OS Type	PerfectStorm1
		Product Build	262287
System time and date	•	Strike Build	264493
,		WAF Version	2.0.4.155
		Disk Usage	5% used
Backup		Serial Number	091087
Restore		UPDATE SYSTEM FACT	ORY REVERT WIPE SYSTEM
Deselvers			
Database	P	INSTALLED APPLICATIO	vs
Authentication	•	BREAKINGPOINT	Version: 8.0.1
		ATI STRIKE PACK	Version: 264493
	•		
Maintenance		VM DEPLOYMENT	

#### ATI packages can be updated through the intuitive BreakingPoint GUI

## BREAKINGPOINT TEST COMPONENTS

BreakingPoint offer a single Web GUI for management results in simple, central control of all components and capabilities. Test components helps configure legitimate application, malicious, malformed and stateless traffic to validate application-aware devices and networks.

	Test Components
Application Simulator	Allows users to create mix of applications and run tests in 2-Arm mode (BreakingPoint being the client and server) to test application-aware devices
BitBlaster	Transmits layer 2 frames and analyzes a device's ability to handle stateless malformed or normal traffic at high speed
Client Simulation	Allows users to generate client traffic via Super lows against real servers (device under test) in 1-Arm mode (BreakingPoint being the client)
Live AppSim	Amplifies BreakingPoint traffic realism by running TrafficREWIND summary configurations that replicate the dynamic nature of production networks and applications; it leverages TrafficREWIND's ability to record and synthesize production traffic characteristics over extended periods of time.

	Test Components
Recreate	Helps users to import captured traffic from network and replay it through BreakingPoint ports
Routing Robot	Determines if a DUT routes traffic properly by sending routable traffic from one interface and monitoring the receiving interface; this is useful to perform RFC2544 and network DDoS testing
Security	Measures a device's ability to protect a host by sending strikes and verifying that the device successfully blocks the attacks
Security NP	This subset of Security allows users to send malware traffic at higher loads
Session Sender	Enables testing of pure TCP and/or UDP behavior and performance and is also capable of performing advanced DDoS attacks
Stack Scrambler	Validates integrity of different protocol stacks by sending malformed IP, TCP, UDP, ICMP, and Ethernet packets (produced by a fuzzing technique) to the DUT



BreakingPoint purpose-built test components

#### APPLICATION SIMULATION

Add Selected

BreakingPoint simulates over 300 real-world applications, each configurable with application actions (flow) to simulate multiple user behavior and dynamic content. BreakingPoint also provides 100s of predefined application mix profiles representative of various enterprise and carrier networks.

Content realism is critical in validating performance of application-aware devices and networks, as it has a direct impact on inspection performance. BreakingPoint offers various functionality to easily parametrize applications with representative payloads such as:

- Tokens that allow users to randomize data as part of the application flow to prevent devices from accelerating bandwidth or detecting static data patterns.
- Markov text generation, which is a unique way of converting documents into new documents to generate random data by word instead of by character, allowing the data to look realistic, but at the same time to be dynamic.
- Dictionary functionality that allows users to input a table of rows as an input to a field. These are highly useful for emulating scenarios such as brute force attacks, where a user can input a huge list of passwords that are randomly sent one after the other through the "password" field in a flow.
- Dynamic file generation capability that allows users to generate different types of attachments like exe, jpg, pdf, flash, and mpeg and helps in testing a device's file handling or blocking capabilities.
- Multi-Language capability that allows users to send emails, chats, or texts in languages like French, Spanish, German, and Italian, making the contents demographically realistic.

Add/Remove Super Flows			
<enter criteria="" search=""></enter>	Search		
Displaying 100 of 3922   Get more results	5		
Super Flow Search Results		Associated Super Flows	
Name		Name	
AUL Mail Nov 2013	ų υ α ()	Angry Birds Friends September 2015 Facebook server overload error	1
Apache Cassandra DB	در 🕤 در 🛈	ClientSim Facebook	1
Apache Cassandra DB Start Up		Twitter	í
Apache Cassandra DB Start Up and Registration	Q 🕢	Google Earth Search	1
Apple Bonjour Multicast DNS Service Discovery	Q 🛈	Google Mail-English	í
AppleJuice	۹ 🕥	HTTPS Simulated	1
AppLine Basic Audio Call	۹ 🕑	Linkedin_1301	1
AppLine Demo Superflow	Q 🕥	BitTorrent Enterprise	1
AppLine Simple Chat	۹ 🔘	Amazon 1302	1
BACnet/IP Read File	۹ 🔘	Bing Search	1
BACnet/IP Time Synchronization	۹ 🔾	AOL Instant Messenger	1
BACnet/IP Who-Has/I-Have Object Query	۹ 🔾	BBC iPlayer	1
BACnet/IP Who-Is/I-Am Device Discovery	۹ 🕑	KakaoTalk Chat	í
BACnet/IP Write File	Q 🕑	Rakauraik Cridt	

# BreakingPoint provides flexibility to emulate a variety of apps and protocols that can be assembled to create real-world application mixes

Last-Modified: Mon, 12 Jul 13 05:56:39 GMT Date: Wed, 22 Jun 14 19:16:20 GMT Connection: Keep-Alive Server: BreakingPoint/1.x Content-Type: text/html Content-Length: 2037

<! DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1transitional.dtd"><html xmlns="http://www.w3.org/1999/xhtml"><head><met a content="text/html; charset=UTF-8" httpequiv="Content-Type"/><title>broach the subject of his</title><style type="text/css">p { vertical-align: textbottom; background-color: #1ec4cc; backgroundimage: none; display: inline; list-style-image: none; clear: right; font-family: cursive; border-width: thin; }</style></head> <body>Copyright (C) 2005-2011 BreakingPoint Systems, Inc. All Rights Reserved.<h5><q>Aterrible country, Mr.</q><q>Bickersteth and yourself has, unfortunately</g><em>We sallied out at once</em><u>Corcoran's portrait may not have</u><b>Won't you have an egg</b><u>Who the deuce is Lady</u>

BreakingPoint generates real-world application and security strike traffic; this example shows an HTTP request and response

## TRAFFICREWIND AND LIVE APPSIM

Ixia's new TrafficREWIND solution complements BreakingPoint to easily translate production network insight into test traffic configurations with high fidelity. TrafficREWIND is a scalable, real-time architecture that uses production traffic metadata to record and synthesize traffic characteristics over extended periods of time (up to 7 days). The resulting test configuration from TrafficREWIND is used in BreakingPoint's Live AppSim test component. Live AppSim adds a new testing dimension by empowering users not only replicate traffic profiles with associated real-world applications, but also dynamically changing traffic composition over time to model the temporal nature of production networks and applications in the lab.

Live AppSim is used to run TrafficREWIND exported traffic summary configurations, opening up unprecedented test possibilities:

- Faster fault analysis and reproduction capabilities
- Reference architectures and pre-deployment validation with production-like application mixes
- Relevant what-if scenarios by combining real production traffic with other test traffic, including security strikes, incremental applications, or even fuzzing

End Time: W	ed Apr 06 2016 07:15:00 GMT+ ed Apr 06 2016 21:00:00 GMT+ 8 hour, 45 min					ÂD
and Time: W	ed Apr 06 2016 21:00:00 GMT+					Ap
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07:15A						
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08:00 0	9:00 10:00 11:00	12:00 13:0	00 14:00 15	5:00 16:00 17	:00 18:00	19:00 20:00
Total Bytes						
Associated Super F	lows					
			-1	-		
Name		Protocol	Flows	Bytes	% Flows	% Bytes
android.int		TCP	163,394	7,027,389,254	0.00	0.00
BreakingPoint Bandwid	dth Raw - TCP	TCP	11,425,157	114,469,279,025	27.00	3.00
BreakingPoint Bandwid	dth BitTorrent File Download	TCP	3,318,824	950,433,081,646	8.00	32.00
cdninstagram.com		TCP	447,329	106,653,514,497	1.00	3.00
google.int		TCP	163,204	20,590,430,473	0.00	0.00
gstatic.int		TCP	245,612	50,723,036,483	0.00	1.00
gotatrenne		TCP	1,201,113	22,343,830,533	2.00	0.00
BreakingPoint IMAPv4	Advanced		2,913,406	391,548,759,102	7.00	
BreakingPoint IMAPv4		TCP	2,913,400	351,370,739,102	7.00	13.00
	am Bandwidth	TCP TCP	6,829,760	50,987,440,884	16.00	13.00
BreakingPoint IMAPv4 BreakingPoint Instagra	am Bandwidth					

Live Profile created by importing a TrafficREWIND traffic summary configuration

#### COMPREHENSIVE SECURITY

BreakingPoint delivers the industry's most comprehensive solution test network security devices—such as IPSs, IDSs, firewalls, and DDoS mitigation. It measures a device's ability to protect a host by sending strikes and verifying that the device successfully blocks the attacks. Simply select a Strike List and an Evasion Setting to create a security test, or use one of the default options.

- Supports over 37,000 strikes and malware and the attacks can be obfuscated by over 100 evasion techniques
- Emulate botnets, from zombie to command and control (C&C) communication
- Simulates a variety of volumetric, protocol, and application-layer DDoS attacks
- Generates legitimate and malicious traffic from the same port—purpose-built hardware design allows sending all types of traffic simultaneously from a single port, with full control of the weight/mix of legitimate traffic, DDoS and other attacks, malware, and fuzzing

			e List:											
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													Advance	d 🔺
	lame:			Strike	ld:			Direction:	Client =	> Se	erver	*		
Sev	erity:	Critica	(CVSS 10.0) 🔻	Ye	ar: 2016		1	Protocol:				*		
		ferenc		<b>T</b>			Keywords				Bre	owse		
	Re	rerenc	e.	· .			Reywords.				ВП	JWSE		
						Displaying 20 of 20	Get mor							
	StrikeI	d	Name	Proto	Direc	Reference	Sever	Varia			StrikeId	Name	Reference	
ŧ	E16-30	0401	IBM Tivoli Storage Manager	tcp	c2s	CVE: 2015-8521	HIGH	1	•	٠	D16-31e01	Microsoft Network	CVE: 201	ī
ŧ	E16-30	0501	IBM Tivoli Storage Manager	tcp	c2s	CVE: 2015-8522	HIGH	1	•	٠	E16-3dm	Oracle Application	CVE: 201	冒
ŧ	E16-30	602	IBM Tivoli Storage Manager	tcp	c2s	CVE: 2015-8520	HIGH	1	0	۰	E16-30602	IBM Tivoli Storage	CVE: 201	冒
ŧ	D16-3z	zq01	ISC BIND RRSIG For Nonexi	udp	c2s	CVE: 2016-1286	MEDI	1	٢					
ŧ	D16-31	le01	Microsoft Network Policy Ser	udp	c2s	CVE: 2016-0050	MEDI	2	$\bigcirc$					
ŧ	E16-46	5c01	NETGEAR Management Sys	http	c2s	CVE: 2016-1524	HIGH	1	٢					
ŧ	E16-46	5d01	NETGEAR Management Sys	http	c2s	CVE: 2016-1525	MEDI	1	٢					
ŧ	E16-30	dd01	Oracle Application Testing S	http	c2s	CVE: 2016-0481	MEDI	4	٢					
ŧ	E16-30	lm	Oracle Application Testing S	http	c2s	CVE: 2016-0490	MEDI	2						
ŧ	E16-30	101	Oracle Application Testing S	http	c2s	CVE: 2016-0489	MEDI	1	$\odot$					
-							Add All	Add	Selected			Remove All	Remove Sel	ecte

An intelligent search bar makes it easier to browse through the 37,000+ attacks

## NETWORK NEIGHBORHOOD

BreakingPoint's Network Neighborhood provides flexibility for the user to create simple to highly complex network environments. It includes support of commonly used network elements like IPV4, IPV6, VLAN, IPsec, DHCP, DNS and for 3G/4G mobile infrastructure network elements.

S Network Neighborhood	»>				Browse	?
INTERFACE: (2)      DEL ID      X Interface 1      X Interface 2	DD NEW ELEMENT IP Infrastructure IP Configuration Endpoint LTE Mobile Configuration 3G	IPv4 DNS Configuration	ation	Lock Network Neighbo	_	ADD ROW
<ul> <li>IPV4 DNS CONFIGURATION: (1</li> <li>IPSEC CONFIGURATION: (1)</li> <li>IPV4 EXTERNAL HOSTS: (1)</li> </ul>	1)       	DHCPv8 Client Configuration DHCPv8 Request Options Con DHCPv8 Timeout and Retransi External hosts used as a test targe	mission		_	
×	   	Simulated IPv4 endpoints Simulated IPv6 endpoints Devices that transmit data over a	3G or LTE mobile network			
<ul> <li>× ► ENODEB/MME (GTPV2): (2)</li> <li>× ► SGW/PGW: (2)</li> </ul>		Simulates eNodeB/MME S1-U and Serving Gateway/PDN Gateway				
<ul> <li>➤ HSS/UE DATABASE: (2)</li> <li>➤ PUBLIC LAND MOBILE NETWOR</li> </ul>		Information required to properly A regulatory domain for a mobile	network		ork	
× ► MOBILITY SESSION INFORMAT	10N; (2)	Information required for a device	to connect to a mobile net	work		
Revert Test Paths Expo	prt			Save	Save As	Close

A complex mobile Network Neighborhood created in BreakingPoint that include some key network elements

## LOAD PROFILES

Load profiles and constraint provides users options to have more granular controls over the test run. This helps users create varied network conditions and load dynamics like rate controls, burst profiles, and Poisson distribution.

16000000						
		4 6 8 Max Sessions 🔲 Data Rate		16 18 20 22	24 26 28	30 32 34
Phase	Туре	Duration(s)	Data Rate	Behavior	Session/s	Max Sessions
Phase 0	up	15	148809 Frame	▼ Full Open	▼ 188249	1500000
Phase 1	steady	2	148809 Frame	<ul> <li>Open and Close Sessions</li> </ul>	▼ 188249	1500000
Phase 2	steady	2	1 Frame	<ul> <li>Open and Close Sessions</li> </ul>	• 1	1
Phase 3	steady	2	148809 Frame	<ul> <li>Open and Close Sessions</li> </ul>	▼ 188249	1500000
Phase 4	steady	2	1 Frame	<ul> <li>Open and Close Sessions</li> </ul>	• 1	1
Phase 5	steady	2	148809 Frame	<ul> <li>Open and Close Sessions</li> </ul>	▼ 188249	1500000
Phase 6	down	10	1 Frame	Full Close	• 1	1
			Add New	Duplicate Phase Delete Selected		

A BreakingPoint MicroBurst Load profile

## PRE-DEFINED TEST METHODOLOGIES/LABS

Leverage extensive automation and wizard-like labs that address many use-case scenarios, including validation of lawful intercept and data loss prevention (DLP) solutions, RFC2544, DDoS, Session Sender, and Multicast.

In addition, a REST and TCL API are provided for building and executing automated tests.



#### A test configured with DDoS Lab

#### **BUILT-IN REPORTING**

BreakingPoint's extensive reports provide detailed information about the test, such as the components used in a test, addressing information, DUT profile configuration, system versions, and results of the test.

- All reports include an aggregated test results section, which provides the combined statistics for all of the test components. It also includes the information over time, to pin-point a potential error within the time-slot it happened.
- All reports are automatically generated in HTML and viewable with a web browser; however, you may export the test results in XLS, HTML, PDF, RTF, CSV, or ZIP (CSV files). Reports are automatically generated each time a test is run and are viewable from the Results page.

• Comparison Report feature allows you to run multiple iterations of the same test on different load modules or different ports and compare the results. You have the option of comparing all sections of the tests, or you can select only certain sections to be included in the comparison.



A segment of BreakingPoint report showcasing flow mix

# **BREAKINGPOINT HARDWARE PLATFORMS**

Ixia's **CloudStorm**<sup>™</sup> platform is the world's first multi-terabit applications and security test solution, modularly scaling to more than two terabits of application traffic in a single, integrated system. It consists of a 2-port SFP28 100GE load module with an innovative architecture that allows concurrent emulation of complex applications and a large volume of stateless DDoS traffic at 200Gbps line-rate per module without any mode switch. Its seamless proxy support enables web proxy and SSL inspection scenarios using simple 2-arm configurations. The full crypto offload delivers stellar IPsec and SSL performance.

Ixia's **PerfectStorm**<sup>™</sup> platform modularly scales to nearly a terabit of application traffic in a single, integrated system. It generates stateful applications and malicious traffic that simulate millions of realworld end-user environments to test and validate infrastructure, a single device, or an entire system. With PerfectStorm Fusion load modules, Ixia delivers the first platform to seamlessly unify the IxLoad<sup>®</sup> and BreakingPoint software applications into a single, more powerful system to ensure the secure delivery of mission-critical applications.

Ixia's **PerfectStorm ONE**<sup>™</sup> network test and assessment solutions are developed specifically to make BreakingPoint solutions available in a compact form-factor for enterprise IT, operations, and security personnel. PerfectStorm ONE condenses Ixia's PerfectStorm massive-scale, stateful Layer 4-7 testing platform into a versatile appliance. Scaling from 4Gbps to 80Gbps of application traffic simulation, PerfectStorm ONE supports a buy-only-what-you-need business model to align with enterprise budgets and future-proof your growing test needs.

#### VISIT IXIACOM.COM FOR MORE DETAILS ON BREAKINGPOINT HARDWARE PLATFORMS

## **BREAKINGPOINT PERFORMANCE BY PLATFORM**

Metric	PERFECTSTORM ONE FUSION 8X10G/2X40G	PERFECTSTORM FUSION 8X10G/2X40G	CLOUDSTORM FUSION 2X100G
App Throughput	80Gbps	80Gbps	200Gps
TCP Connections per Second	1.45 Million	1.45 Million	3.5 Million
App Concurrent Flows	60 Million	60 Million	120 Million
SSL Bandwidth	20Gbps	20Gbps	65Gbps
<b>SSL Handshake Rates</b> (2K Key and AES256)	200,000	200,000	400,000
SSL Concurrent Flows	1 Million	1 Million	2 Million
App Throughput over SCTP	5Gbps	5Gbps	10Gbps
App Throughput over IPsec	25Gbps	25Gbps	60Gbps
IPsec Concurrent Tunnels	500,000	500,000	1 Million
IPsec Tunnel Setup Rates	2,000	2,000	4,000
App Throughput over GTP	80Gbps	80Gbps	170Gbps
GTP UE Attachment Rate	2M per second	2M per second	5 M per second
GTP Tunnels	18 Million	18 Million	27 Million

The performance numbers are on a single appliance or load module

# **SPECIFICATIONS**

SPECIFICATION	PROTOCOLS
Applications	360+ application protocols, including Yahoo!® Mail and Messenger, Google® Gmail, Skype®, BitTorrent <sup>™</sup> , eDonkey, RADIUS, SIP, RTSP, RTP, HTTP, SSL, Facebook®, Twitter Mobile, YouTube®, and Apple® FaceTime®, as well as other mobile, social, and gaming protocols—with Multicast support
Wireless Interfaces	<ul> <li>S1-U (eNodeB and SGW sides)</li> <li>S1-MME (eNodeB side)</li> <li>SGi (PDN side)</li> <li>S5/8 (SGW and PGW sides)</li> <li>S11 (MME and SGW sides)</li> <li>Gn (SSGN and GGSN sides)</li> <li>Wireless Protocols Supported: <ul> <li>S1AP</li> <li>GTP-C v1, GTP-C v2, GTP-U v1</li> <li>SCTP (over UDP or IP)</li> </ul> </li> </ul>
Wireless Operational Modes	<ul> <li>User Equipment</li> <li>3G GGSN</li> <li>3G SGSN</li> <li>eNodeB/MME (GTPv2)</li> <li>eNodeB/MME/SGW (GTPv2)</li> <li>eNodeB (S1AP/ GTPv1)</li> <li>SGW/PGW</li> <li>MME/SGW/PGW</li> <li>PGW</li> </ul>

SPECIFICATION	PROTOCOLS
Network Access	IPv4/IPv6 Static Hosts
	IPv4/IPv6 External Hosts
	IPv4/IPv6 DHCP Hosts
	IPv4/IPv6 DHCP Server
	<ul> <li>IPv6 SLAAC + Stateless DHCPv6</li> </ul>
	• DHCP-PD
	• VLAN
	IPv4/IPv6 Router
	6rd CE Routers
	DS-Lite B4 and AFTR
	IPv4/IPv6 DNS
	IPsec IKEv1/IKEv2
	NAT Support
Test Methodologies/Labs	• RFC 2544 Lab
	DDoS Lab
	Multicast Lab
	Lawful Intercept Lab
	Session Sender Lab
	LTE Lab
	Device Validation Lab
	MultiBox testing
	Resiliency Score (Not supported on PerfectStorm 100GE)
	Data Center Resiliency
	LTE Lab
	DDoS Lab

SPECIFICATION	PROTOCOLS
Security Exploits and	• 37,000+ total attacks
Malware	• 7,000+ exploits
	• 30,000+ malware
	• 100+ evasion classes
	Attacks include:
	IP-based DoS attack types:
	<ul> <li>ICMP flood test case</li> </ul>
	<ul> <li>ICMP fragmentation test case</li> </ul>
	<ul> <li>Ping flood test case</li> </ul>
	UDP-based DoS attack types:
	<ul> <li>UDP flood test case</li> </ul>
	<ul> <li>UDP fragmentation test case</li> </ul>
	<ul> <li>Non-spoofed UDP flood test case</li> </ul>
	<ul> <li>TCP-based DoS attack types:</li> </ul>
	<ul> <li>Syn flood test case</li> </ul>
	<ul> <li>Syn-ack flood test case</li> </ul>
	<ul> <li>Data ack and push flood test case</li> </ul>
	<ul> <li>Fragmented ack test case</li> </ul>
	<ul> <li>Session attack test case</li> </ul>
	Application-layer attack types:
	<ul> <li>DNS flood attack case</li> </ul>
	<ul> <li>Excessive verb attack case</li> </ul>
	<ul> <li>Recursive GET Floods</li> </ul>
	<ul> <li>Slow POSTs</li> </ul>
	Botnets:
	o Zeus
	○ SpyEye
	<ul> <li>BlackEnergy</li> </ul>
	o Duqu
	<ul> <li>Pushdo Cutwail</li> </ul>

# **PLATFORM OPTIONS**

VISIT IXIACOM.COM FOR MORE INFORMATION ON BREAKINGPOINT PLATFORM OPTIONS		
Virtual Platform	BreakingPoint Virtual Edition (VE)	
Chassis	<ul> <li>XGS-12 HS Chassis</li> <li>XGS-12 HSL Chassis</li> <li>XGS-2 HS Chassis</li> <li>XGS-2 HSL Chassis</li> </ul>	
Appliances/Load Modules	<ul> <li>CloudStorm Fusion 100GE</li> <li>PerfectStorm Fusion 10/1GE</li> <li>PerfectStorm Fusion 40/10GE</li> <li>PerfectStorm Fusion 100GE</li> <li>PerfectStorm ONE Fusion 10/1GE</li> <li>PerfectStorm ONE Fusion 40/10GE</li> </ul>	

# **PRODUCT ORDERING INFORMATION**

BREAKINGPOINT SOFTWARE		
BreakingPoint Application and Threat Intelligence (ATI)		
909-0856	BreakingPoint – Application & Threat Intelligence Program	
BreakingPoint VE		
939-9600	BreakingPoint Virtual Edition (VE) 1G Floating Subscription Counted License	
939-9619	BreakingPoint, Virtual Edition (VE) 10G Floating Subscription Counted License	

#### BREAKINGPOINT ON CLOUDSTORM

#### Chassis

BREAKINGPOINT ON CLOUDSTORM		
940-0016	XGS12-HSL 12-slot chassis bundle with High Performance Controller	
940-0014	XGS2-HSL 2-slot chassis with High Performance Controller	
Fusion Load Modules (Includes BreakingPoint Application)		
944-1231	CloudStorm 100GE Fusion 2 QSFP28 ports (CS100GE2Q28NG)	
Transceivers and Cables		
QSFP28-LR4-XCVR	QSFP28 100GBASE-LR4 100GE pluggable optical transceiver, SMF (single mode fiber), 1310nm, 10km reach	
QSFP28-SR4-XCVR	QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode), 850nm, 100m reach	
942-0087	QSFP28 Active Optical Cable (AOC), multimode fiber, 850nm, 3-meter length	
942-0088	QSFP28 passive, copper, Direct Attach Cable (DAC), 3-meter length	
942-0092	QSFP28 Active Optical Cable (AOC), multimode fiber, 850nm, 3-meter length	

## BREAKINGPOINT ON PERFECTSTORM

Chassis	
940-0006	XGS12-HS 12-slot chassis bundle with High Performance Controller
940-0016	XGS12-HSL 12-slot chassis bundle with High Performance Controller
940-0012	XGS2-HS 2-slot chassis with High Performance Controller
940-0014	XGS2-HSL 2-slot chassis with High Performance Controller
Fusion Load Modules (Includes BreakingPoint Application)	
944-1203	PerfectStorm 1GE Fusion 8-port (PS1GE8NG)
944-1200	PerfectStorm 1/10GE Fusion 8-port (PS10GE8NG)
944-1209	PerfectStorm 1/10GE Fusion 4-port (PS10GE4NG)
944-1210	PerfectStorm 1/10GE Fusion 2-port (PS10GE2NG)

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BREAKINGPOINT ON PERFECTSTORM		
944-1201	PerfectStorm 40GE Fusion 2-port (PS40GE2NG)	
944-1202	PerfectStorm 100GE Fusion 1-port (PS100GE1NG)	
Transceivers and Cables		
988-0011	SFP+, 10Gb/1Gb SR optical Xcvr, 850nm (cable included)	
988-0012	SFP+, 10Gb/1Gb LR optical Xcvr, 1310nm (cable included)	
948-0016	SFP+10GSFP+Cu, Accessory, Passive Direct Attach Cable Assembly, Copper Wire, 3 meter length (cable not included)	
988-0004	1GbE, Copper Xcvr (cable included)	
948-0031	QSFP+ 40GBASE-SR4 optical transceivers (cable not included)	
942-0041	MT 12-Fiber Multimode cable for 40GBASE-SR4 optical transceivers with MT Flat F-F connectors, 850nm, 3 meter length	
942-0067	MT-to-4x10GE LC fan-out, MMF, 3-meter – required for 40 Gig to 4x10Gig fan-out	
942-0068	MT-to-4x10GE LC fan-out, MMF, 5-meter – required for 40 Gig to 4x10Gig fan-out	
948-0030	CXP,100GE, MMF, 850NM, PLUGGABLE TRANSCEIVER (cable not included)	
942-0041	MT 12-Fiber MM cable for 40GBASE-SR4 optics, F-F, 850nm, 3-meter length	
942-0052	CXP-to-CXP 100GE Active Optical Cable, point-to-point (AOC), 3-meter length	



BREAKINGPOINT ON PERFECTSTORM ONE APPLIANCES (INCLUDES BREAKINGPOINT APPLICATION)		
941-0028	PerfectStorm ONE Fusion, 40 Gig 2-PORT QSFP+ appliance (PS40GE2NG)	
941-0027	PerfectStorm ONE Fusion, 1Gig/10 Gig 8-PORT SFP+ appliance (PS10GE8NG)	
941-0031	PerfectStorm ONE Fusion, 1Gig/10 Gig 4-PORT SFP+ appliance (PS10GE4NG)	
941-0032	PerfectStorm ONE Fusion, 1Gig/10 Gig 2-PORT SFP+ appliance (PS10GE2NG)	
941-0033	PerfectStorm ONE Fusion, 1 Gig 8-PORT SFP+ appliance (PS1GE8NG)	
941-0034	PerfectStorm ONE Fusion, 1 Gig 4-PORT SFP+ appliance (PS1GE4NG)	

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