



## WaveBlade WiFi 802.11n (1-port WBW2000 & WBW1101P, 4-port WBW1104N)

The VeriWave 802.11n WaveBlade provides a state-of-the-art and an industry first test product to evaluate the functionality and performance of IEEE 802.11n based WLAN networking products. Designed for testing network infrastructure devices, including consumer Access Points and reference designs, enterprise/carrier-grade Access Points and controllers, and entire WLAN networks, the WaveBlade integrates both traffic generation/analysis and multi-path channel emulation capabilities on a single platform.

The WBW2000 generates traffic from hundreds of independent stateful clients and makes it easy to determine the effects of complex MIMO propagation on 802.11n Access Point and Controller performance by subjecting each individual client to any of the IEEE-defined channel emulation models.

The WBW1104N generates over 500 Mbps of traffic from 2000 fully stateful clients per blade to enable cost-effective, feature-rich functional and performance testing of 802.11n controllers.

The WBW1001P is a single port, high power 802.11 module suitable for open air testing.

The WaveBlade WiFi 802.11n is a line-card that fits into VeriWave's WT90 and WT20 chassis and interworks seamlessly with the WaveBlade WiFi 802.11 a/b/g and WaveBlade Ethernet line-cards. It provides the essential tools necessary to complete various types of testing ranging from functional testing at the AP level to scale testing a large 802.11n infrastructure network.



## Benefits

- Up to 500 fully independent, stateful 802.11n clients per port enable precise measurement of critical performance metrics at data rates reaching up to maximum theoretical limits
- Highly scaled setup in a single test-bed to test real-world deployment levels of Controllers, APs and clients
- Built-in channel models help determine real-world performance in six typical WLAN multi-path scenarios, per recommendations of IEEE 802.11n task group (WBW2000 Only)
- Full support of legacy IEEE 802.11 a/b/g traffic generation and analysis
- Ease-of-use through simplified setup including single-click selection of desired channel model to be used on clients in a wide-array of VeriWave Test Suites.

# Specifications

	WBW2000	WBW1104N	WBW1101P
Number of ports	1 x 802.11 a/b/g/n MIMO port	4 individual and independent 802.11 a/b/g/n SISO ports supporting multi-user and multi-test beds	1 x 802.11 a/b/g/n MIMO port
Maximum number of ports per chassis	9	36	9
MIMO configuration	Support for 2x2, 2x3, 3x3 with spatial multiplexing	Works with a single spatial stream per port only	
PLCP mode	Legacy, Mixed-mode		
Operating frequency	2.4 GHz, 4.9 GHz and 5 GHz		
IEEE channel models	<ul style="list-style-type: none"> <li>• Model A – typical home/small office environment</li> <li>• Model B – typical medium office environment</li> <li>• Model C – typical large office environment</li> <li>• Model D – typical open space environment</li> <li>• Model E – typical large open space environment</li> <li>• Model F – complex environment with many scatters</li> <li>• By-pass mode – to not impose any channel conditions</li> </ul>		
Guard interval selection (per client control)	800 / 400 ns		
Spatial streams (NSS)	1 to 3	1	
HT PHY rates	6.5 Mbps to 450 Mbps (MCS Index 0 to 23)	6.5 Mbps to 157.5 Mbps (MCS Index 0 to 7)	
FEC coding rate	1/2, 2/3, 3/4, 5/6		
Channel bandwidth	20 MHz, 40 MHz		
Legacy PHY rates	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54 Mbps		
Aggregation types	<ul style="list-style-type: none"> <li>• Tx and Rx: A-MPDU and Block-Ack</li> <li>• Rx only: A-MSDU</li> </ul>		
Transmit power control	-50 dBm to 0 dBm in 1 dB steps		0 dBm to +15dBm in 1 dB steps
Transmit power accuracy	+/- 1.0 dB (Typical)		
Optional in-path attenuation	20 dB		No

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Receive sensitivity	<ul style="list-style-type: none"> <li>• -82 dBm min for 8x10-2 FER (1 Mbps CCK)</li> <li>• -65 dBm min for 10x10-2 PER (64-QAM (5/6))</li> </ul>		
Operating channels	<ul style="list-style-type: none"> <li>• 2.412 to 2.484 GHz: 1 to 14</li> <li>• 4.940 to 4.990 GHz: 21, 25</li> <li>• 5.180 to 5.320 GHz: 36, 40, 44, 48, 52, 56, 60, 64</li> <li>• 5.500 to 5.700 GHz: 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140</li> <li>• 5.740 to 5.825 GHz: 149, 153, 157, 161, 165</li> </ul>		
Antenna interface connector configurations	3 connectors	<ul style="list-style-type: none"> <li>• 1 connector per port</li> <li>• 4 total per blade</li> </ul>	1 connector
Antenna interface connectors	<ul style="list-style-type: none"> <li>• SMA female connector, standard thread</li> <li>• AC coupled, 50 Ohms</li> </ul>		
Traffic timestamp accuracy	50ns		
Maximum number of stateful clients per port	500	<ul style="list-style-type: none"> <li>• 500 per port</li> <li>• 2,000 total per WaveBlade</li> </ul>	500
Maximum number of traffic flows generated per port	1,000	<ul style="list-style-type: none"> <li>• 1,000 per port</li> <li>• 4,000 total per WaveBlade</li> </ul>	1,000
Maximum number of traffic flows analyzed per port	131,000	<ul style="list-style-type: none"> <li>• 131,000 per port</li> <li>• 524,000 total per WaveBlade</li> </ul>	131,000
802.11 MAC control (all parameters)	Independent per client		
802.1x authentication support	PEAP/MSCHAPv2, TLS, LEAP/EAP-FAST, TTLS		
Encryption support	WEP-40 and WEP-104, TKIP (WPA, AES-CCMP (WPA2))		
OSI layer 3 and layer 4 (IP, UDP, TCP, etc.) control (all parameters)	Independent per client		
Port counters	Comprehensive set of layer 2, 3 and 4 frame types		
Client control	Control frames, management frames, action frames		
Flow and flowgroup counters	Frames sent / received, bytes sent / received, out-of-order frames, payload integrity, latency histogram		

# Minimum Requirements

<b>VeriWave Test System</b>	1 x VeriWave WaveTest 90™ or WaveTest 20™ system
<b>Host Computer</b>	<ul style="list-style-type: none"> <li>• X86-based PC with 1GHz processor and 256MB RAM</li> <li>• Windows XP SP2, or Linux (2.6 or higher kernel level) with Web Browser installed to manage the WaveBlade</li> <li>• Web Browser Installed</li> </ul>