**PRODUCT HIGHLIGHTS**

**Multi-Channel WLAN Support**
Support for three or more channels of WLAN simultaneous operation enables high-capacity access points offering greater than 594 Mbps.

**Advanced Spectral Processing**
Highly integrated chip set employs unique wideband spectral processing technology to mitigate RF interference and continually monitor the complete RF spectrum.

**RF Spectrum Monitor**
Continually monitors active and inactive channels for optimal WLAN channel selection without disrupting communications traffic flow.

**Support for 802.11a/b/g**
The EAP-3000 supports any combination of three or more channels of simultaneous 802.11a/b/g communications.

**Hardware Security Support**
Hardware-based AES implementation and onboard security engine support for WEP and TKIP ensure line-rate secure communications and 802.11i compliance.

**Superior WLAN Control**
Dynamic Frequency Selection and Transmit Power Control for maximum network control and network scalability.

**Standards Based Technology**
Support for IEEE 802.11e, h and i draft standards. Designed for Wi-Fi and WPA compliance.

**Superior Flexibility**
Programmable MAC design allows granular control of all MAC parameters for maximum configuration flexibility. MAC Bypass mode available to enable the use of 3rd party MAC solutions.

### FIG 1: Edgewater EAP-3000 802.11A/B/G WLAN Switching Engine Architecture

<table>
<thead>
<tr>
<th>Edgewater EAP-3000 WLAN Switching Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRODUCT SPECIFICATIONS</strong></td>
</tr>
</tbody>
</table>

**EAP-3000 Multi-Channel WLAN Switching Engine**

- **Enabling the Next Generation of Access Points**
  The Edgewater EAP-3000 Multi-channel Wireless LAN Switching Engine is a multi-channel, multi-mode, multi-band chipset that enables a new generation of high-capacity access points that offer a dramatic improvement in WLAN data capacity and manageability. With simultaneous support for 3 or more channels of any combination of 802.11a, 802.11b and 802.11g the Edgewater EAP-3000 chipset far exceeds the limitations of single channel WLAN access point solutions, enabling the design of 162 Mbps access points and beyond. Additionally, Edgewater’s unique Wideband Spectral Processing support enables these high capacity access points to perform as RF monitoring devices that simplify network configuration and maintenance, enhance network security and improve WLAN fault tolerance and reliability.

- **High Capacity Multi-Channel WLAN Switching Technology**
  The staggering growth in WLAN users is presently driving the need for WLAN infrastructure that is able to provide the bandwidth and quality of service that users are accustomed to with wired networks. Edgewater’s Multi-Channel WLAN Switching technology offers unprecedented WLAN infrastructure capacity by allowing simultaneous communications on multiple 802.11 channels from a single access point. For the first time, high-capacity access points can be constructed which take advantage of all available 802.11 spectrum, allowing WLAN clients to enjoy the best possible Wi-Fi experience. An Edgewater-enabled access point has the ability to provide greater than 500 Mbps of data throughput, ensuring mobile PCs, PDAs, VoWIP telephones and other 802.11 devices the capacity they require for maximum productivity.

  In addition to providing maximum capacity through simultaneous multi-band, multi-channel support, the EAP-3000 chipset offers enhanced quality of service features and extensive RF monitoring capabilities. Furthermore, Intelligent Channel Association maximizes system throughput by intelligently associating clients to strategic channels based on signal integrity, 802.11 standard, traffic type, and traffic load, resulting in huge gains in WLAN performance. Finally, through support of the 802.11e draft standard, the Edgewater chipset offers quality of service extensions to support isochronous WLAN traffic such as multimedia and 802.11 telephony.
Highly Integrated System Design

The EAP-3000 WLAN Switching Engine is a complete WLAN system which combines unique RF, analog, digital and systems software technology into a complete WLAN access point solution. Each component of the EAP-3000 system is optimized for wideband, multi-channel, multi-band operation (refer to figure 1).

- **2.4 GHz Wideband RF Front-End Chip (EN-3201):** A fully integrated direct conversion transceiver for IEEE 802.11b/g WLAN applications that supports 3 simultaneous channels of 802.11b/g operation.

- **5 GHz Wideband RF Front-End Chip (EN-3501):** A fully integrated direct conversion transceiver for IEEE 802.11a WLAN applications that supports 3 simultaneous channels of 802.11a operation.

- **Analog Baseband Chip (EN-3101):** A high performance, low-power, fully monolithic device integrating an ultra-fast sampling 13-bit analog-to-digital converter (ADC) and two IQ high-performance 12-bit digital-to-analog converters (DACs).

- **Digital Baseband Processor and MAC Chip (EN-3301):** A multi-channel, multi-standard device that includes a programmable Medium Access Controller (MAC), three concurrent IEEE 802.11a/b/g compliant digital basebands and modern capable of achieving a peak data rate of 162 Mbps.

Together with systems software, these individual components combine to offer unprecedented access point functionality and scalability.

Access Point Configuration Flexibility

The EAP-3000 WLAN Switching architecture allows for highly scalable access point configurations, ranging from 3 channels of 802.11b/g performance up to 9 channels of 802.11a/b/g and beyond.

As indicated in the figure 2, a variety of access point architectures are possible:

- **3 Channel 802.11b/g or 802.11a Access Point:** Accommodates 3 channels of 802.11b/g or 802.11a for a maximum capacity up to 162 Mbps.

- **6 Channel 802.11a/b/g Access Point:** Accommodates 3 channels of .11b/g and 3 channels of .11a for a maximum capacity up to 324 Mbps.

- **9 Channel 802.11a/b/g Access Point:** Accommodates 3 channels of .11b/g and 6 channels of .11a for a maximum capacity up to 486 Mbps.

Higher capacity solutions can be constructed by adding additional 5 GHz 802.11a support to address additional spectrum.

Flexible, Programmable MAC

The EAP-3000 includes a flexible three channel MAC implementation that allows extensive programmability of all relevant MAC attributes. The EN-3301 MAC is powered by an embedded processor core and can be configured for full MAC functionality or MAC Bypass implementations for use with a 3rd party MAC. The included firmware supports multiple BSS operations under both Distributed Coordination Function (DCF) and Point Coordination Function (PCF).

Additionally, RTS/CTS generation, beacon generation, association, authentication, and fragmentation/defragmentation are supported without host intervention.

Unique Wideband WLAN Spectral Processing Technology

Edgewater’s EAP-3000 WLAN Switching Engine utilizes Wideband Spectral processing technology, which digitizes available RF spectrum for the purpose of RF interference management and monitoring. This unique approach gives access point designers full access to the complete wireless spectrum for the first time (refer to figure 3). Spectral processing enables access points to simultaneously communicate on multiple channels and multiple 802.11 bands.

Additionally, this detailed knowledge of the WLAN RF spectrum allows the multi-channel access point to also become a network monitor, offering full visibility of the WLAN RF environment.

The enabling technology for Edgewater’s WLAN chipset is a new generation of RF and analog front ends with very high dynamic range, linearity, and low noise, and sophisticated integrated digital baseband processing. The chipset is controlled via a multithreading software MAC running on an integrated RISC core, and which may be bypassed in part or in its entirety for custom MAC implementations. Edgewater provides several key hardware hooks within its RF, analog, and digital front ends to offer access point OEMs full access to the complete wireless spectrum. This allows access point manufacturers to implement value-added software to control the wireless environment and AP deployment and configuration to an unprecedented degree, from single AP networks to large campus-style enterprise deployments.

RF Interference Mitigation

Single channel 802.11 chipsets take a narrow-band approach to processing WLAN signals by utilizing only the small portion of the ISM or UNII band associated with a single channel of operation. Energy outside this narrow range is then filtered out by the single channel chipset. This approach makes sense for clients, which transmit on a single channel at a time. An access point has different requirements, however, as it typically services multiple clients.
Edgewater utilizes a wideband approach through its use of Spectral Processing Technology. Rather than addressing only a small amount of the usable spectrum, the EAP-3000 addresses all available WLAN spectrum to offer a complete and accurate representation of the RF environment. This spectrum is then digitized and subsequently processed by advanced DSP algorithms to compensate for and suppress the effects of the adjacent channel interference that limits narrowband, single channel solutions to supporting only one channel at a time. This interference mitigation capability accounts for the EAP-3000’s ability to simultaneously communicate on multiple channels within the same WLAN band, resulting in large capacity gains.

**Advanced RF Monitoring Capability**

Edgewater’s unique wide-band spectral processing approach enables RF monitoring capabilities that extend well beyond single-channel narrow-band products. The EAP-3000 captures large amounts of spectrum to create an accurate representation of the RF environment. An Edgewater-enabled access point is able to detect the presence of 802.11 clients and other access points within the network as well as non-802.11 sources of interference such as microwave ovens, Bluetooth devices and 2.4 GHz telephones. Wideband spectral monitoring using the FFT module provided in the Edgewater chipset can detect non-802.11 interferers with ease. Higher software layers may be programmed in a straightforward manner to recognize the spectral signatures of phenomena occurring in the 2.4 GHz and 5 GHz bands. This information may then be used for reporting purposes or as a basis for directing the Edgewater chipset to take appropriate action, such as to associate clients onto channels in quieter parts of the spectrum to maintain quality of service. This information may then be used to make strategic decisions regarding network configuration.

Using the controls that the EAP-3000 chipset provides for and the spectrum monitoring information fed back from it, a vast array of powerful new services, in addition to raw increased bandwidth, can be realized. Implementing some or all of these applications brings a new powerful class of easy-to-operate and robust wireless networks into being.

Network robustness and fault-tolerance are dramatically improved, as Edgewater’s wideband RF monitoring technology enables self-healing networks that dynamically adjust to accommodate network changes and unexpected events. WLAN network outages can be avoided as malfunctioning network devices are quickly detected and addressed by Edgewater-enabled AP’s wideband monitoring and transmit power control. Network configuration changes can be dynamically addressed and site surveys automated.

- Scalability is important to consider when planning a WLAN deployment. By continually monitoring the RF environment, the EAP-3000 will detect the presence of new access points being added to the network. It can then intelligently select the frequency and transmit power levels to adjust the RF environment to minimize interference and maximize data throughput. This removes the need to rigidly pre-serve a WLAN network configuration for fear of disturbing access point cells after initial setup.

- RF Interference recognition and isolation are possible with the EAP-3000, as access point software can be programmed to recognize the spectral signatures of phenomena occurring in the 2.4 GHz and 5 GHz bands, such as microwave ovens, cordless phones, and Bluetooth or HomeRF devices. This information can then be used as a basis for directing the Edgewater chipset to take appropriate action, such as to re-associate clients onto channels in quieter parts of the spectrum to maintain quality of service.

**Intelligent Channel Association**

By intelligently associating clients to strategic channels based on signal integrity, 802.11 standard, traffic type, and traffic load, huge gains in WLAN performance can be attained. For example, the throughput of a single channel 802.11b/g access point servicing a number of clients associated at different data rates will be limited by clients associated at the lowest data rates. Because clients associated at high data rates have to wait for access to the medium while slower users communicate, aggregate AP performance is negatively impacted, resulting in severely reduced performance for all users. Edgewater technology allows a multi-channel AP to dedicate certain channels to slower clients such as 802.11b clients or those far away from the AP, thereby reserving other channels to users associated at higher data rates. The result is a performance improvement of up to 15 times or greater depending upon client mix and network configuration.

Additionally, demanding traffic types such as Voice over Wireless Internet Protocol (VoWIP) can be intelligently assigned to dedicated channels to ensure the level of guaranteed service that isochronous traffic requires.

**802.11 Standards-Based Solution**

The Edgewater EAP-3000 is fully compliant with the IEEE 802.11 standard. This means that clients do not require modification to realize the benefits of Edgewater’s ‘Multi-Channel WLAN Switching technology. Wi-Fi devices such as personal computers, PDAs and VoWIP telephones can simultaneously connect to the EAP-3000 using 802.11a, 802.11b and 802.11g protocols. Each channel can be individually configured to communicate with 802.11a or 802.11b/g clients. This enables access points to accommodate any standards mix of WLAN traffic and dynamically adjust as the client mix changes over time.

In addition to support for 802.11a/b/g, the EAP-3000 also offers support for extensions to the 802.11 protocol as they become finalized:

- **802.11e - Distributed Coordination Function (DCF) and Point Coordination Function (PCF)** support for enhanced Quality of Service. Support for additional services available as draft standard progresses.
802.11h - Fine granularity transmit power control on a per-packet, per-channel basis. It also includes a high performance, programmable, wideband Automatic Gain Control (AGC) with a 6-bit interface to accommodate a wide dynamic range in received signals.

802.11i - Hardware security engine supports 802.11i algorithms including WRAP, AES-CCMP, WEP w/TKIP and WEP. Additionally, hardware acceleration is provided for RC4, AES-ECB, AES-CBC, AES-CBS-MAC, and AES-CNTR.

Hardware-Accelerated Support

The EAP-3000 provides comprehensive, multi-channel hardware-accelerated standards support. The embedded security engine offers on-board support for 64/128 bit WEP and TKIP and hardware-assisted AES support for CCM and OCB. Furthermore, the EAP-3000 supports WPA and the 802.11i draft standard. The result is secure communications at line-rate.

Edgewater’s EAP-3000 chipset also enables the full WLAN spectrum to be continuously monitored and the results used to identify potential security risks or the presence of unauthorized transmissions. External transmissions or beacon signals can be detected easily using the full spectral monitoring features in the Edgewater EAP-3000 chipset. The presence of unauthorized rogue clients or access points, or transmissions in certain unexpected portions of the RF spectrum can then be reported to a central network management console for subsequent action.

Summary

Large, medium and small enterprises, as well as hot spots, benefit from the EAP-3000’s capacity and management capabilities. A Multi-Channel WLAN Switch-enabled AP allows WLAN users to experience consistent network performance whether they are connected to the wired or wireless network. Furthermore, in WLAN deployments comprised of multiple access points, Edgewater Services allow for automatic WLAN performance optimization and self-healing WLAN deployments.

Edgewater’s Multi-Channel WLAN Switching Engine’s ability to dramatically increase WLAN capacity and improve WLAN reliability, scalability and security makes the EAP-3000 the perfect solution for the next-generation of WLAN infrastructure solutions.