

Home-Optimized Wi-Fi Wireless Network Protocol

Best Wi-Fi Solution for the Home/SOHO

Cirrus' Whitecap™2 is the latest version of our wireless network protocol, providing industry-standard Wi-Fi (802.11b) interoperability plus multimedia and quality of service (QoS) support. It is the only wireless LAN solution capable of seamlessly transmitting high-quality audio and video entertainment throughout the home.

Whitecap2 is designed specifically to address the requirements for consumer-friendly wireless networks—including multimedia support, interference immunity, and ease of use. It incorporates multimedia and QoS extensions for wirelessly distributing the full range of entertainment content and enabling exciting new applications for the home, such as video-on-demand, audio-on-demand, voice over IP, and streaming media. Whitecap2 delivers these unique capabilities while preserving interoperability with other Wi-Fi products.

Why Wi-Fi (802.11b) Networking?

Wi-Fi, based on 802.11b, is the industry standard for wireless networking at 11 Mbps. The Wi-Fi logo certifies that a product is interoperable with other Wi-Fi products available from a broad range of manufacturers. Many public facilities, such as airports, hotels and schools, are installing Wi-Fi networks to provide wireless connectivity for their guests. This rapid adoption of the Wi-Fi standard will enable users to have network access wherever they go – in their home, office, school, or other public gathering place.

Why Wireless Multimedia?

The increasing penetration of broadband access (e.g. cable, xDSL, satellite), entertainment content (e.g. MPEG-2 video, MP3 audio, IP telephony),



and digital devices (e.g. set-top boxes, personal video recorders, DVD and MP3 players, web pads) drives the need for multimedia and quality of service (QoS) in wireless networks. Whitecap2 supports the delivery of broadband services and the distribution of local entertainment content within the home network. This wireless multimedia capability enables exciting new consumer platforms and applications, providing users the freedom to connect with digital content throughout the home, where and when they want it.

Complete Multimedia Support

Entertainment content is time-sensitive (isochronous) and demands special treatment in the network, beyond just high speed. It requires qualitative multimedia and QoS features to provide a satisfactory user experience – watching movies without skips and pauses, for example. Whitecap2 delivers the functionality necessary for wireless multimedia delivery:

Dynamic Stream Support - Whitecap2 provides contention-free access to the network for deterministic behavior and predictable latency. Unlike collision-based access mechanisms (e.g. CSMA-CA) that cause unpredictable delays due to contention, Dynamic Stream Support provides high quality delivery of isochronous entertainment content.

Multiple streams can co-exist simultaneously to carry any variety of content – video, audio, voice, and data – among nodes in the network. In addition, stream bandwidth is monitored and adjusted dynamically to ensure maximum utilization of the total available network bandwidth.

Parameterized Quality of Service (QoS) - Allows resource allocation for each stream based on bandwidth, latency, and jitter requirements. Network resources are managed precisely according to the stream parameters specified by the application transmitting the content. For example, high bandwidth isochronous traffic (e.g. time-sensitive video stream) is differentiated from asynchronous data traffic (e.g. print job, file transfer) to ensure the appropriate quality of service. This offers significant improvement over priority-based QoS mechanisms that do not provide deterministic allocation of resources.

Peer-to-Peer (Mesh) Topology - Creates a network where devices communicate directly with each other for multimedia and QoS performance. Even when a central node or access point exists in the network, payload traffic is not forced to travel through that device, which would reduce the total effective throughput.

Delayed Acknowledgements (Delayed Acks) - Improves payload efficiency and minimizes overhead for network access and housekeeping by deferring acknowledgement packets. This increases the bandwidth available for multimedia transmission.

Interference Immunity

Whitecap2 provides key features to address network reliability and avoid other household interference (i.e. from microwave ovens and cordless phones):

Forward Error Correction (FEC) - Recovers data "on the fly" and increases available usable throughput. FEC is essential for combating interference by correcting and recovering corrupted packets to avoid retransmission. FEC can be used on any type of content; however, it is vital for video since retransmission of streamed content is impractical due to its bulky nature and time-critical delivery requirement.

Channel Agility - Allows the network to automatically

"side step" interference on a channel. Based on a dynamic assessment of error characteristics, Whitecap2 seamlessly migrates network operation to a cleaner channel – one with the lowest packet error rate. This allows the user to experience the highest possible performance in spite of interference conditions and without manual intervention.

Ease of Use

Whitecap2 offers several features that make it easier for end users to create and maintain a wireless home network – without requiring network expertise:

Coordinator Redundancy - Allows continued network operation even if the coordinator node within the network fails. Whitecap2 identifies alternate coordinators on the network and automatically transfers the coordination function to one of those nodes. Unlike centralized coordinator or access point-based networks, Coordinator Redundancy prevents a single point of failure in the network.

Open Enrollment - Permits standalone devices without user input capability, such as bridge/access points, to be authenticated on-air from any authorized wireless node.

Protocol/Firmware Update - Allows easy protocol and firmware upgrades to take advantage of new capabilities. Standalone devices, such as bridge/access points, can be updated on-air from any authorized wireless node.

Interoperability - Provides interoperability with industry-standard Wi-Fi products and backward compatibility with previous versions of Whitecap.

Emerging Industry Standards

Existing wireless industry standards do not address the requirements for distributing entertainment content throughout the home. Recognizing the need to include multimedia and QoS support in the 802.11 standard, IEEE is establishing a specification – called 802.11e – that provides this additional capability. Whitecap2 is the earliest incarnation of 802.11e-type functionality for streaming multimedia.

Related Products

- Cirrus CS22210 Wireless PCI/USB Controller
- Cirrus CS22220 Wireless PCMCIA Controller
- Cirrus CS22230 Wireless Mini PCI Controller
- Cirrus CS22250 Wireless 10BT Controller
- Cirrus CS22270 Wireless Multi-Link Controller
- Cresta3 Radio Design
- Cirrus Bodega Platform System Reference Designs

Feature	Description	Benefit
Wi-Fi Compliance	<ul style="list-style-type: none"> ■ Certification of interoperability with all Wi-Fi products 	<ul style="list-style-type: none"> ■ Provides interoperability in environments where Wi-Fi is installed
Dynamic Stream Support	<ul style="list-style-type: none"> ■ Contention-free access for deterministic behavior and predictable latency, unlike collision-based access mechanism ■ Support for multiple simultaneous streams ■ Dynamic allocation of resources to streams 	<ul style="list-style-type: none"> ■ Provides mechanism to deliver multimedia content (including video, audio, voice, and data) through a wireless network ■ Delivers higher sustained usable throughput ■ Maximizes utilization of available bandwidth ■ Provides foundation for Parameterized QoS
Parameterized QoS	<ul style="list-style-type: none"> ■ Resource allocation for each stream based on bandwidth, latency, and jitter requirements ■ Deterministic allocation of resources, unlike priority-based QoS 	<ul style="list-style-type: none"> ■ Allows differentiation for different types of content and services ■ Supports multiple content streams with consistent, predictable results ■ Preserves quality of broadband stream entering home
Peer-to-Peer (Mesh) Topology	<ul style="list-style-type: none"> ■ Direct communication between devices even when central node or access point exists 	<ul style="list-style-type: none"> ■ Maximizes utilization of available bandwidth ■ Maintains multimedia and QoS performance
Delayed Acks	<ul style="list-style-type: none"> ■ Maximizes payload efficiency by deferring acknowledgement packets ■ Minimizes overhead for network access and housekeeping 	<ul style="list-style-type: none"> ■ Delivers higher usable throughput
Coordinator Redundancy	<ul style="list-style-type: none"> ■ Coordinator responsibility automatically assigned and handed off to alternate nodes 	<ul style="list-style-type: none"> ■ Ease of use ■ Improves reliability and eliminates single point of failure
Open Enrollment	<ul style="list-style-type: none"> ■ Allows wireless nodes to grant network access to standalone wireless devices ■ Permits standalone wireless devices to obtain updates on-air 	<ul style="list-style-type: none"> ■ Ease of use for adding and maintaining standalone devices ■ Avoids complex configuration
Protocol/Firmware Update	<ul style="list-style-type: none"> ■ Ability to update nodes with latest protocol revisions and new features 	<ul style="list-style-type: none"> ■ Scalable to add new features ■ Allows forward/backward compatibility ■ Provides migration path as standards evolve
Forward Error Corrections (FEC)	<ul style="list-style-type: none"> ■ Corrects corrupted content "on the fly" 	<ul style="list-style-type: none"> ■ Improves multimedia performance ■ Provides interference immunity
Channel Agility	<ul style="list-style-type: none"> ■ Network automatically operates on channel with least interference 	<ul style="list-style-type: none"> ■ Avoids interference without user intervention ■ Improves reliability ■ Ease of use
Security <ul style="list-style-type: none"> ■ Network and device authentication ■ 40-bit WEP encryption 	<ul style="list-style-type: none"> ■ Nodes must be authenticated before granted access ■ 40-bit encryption provides privacy equivalent to wired networks 	<ul style="list-style-type: none"> ■ Provides privacy and security



Cirrus Logic, Inc.
Corporate Headquarters

4210 S. Industrial Drive
Austin, TX 78744
USA
T (512) 445-7222
T (800) 888-5016
F (512) 912-3977
www.cirrus.com

Cirrus Logic, Inc.
Wireless Networking Division

5175 Hillside Circle
El Dorado Hills, CA 95762
USA
T (916) 939-9400
F (916) 939-9437

Insight Electronics

9980 Huennekens
San Diego, CA 92121
USA
T (800) 677-6011
F (858) 450-8550
www.insight-electronics.com

Nu Horizons

70 Maxess Road
Melville, NY 11747
USA
T (631) 396-5000
F (631) 396-5060
www.nuhorizons.com

**Asia, Europe,
and Japan:**

Please access our website,
www.cirrus.com, for your
nearest local distributor.

Japan
Cirrus Logic K.K.

Aioi Sonpo, bldg 6F
5-6 Niban-cho, Chiyoda-ku
Tokyo, 160 Japan
T 81-3-5226-7390
F 81-3-5226-7677

Asia
Cirrus Logic Intl. Ltd.

20F., Ocean Building
80 Shanghai Street
Kowloon, Hong Kong, China
T 852-2376-0801
T 852-2314-9920
F 852-2375-1202

Europe
Cirrus Logic UK

4-5 Anglers Court
33-44 Spittal Street
Marlow, Bucks SL71DB
England
T 44-0-1628-472-211
F 44-0-1628-486-114

For more information, visit us at www.cirrus.com