SmartCast®

ADVANCED WI-FI QUALITY OF SERVICE ENGINE

Smart traffic management maximizes reliability and wireless performance

SmartCast is a sophisticated quality of service (QoS) engine specifically developed to maximize the reliability and performance of delay-sensitive applications, such as IP-based voice and video over 802.11 networks.

Based on patented technology, SmartCast delivers a collection of unique capabilities — such as packet inspection, automatic traffic classification, advanced queuing and scheduling.

Unlike any other 802.11 system, Ruckus SmartCast algorithms automatically schedule and pre-queue traffic in software on a per client basis. This enables more advanced classification and scheduling that can be applied for each client on a per-traffic-class basis. SmartCast is a superset of the IEEE 802.11e/WMM hardware-based queuing standard, ensuring uncompromised performance while remaining standards-compliant.
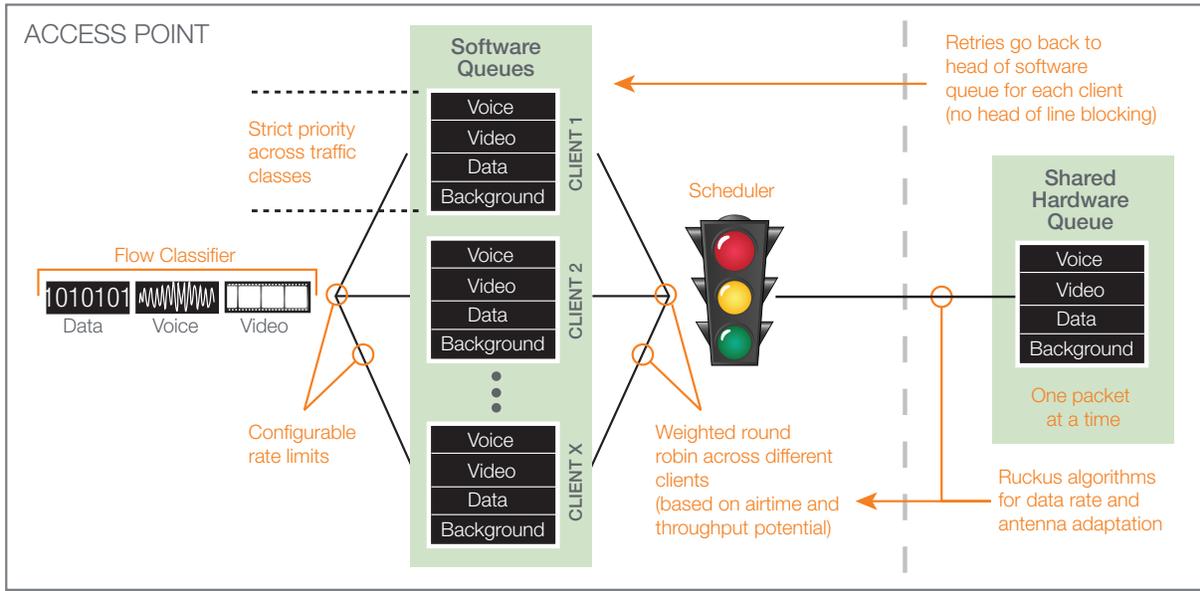
With per-client queuing, SmartCast is ideal for video and voice over Wi-Fi applications because it ensures disruptive clients don't negatively effect the performance of others clients on the network (no head-of-line blocking).

The SmartCast engine further optimizes spectrum usage with innovative band steering and airtime fairness technologies. Essential in high-density and diverse client environments such as conference facilities, classrooms and auditoriums, SmartCast works in concert with Ruckus BeamFlex smart antenna array technology to deliver greater network throughput and more predictable performance for latency-sensitive applications.

FEATURES

- Traffic queuing on a per client basis (voice, video, best-effort, background)
- Automatic (heuristics-based) traffic classification
- 802.11e/WMM support
- TOS and 802.1p classification
- Airtime fairness
- Band steering
- Rate limiting
- WLAN prioritization*
- Client load balancing*
- Power save (UAPSD and Legacy)
- IP multicast-to-unicast conversion
- IGMP snooping

BENEFITS

- **Powerful** — Sophisticated, application-aware classification engine, per-client scheduling and prioritization for WLANs provides precision bandwidth management, traffic shaping and service level agreements for video, voice and data.

- **Superior Performance** — Eliminates jitter and delay for video and voice, providing quality of service and outstanding user experience.

- **Guaranteed multicast streaming** — The only proven QoS system for IPTV, SmartCast converts multicast traffic to unicast, delivering video traffic to each subscriber at the highest data rate that the client is capable of supporting.

- **Optimal utilization** — Airtime fairness provides efficient use of the available spectrum, resulting in greater network capacity in high-density and diverse client environments.

- **Increased efficiency and capacity** — Band steering directs dual band clients to the less congested 5 GHz spectrum, while load balancing directs clients to less congested APs, distributing client load across all available channels and APs.

- **Easy to use** — Smart heuristic-based classification automatically provisions QoS services.

*with ZoneDirector

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SmartCast Queuing and Scheduling

SmartCast uses patented multicast traffic handling to guarantee high-definition video streaming over Wi-Fi. Proven in millions of subscriber homes around the world, providers are using SmartCast to deliver multiple concurrent broadcast quality video streams to subscribers without having to wire or rewire homes or offices.

SmartCast was designed for simplicity, requiring no manual tuning or configuration. SmartCast automatically classifies traffic based on Layer 2 or 3 priority tags and performs and advanced heuristic analysis on untagged traffic.

Auto Traffic Inspection, Classification and Queuing
At the heart of SmartCast is a sophisticated traffic inspection, classification, and optimization engine that works in software to provide per-client, per-traffic-class queuing.

The SmartCast QoS engine inspects each packet and automatically classifies it into one of four queues — voice, video, best effort, and background. SmartCast can inspect a variety of headers including those of Ethernet frames (both TCP and UDP), VLAN tags, and IPv4 and IPv6 packets.

If the type of service or 802.1p priority field is used, SmartCast maps packets to an equivalent internal field. If no tag is provided, SmartCast employs heuristics to classify traffic.

Once classified and queued, traffic is scheduled using a weighted round robin method based on airtime and throughput potential as well as prioritization defined for the WLANs. Rate limits can also be applied on a per-WLAN basis for every client.

Once SmartCast classifies, schedules and queues traffic, Ruckus' patented BeamFlex smart antenna array then takes over. BeamFlex is a miniaturized intelligent phase array antenna system that constantly steers traffic over the best performance signal paths and away from interference to minimize packet loss and maximize throughput.

Always looking for patterns in the packet flow, SmartCast is automatically enabled on every AP — no configuration is necessary.

Patented Multicast Voice and Video Support
When transported over 802.11 networks, multicast transmissions typically use a best-effort technique that requires no acknowledgement from the receiving devices.

To ensure the delivery of multicast and broadcast traffic, often used in voice and video applications, SmartCast employs a patented multicast technique that converts multicast to unicast packets.

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Converting multicast to unicast traffic enables the use of 802.11 acknowledgements to ensure transmissions are forwarded at the highest possible data rate and are properly received.

Receipt acknowledgement provides the guaranteed delivery necessary for streaming broadcast quality video over wireless. Through IGMP snooping, all APs and mesh nodes are aware of multicast group membership tables, ensuring consistent service anywhere in the wireless network.

Increased Efficiency and Capacity with Load Balancing and Band Steering

SmartCast employs sophisticated load balancing and band steering techniques to enable clients to efficiently use the AP and spectrum resources.

Ruckus ZoneDirector monitors the client load across the APs, and drives new clients to less congested APs. Requiring no specialized software on the client, ZoneDirector, not the client, is in control of how they join amongst available APs, resulting in a more prescribed distribution. ZoneDirector automatically groups APs to balance across — there's no need for manual configuration. Operating on a per WLAN basis, load balancing can be selectively disabled, for instance disabling on Voice WLANs only to ensure seamless roaming.

Available on Ruckus ZoneFlex dual-band APs, band steering automatically "steers" clients to the 5GHz band, maximizing the use of spectrum resource to ensure higher availability and throughput for users.

This is ideal for high-density client environments such as auditoriums, conference halls and public venues where many users try to concurrently connect to the WLAN.

With only 3 non-overlapping channels within the 2.4GHz band, it is preferable, when possible, to automatically steer dual-band clients to the 5GHz band where 23 non-overlapping channels are available.

For dual-band clients with a poor signal to the 5 GHz radio, the 2.4 GHz band would used instead. This results in a more optimal distribution of traffic across available channels and a better use of the available air resources. Performance is further improved because there are fewer users sharing (and colliding) on a given channel.

More Efficient Use of Spectrum with Airtime Fairness

Airtime fairness is an advanced scheduling technique that ensures legacy Wi-Fi clients as well as under performing 802.11n clients don't slow down the performance of faster 802.11n clients by taking too long to transmit.

With airtime fairness enabled, transmit queues are scheduled based on the airtime constraints per station using weighted round robin algorithm.

With airtime fairness, users have an equal time on the air and can continue to send packets so long as their airtime use allows. This allows clients with faster potential throughput to recapture the advantages of their higher rate potential and increases overall network capacity.

Band Steering in Action

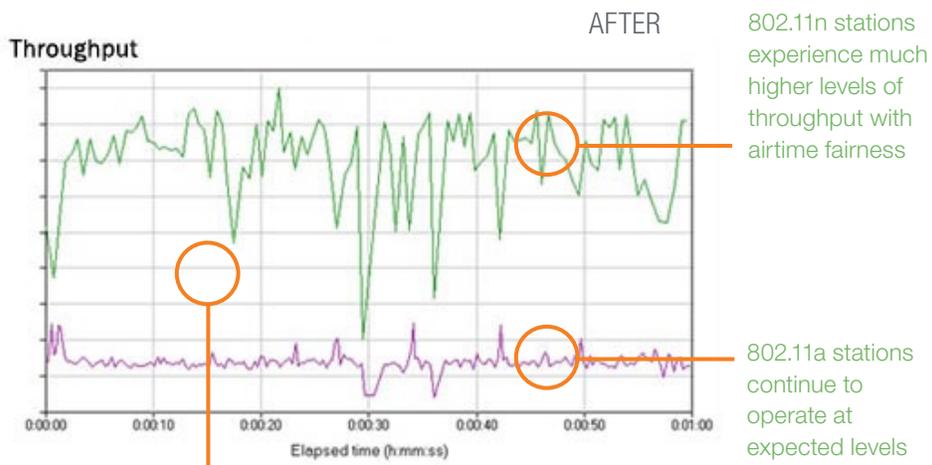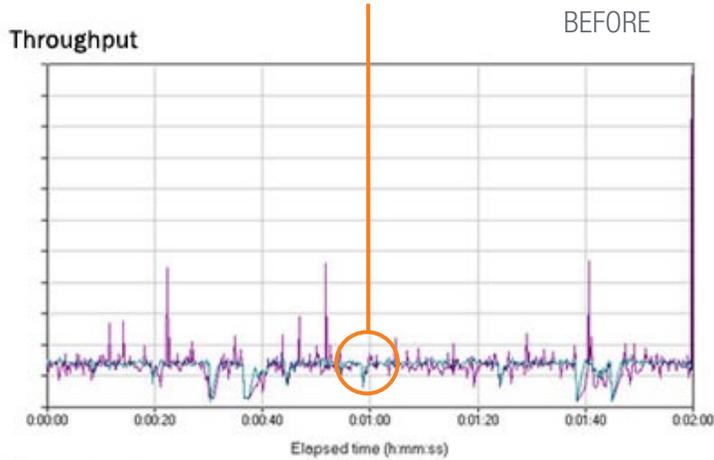BEFORE

2.4GHz   5GHz

AFTER

2.4GHz   5GHz
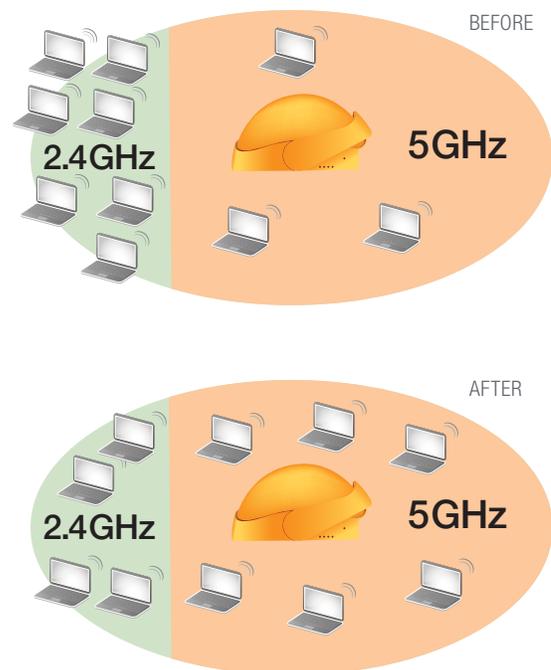
- Ideal for high-capacity environments

- Automatically steers clients to 5GHz

- Takes into consideration RSSI levels across both bands

- Supported in Ruckus dual-band APs

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The Impact of Airtime Fairness

Performance of both 802.11n and 802.11a stations without airtime fairness enabled

BEFORE

AFTER

802.11n stations experience much higher levels of throughput with airtime fairness

802.11a stations continue to operate at expected levels

Transmit queues scheduled based on the airtime constraints per station using weighted round robin algorithm

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Ruckus®
Simply Better Wireless.