

# feature sheet

## FEATURES

- Multiple directional high-gain elements
- Real time optimization system
- Thousands of antenna patterns that are optimized via patented software to ensure the best path to the client
- Compatible with 802.11a/b/g/n networks and clients
- Continuous learning based on inputs from network layers 0 through 7
- On-the-fly antenna reconfiguration and transmission policy management per packet, per flow, per receiving device
- Up to 6 dBi signal gain and 15 dB interference mitigation

## BENEFITS

- Fewer APs deliver a higher capacity coverage over a greater area delivering more reliable client connectivity
- Self-healing, self-optimizing antenna system proven in more than 3.5 million installations
- Mitigates interference in a high density client and AP environment
- Extends Wi-Fi range and coverage by focusing Wi-Fi signals toward client
- Maximizes AP and client performance
- Eliminates dead spots
- Better reception and transmission for handheld clients that are hard to hear and constantly move orientation

## BeamFlex<sup>®</sup>

### SMART ANTENNA SYSTEM

**The industry's only smart antenna system that delivers stable connectivity and higher performance**

BeamFlex is a combination of multiple high-gain polarized antenna elements and patented software algorithms that are combined in real time to offer an exponential increase in performance. With up to 21 high-gain, directional antenna elements, a BeamFlex smart antenna offers over 4,200 unique antenna patterns to optimize the reception of a given client.

Ruckus' adaptive antenna technology also includes BeamFlex+ that further increasing signal gain. Translating into better reception and transmission, BeamFlex+ is particularly advantageous for mobile devices such as smartphones, tablet, and other handheld devices that are hard to hear and constantly change direction.

Completely standards based, the BeamFlex smart antenna system works with any off-the-shelf 802.11a/b/g/n chipset and is integrated into every Ruckus Smart Wi-Fi access point.

#### How it works

Unlike omnidirectional antennas that radiate signals in all directions, BeamFlex directs transmit energy towards the best path to the receiving device. And unlike fixed-positioned directional antennas, BeamFlex dynamically configures and re-configures its antenna pattern to achieve focused coverage with directional performance within a given environment thus increasing signal gain.

The BeamFlex smart antenna is controlled by an optimization engine that automatically reconfigures the antenna patterns on a packet by packet basis, selecting the best performing and highest quality signal path and optimum data rate for each receiving device.

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## SMART ANTENNA SYSTEM

BeamFlex takes advantage of 802.11's built-in acknowledgement mechanisms using 802.11 acknowledgements to continually ascertain the quality and performance of a physical RF link.

The expert software system within BeamFlex extracts important information from all 802.11 packets received such as the sender's performance, the optimum data rate, RSSI, error rates and approximate location. It then ranks the optimum antenna patterns for each communicating device keeping track of the best performing signal path at any time for any given client. The resulting antenna pattern shows RF energy directed toward the client thus increasing performance while mitigating interference by removing energy where it does not need to go for each packet transmitted.

### What's the big deal?

#### Consistent Performance

By continuously steering transmissions to high quality signal paths, BeamFlex maximizes and sustains Wi-Fi transmission speeds while minimizing transmission errors. BeamFlex stabilizes wireless network performance to enable consistent throughput at range.

#### Extended Range

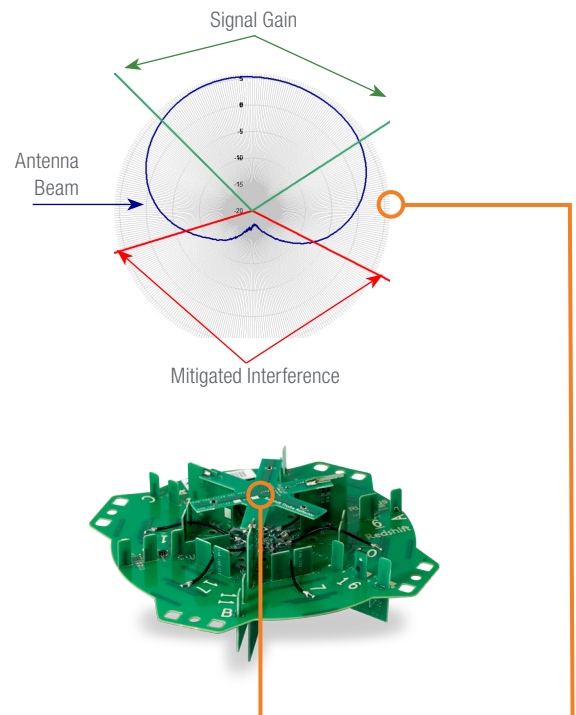
And because BeamFlex enables high-gain, directional Wi-Fi signals to clients, it delivers a up to a four-fold increase in range over any other Wi-Fi access point.

#### Stable Connections

Through antenna diversity and dynamic adaptation, BeamFlex ensures that the best performing and most reliable signal path is used at any given time thereby minimizing erratic Wi-Fi behavior such as dropped connections.

#### Interference Mitigation

BeamFlex is able to select antenna patterns that focus RF energy away from the direction of interference; thereby attenuating noise to the receiving station. This enables remarkable improvements in signal gain while at the same time reducing interference or contention among other APs. Using these interference mitigation techniques, a single ZoneFlex AP can realize up to 6 dBi in signal gain and 15 dB in interference mitigation. An interference mitigation algorithm enables the BeamFlex software to detect the direction of interference from, for example, a neighboring network, a microwave oven or a nearby Bluetooth device. In response, BeamFlex is



BeamFlex not only focuses RF energy only where it's needed but also mitigates interference coming from other directions. This ensures that the highest possible PHY rate is used and that the highest possible throughput is achieved for all clients.

able to select antenna patterns that direct energy away from the direction of interference, thereby attenuating noise to the receiving station.

#### Better RF Neighbor

Because BeamFlex only focuses RF energy where it's needed, it interferes less with other Wi-Fi access points and clients.

#### Automatic Adaptation

Dynamically configuring the Wi-Fi "beam" hundreds of times each second, BeamFlex can adapt in real-time to environmental changes — steering signals around obstacles, interference and other hazards that would otherwise negatively affect performance.

BeamFlex effectively allows each Ruckus AP to deliver high gain directional Wi-Fi signals in 360° while simultaneously minimizing noise to nearby networks, devices and other APs.

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## SMART ANTENNA SYSTEM

### What does BeamFlex+ bring to the game?

Mobile devices such as smartphones, tablets, and handhelds pose a unique problem to wireless networks by constantly changing orientation. Traditional mobile devices such as laptops rarely changed orientation as they were designed for flat desktop purposes. Changing the orientation of a mobile device inevitably changes the polarization of the wireless signal from horizontal to vertical or vice-a-verse. Most access points do not support true polarization diversity equating in degradation of signal strength by up to 75% or complete signal loss depending on where you are standing in respect to the AP.

BeamFlex+, using Ruckus Wireless SmartAntenna technology, optimizes the wireless signal to mobile devices with true polarization diversity in 100% of the coverage area. The result is high signal strength, continuous throughout, and better experience for mobile devices regardless of orientation.

Figure 1: An example of antenna polarization changing device orientation, horizontally and vertically.

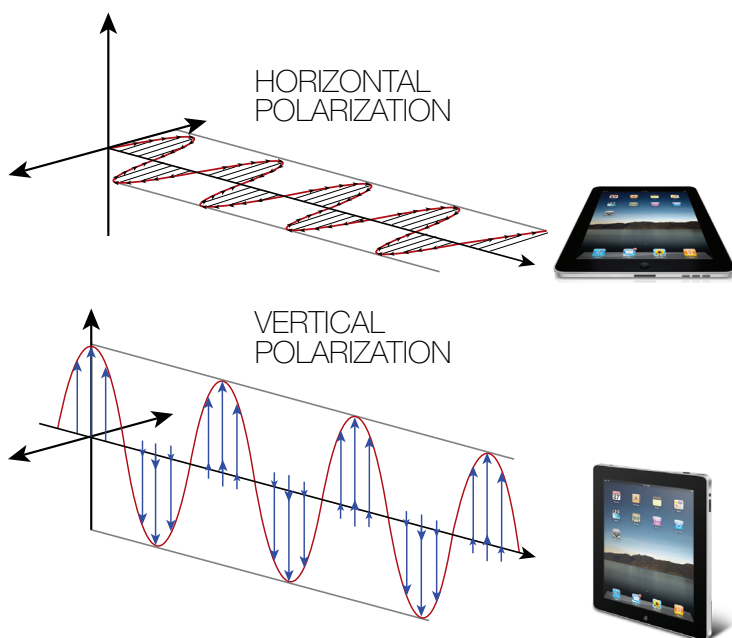


Table 1: Ruckus AP support table for BeamFlex and BeamFlex+

AP Model	BeamFlex	BeamFlex+
ZoneFlex 7321		
ZoneFlex 7352	X	X
ZoneFlex 7372	X	X
ZoneFlex 7372-E		
ZoneFlex 7982	X	X
ZoneFlex 7025		
ZoneFlex 7055		
ZoneFlex 7363	X	
ZoneFlex 7343	X	
ZoneFlex 7341	X	
ZoneFlex 7351	X	
ZoneFlex 7962	X	
ZoneFlex 2942	X	
ZoneFlex 7782	X	X
ZoneFlex 7782-N		
ZoneFlex 7782-E		
ZoneFlex 7762	X	X
ZoneFlex 7762-AC		
ZoneFlex 7762-S	2.4G only	2.4G only
ZoneFlex 7762-S-AC		
SmartCell 8800-S	X	X
ZoneFlex 2741	X	
ZoneFlex 7731		

