Smart Mesh Networking

HIGH PERFORMANCE, RELIABLE AND EASY WI-FI MESH

The First Intelligent 802.11 Meshing for Building Low Cost, High Performance, and Ultra-Reliable Wireless LANs

Ruckus Wireless Smart Mesh Networking is a unique, new approach to building high-performance wireless LANs (WLANs). It reduces cumbersome RF planning and costly cable backhaul by lowering the need to run Ethernet wiring to individual ZoneFlex™ Smart Wi-Fi access points.

Smart Mesh Networking dramatically simplifies, speeds and reduces the cost of WLAN deployment. With Smart Mesh Networking, enterprises now simply plug ZoneFlex access points into any convenient power source, and walk away. No extensive RF site surveys, cable runs, configuration, or optimization adjustments are required.
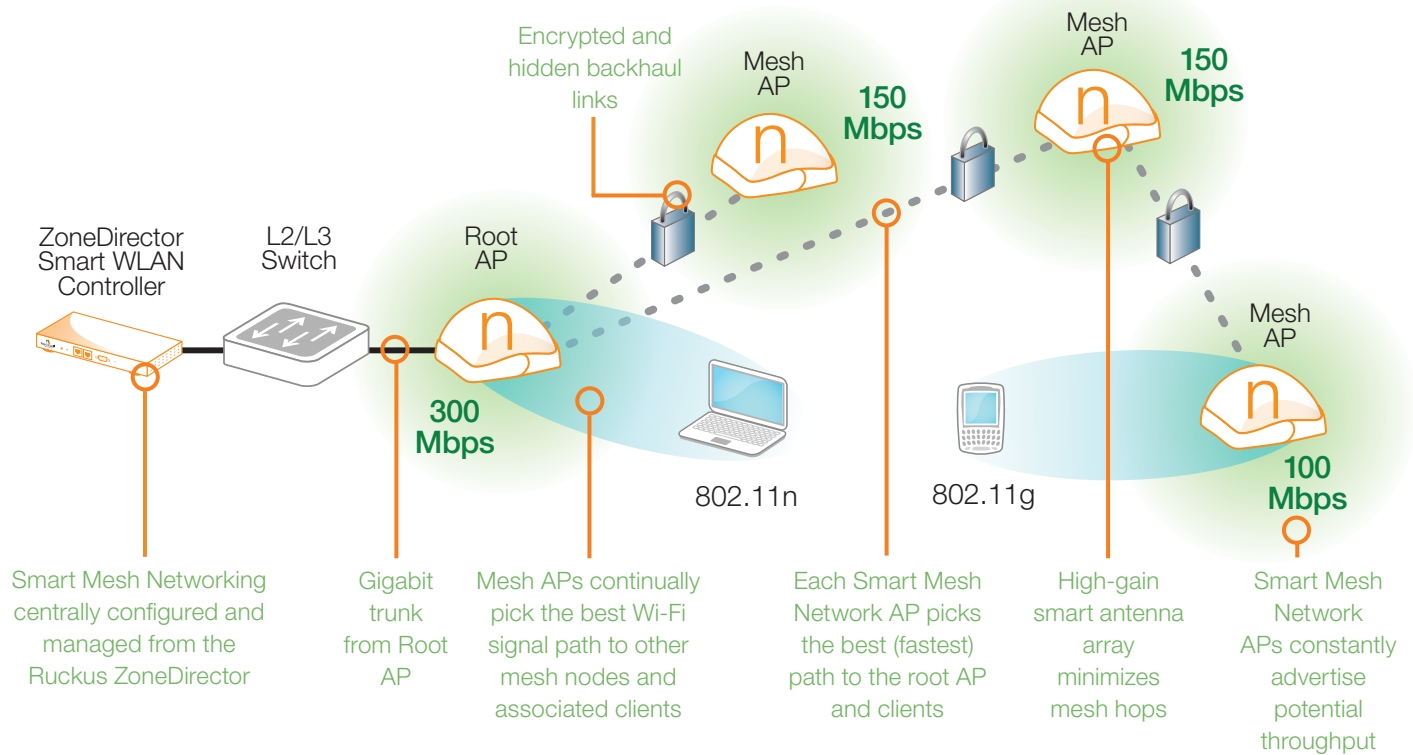
Ruckus Hybrid Mesh also allows APs to be connected by Ethernet to remote mesh nodes. Forming new trees in the middle of the mesh, Hybrid Mesh takes advantage of spectrum reuse to increase system capacity while expanding the mesh. APs automatically determine their role in the mesh, and automatically react to topology changes.

Proven in the largest outdoor mesh installation in the world, Smart Mesh Networking delivers three key ingredients that have previously hindered the use of indoor meshing:

1) **high performance**
   by combining 802.11n with smart Wi-Fi technology

2) **reliable connectivity**
   between mesh nodes, using best path selection and interference avoidance techniques

3) **ultra-simple deployment**
   through the automation of AP and mesh provisioning

BENEFITS

Smart Mesh Networking dramatically lowers deployment costs
Smart Mesh Networking eliminates costly Ethernet cabling to every Wi-Fi access point. Extended signal range from high-gain directional antenna arrays reduce the number of mesh APs typically required

No RF experts required
Smart Mesh Networking automatically determines the optimal network topology and maintains the best connections between APs

Extended range minimizes mesh hops for high performance
High-gain directional antenna arrays in every Smart Mesh Networking access point enable signals to reach farther to eliminate needless mesh hops that degrade performance

Hybrid mesh architecture expands the mesh without reducing throughput
APs can be connected by Ethernet to remote Mesh APs, forming new trees on new channels and eliminating the "halving of throughput" that happens when adding a hop

Deploys in half the time of conventional 802.11 WLANs
Smart Mesh Networking automates configuration, reducing Ethernet cabling and eliminating extensive RF planning, enabling Smart Mesh Networking WLANs to be deployed and operational in half the time of conventional WLANs

Integrated interference avoidance ensures high reliability
An intelligent antenna array in each ZoneFlex AP picks the best signal path for traffic at any given time and automatically steers signals around interference to ensure high availability of mesh links

Automated deployment keeps things simple
Configure the entire Smart Mesh Network in minutes from a central management system. Plug mesh APs into the network and the ZoneDirector™ automatically provisions all nodes

Highly secure
All mesh backhaul links between nodes are encrypted and hidden to ensure safe and secure operation

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Encrypted and hidden backhaul links

Mesh AP — 150 Mbps

Mesh AP — 150 Mbps

Mesh AP — 100 Mbps

ZoneDirector Smart WLAN Controller

L2/L3 Switch

Root AP — 300 Mbps

802.11n

802.11g

Smart Mesh Networking centrally configured and managed from the Ruckus ZoneDirector

Gigabit trunk from Root AP

Mesh APs continually pick the best Wi-Fi signal path to other mesh nodes and associated clients

Each Smart Mesh Network AP picks the best (fastest) path to the root AP and clients

High-gain smart antenna array minimizes mesh hops

Smart Mesh Network APs constantly advertise potential throughput

Smart Mesh Networking extends Ruckus Smart Wi-Fi technology to create a new class of reliable and high-performance wireless LANs that are self-organizing, self-optimizing and self-healing. It is the first Wi-Fi meshing approach that combines high-gain smart antenna arrays, sophisticated RF routing and centralized management with a single WLAN system.

Smart Wi-Fi Makes all the Difference

Ruckus Smart Wi-Fi technology is used by the Smart Mesh Networking to form, direct and steer Wi-Fi signals over the best performing paths between mesh nodes, as well as to associated clients. This enables the Smart Mesh Network to adapt in real time to environmental changes, ensuring highly reliable and available wireless trunk links.

Each ZoneFlex AP within the Smart Mesh Network integrates an intelligent, high-gain antenna array that provides diversity and extended signal range. This ensures high performance by minimizing the number of mesh hops and reducing the number of mesh APs required.

Additionally, this same smart antenna array allows the Smart Mesh Network to continuously choose from thousands of antenna patterns, to avoid or reject interference, and to maintain high performance connections between mesh nodes.

How Ruckus Smart Mesh Networking Works

With Smart Mesh Networking, each ZoneFlex AP functions as a wireless node within the mesh. Smart Mesh Networking uses antenna-ranking techniques to determine the best upstream path through the RF to the backhaul AP.

Smart Mesh Networking topology is automatically determined based on the potential throughput of each node. Potential throughput is the actual throughput of its uplink (i.e., how fast the uplink AP can get a packet to the wired network) as well as the potential throughput to the uplink AP. This is based on the actual throughput to the uplink AP, signal strength, and other considerations such as AP load and hop count.

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Each AP in the mesh determines the best mesh node with which to associate. Each upstream ZoneFlex AP continually advertises its Smart Mesh Networking characteristics including its own potential throughput and the path through which it is connected to the wired network. This allows other APs to make real-time topology decisions, reacting to any changes in the environment.

In the event of an AP failure or if an upstream path drops below a set performance threshold due to overloading or interference, a new path to the best performing AP is selected. This efficient "tree" topology minimizes convergence risks and latency while maximizing performance.

Ruckus Hybrid Mesh

In a Hybrid Mesh architecture, APs are connected by Ethernet to remote Mesh nodes. Using Ethernet as its uplink, the AP forms a new tree using a different channel than its parent node. By separating the tree onto a different channel, more capacity becomes available to the system. APs can be installed in separate locations on the rooftop to eliminate co-channel inter-ference, or can be attached to a switch for deploying wireless throughout a remote building.

Everything with Smart Mesh is automatic. APs automatically determine their role in the network, detect the topology to avoid loops, and adapt to use wired or wireless as their uplink when better throughput is achievable.

Simple to Deploy

To enable Smart Mesh Networking, administrators simply click a check box within the ZoneFlex Setup Wizard. Once the WLAN is configured, the administrator attaches the access points to the ZoneDirector for auto-provisioning. Alternatively, the AP can be manually provisioned on-site, such as to replace one in the field. After provisioning is complete, the administrator can place the ZoneFlex AP virtually anywhere.

Once plugged into any power source, the Ruckus Smart Mesh Network determines the optimal network topology and each ZoneFlex AP chooses the best mesh path back to a root AP.

In the unlikely event that a mesh node becomes orphaned, administrators can connect to it over wireless through a special SSID for recovery, avoiding the need for a truck-roll. The network remains protected since traffic on this SSID is not bridged.

Simple to Manage

All management of the Smart Mesh Network is performed from the ZoneDirector. There, administrators can view a topology map of the mesh, see associated clients and make any desired changes.
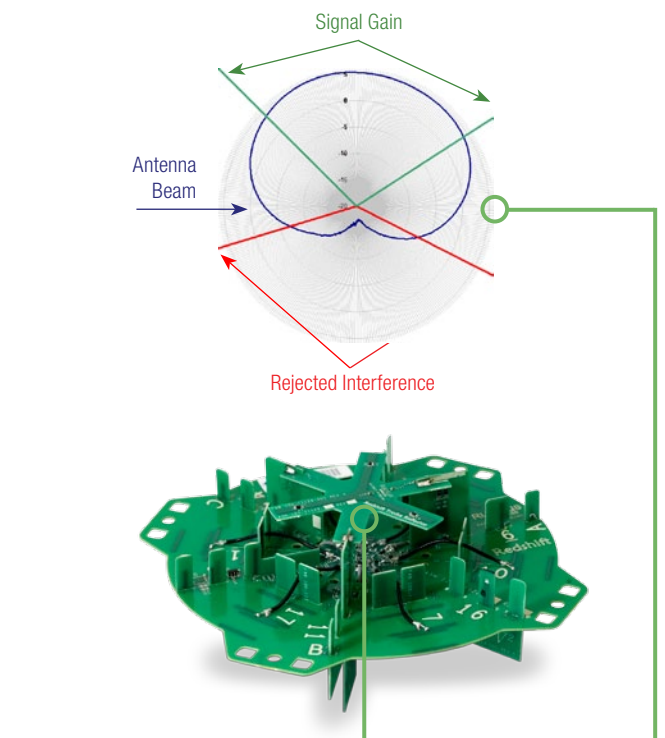

Each Smart Mesh Network AP integrates a patented Ruckus smart antenna array with up to nine high-gain vertically-polarized, and up to nine horizontally-polarized antenna elements. This enables up to 4224 potential antenna combinations and up to 9 dBi gain and 17 dB interference rejection, thereby delivering unprecedented range extension and signal reliability.

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FEATURES

- Built on patented Ruckus BeamFlex™ directional smart Wi-Fi antenna array technology

- Real-time interference avoidance and automatic interference rejection

- Best path signal selection to clients

- Self-forming network topology

- Self-healing around mesh AP failures and environmental problems

- Centrally managed by Ruckus ZoneDirector smart WLAN controller

- Automatic access point provisioning

- Secure encrypted backhaul links

- High quality of service, rate limiting and traffic filtering throughout the mesh

- Flexible Hybrid Mesh topology

- Secure recovery mode

- Supported on all Ruckus ZoneFlex Smart Wi-Fi access points
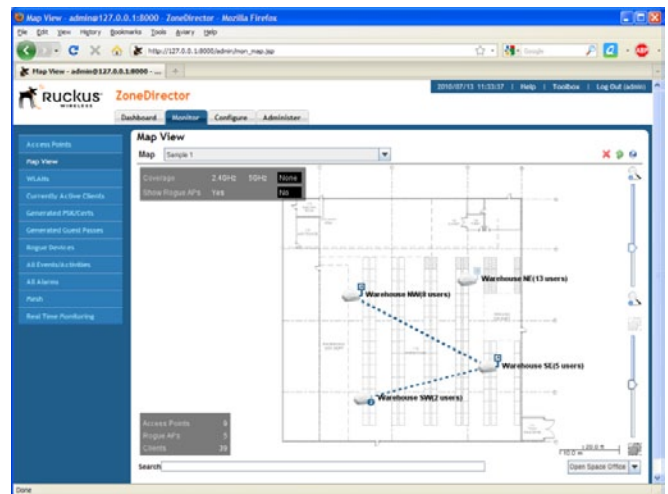
Ruckus Smart Mesh Network is managed centrally from the Ruckus ZoneDirector WLAN controller. Powerful mapping and management tools allow a complete view of the entire Smart Mesh Network, including connections within the mesh, associated mesh clients and other unique controls.

Simply Better Wireless.

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