Cisco Radio Aware Routing

Cisco® Radio Aware Routing addresses several of the challenges faced when merging IP routing and radio communications in mobile networks, especially those exhibiting ad hoc behavior. With this release, Cisco provides capabilities that facilitate:

- Optimal route selection based on cross-layer feedback from cooperating radios
- Faster convergence when nodes join and leave the network
- Flow-controlled communications between the radio and its partner router
- Efficient integration of point-to-point, directional radio topologies with multihop routing

What Problems Need to be Solved?

- Fluctuations in radio link quality affect throughput and need to be factored into route cost calculation.
- The self-forming, self-healing nature of a mobile ad hoc network requires immediate recognition of topology changes to help ensure fast convergence.
- Radios need to control the rate at which routers send information to minimize the need for queuing within the radio.
- Directional radios form point-to-point or point-to-multipoint networks with neighbors, which increases the size of the router’s database and reduces routing efficiency.

How Radio Aware Routing Works

This solution, based on RFC 4938, employs PPP-over-Ethernet (PPPoE) sessions to facilitate intranodal communications between a router and a compliant device, such as a mobile radio or satellite modem. A PPPoE session is established between router and radio on behalf of every other router/radio neighbor. Once these PPPoE sessions are established, a PPP session is established end to end.

- **Neighbor Up/Down Signaling:** Enables Cisco routers to provide faster network convergence by reacting to link status signals generated by the radio, rather than waiting for protocol timers to expire. The routing protocols (OSPFv3 or EIGRP) respond immediately to these link status signals by expediting adjacency formation or tear-down.
- **Link Quality Metrics Reporting:** The PPPoE protocol has been extended to enable a radio to report link quality metric information to a router. Cisco routers have been enhanced so that OSPFv3 or EIGRP routing protocols can factor link quality metrics into route cost calculations.
- **PPPoE Credit-Based Flow Control:** This PPPoE extension allows a receiver to control the rate at which a sender can transmit data for each PPPoE session, so that the need for queuing in the radio is minimized.

Virtual Multipoint Interface (VMI): Aggregates per neighbor PPPoE sessions and maps these to appear as a single point-to-multipoint, multiaccess, broadcast-capable network.

What Are The Benefits Of Radio Aware Routing?

- Enables network-based applications and information to be delivered reliably and quickly over directional radio links
- Provides faster convergence and optimal route selection so that delay-sensitive traffic, such as voice and video, is not disrupted
- Reduces impact on radio equipment by minimizing the need for internal queuing/buffering; also provides consistent quality of service for networks with multiple radios

Why Cisco?

Cisco Radio Aware Routing is the industry’s first router-based implementation of RFC 4938, and is available as a no-charge feature for select models of the Cisco Integrated Services Router running IOS 12.4(15)T or later. As the global leader in mission-critical networking and IP communications, Cisco is uniquely positioned to deliver reliable and efficient converged voice, video, and data solutions to organizations around the world. Cisco solutions are backed by award-winning technical support and advanced services.