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ABSTRACT

The Federal Communications Commission (FCC) and other regulatory bodies around the world have opened up a new range of spectrum in the 6 Gigahertz (GHz) band for unlicensed use. The 6GHz band provides more channels, more bandwidth, and has less network congestion as compared to existing 2.4/5GHz bands. However, even though 6GHz capable radios are present and reachable in networks, 6GHz capable clients may still associate to a 2.4GHz or 5GHz radio because these bands typically have wider coverage and stronger signal strength than the 6GHz band. As a result, clients may not obtain the best performance available. Presented herein are techniques to steer 6GHz capable clients to a 6GHz radio when such clients associate to a non-6GHz radio, which can help to increase wireless network performance by providing the best performing band and decreasing network congestion by load balancing between bands.

DETAILED DESCRIPTION

The 6GHz band can provide many improvements over existing 2.4/5GHz bands by providing more channels and bandwidth. Further, the 6GHz band may have less network congestion as compared to existing 2.4/5GHz bands. However, 6GHz capable clients often associate with the existing 2.4/5GHz bands, which can limit their performance.

This proposal provides techniques for 6GHz capable clients that are associated to the 2.4GHz or 5GHz band to roam to a 6GHz radio when the client meets various criteria, such as client count, client window size, 6GHz receive (Rx)/transmit (Tx) utilization, and/or estimated uplink/downlink Receives Signal Strength Indicator (RSSI). Figure 1,

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below, is a flow diagram illustrating example details associated with steering 6GHz clients to the 6GHz band in accordance with techniques of this proposal.
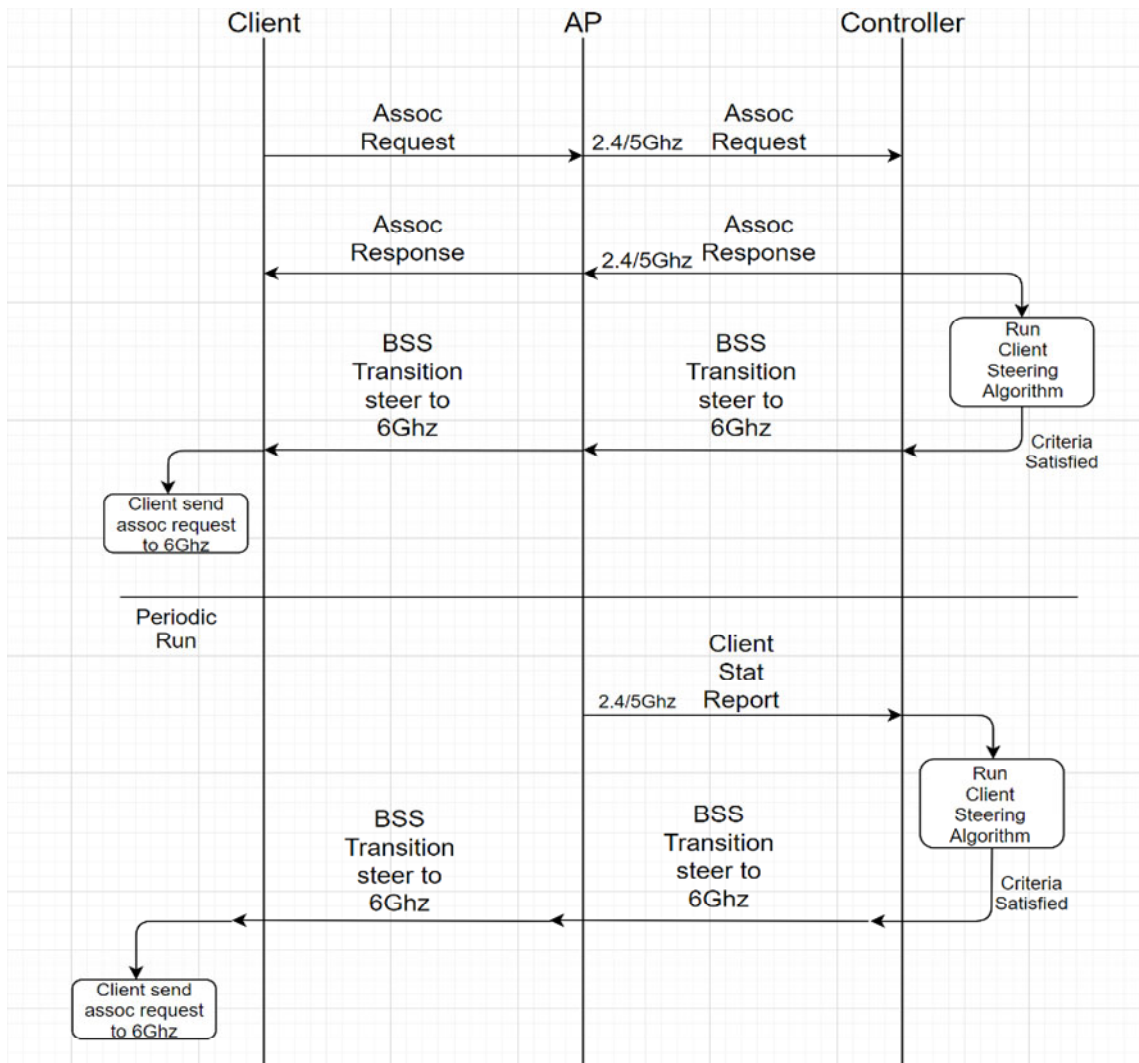

Figure 1: Example 6GHz Steering Call Flow

As shown in Figure 1, the consideration for 6Ghz client steering can occur during two events. The first steering event can occur after client association and the steering event can occur when a client statistics report is received. During client association, if the client sends an association request on the 2.4/5Ghz band and is 6Ghz capable, then a client steering algorithm is triggered after an association response is successfully sent. If criteria for the steering algorithm is satisfied, an 802.11v Basic Service Set (BSS) transition will

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be sent to the client in order to steer the client to the 6Ghz band. The same operations can be performed after processing a client stat report received on 2.4/5Ghz radio.

The steering techniques of this proposal can be triggered when a client steering configuration is enabled and may only be performed for clients that are 6Ghz capable. As noted above, the steering can be performed after the association of the new clients and/or after receiving client statistics for the existing clients on the 2.4/5Ghz band. In the case of the new clients, the steering is performed only for that client. In other cases, the steering is performed for all currently associated 6Ghz capable clients. Various example details associated with the client steering algorithm flow are shown below in Figure 2.
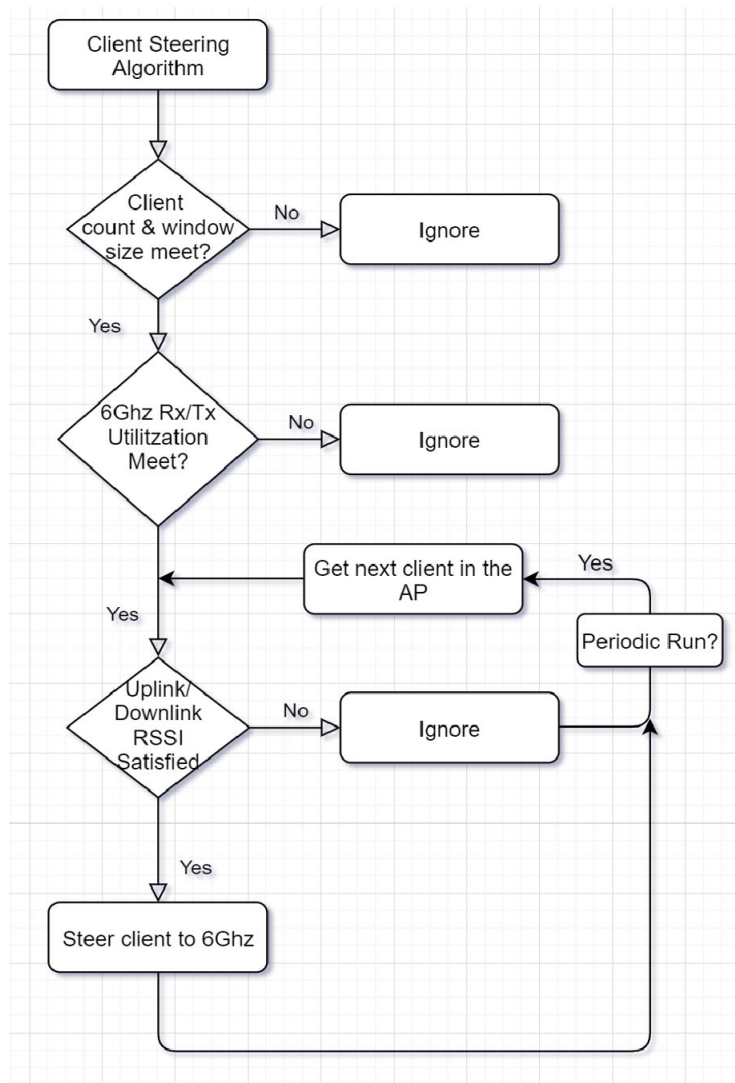

Figure 2: Client Steering Algorithm Flow

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For the client steering algorithm parameters, client count, client window size and 6Ghz Rx/Tx utilization can be per-access point (AP) parameters. In one example, the default client count and client window size can be set to 3. The 6Ghz Rx/Tx utilization is a threshold that is based on the difference between the 6GHz band and 2.4/5Ghz band. In one example, if utilization of the 6GHz band is less than or equal to the 2.4/5Ghz band, or the difference is less than or equal to a pre-configured threshold, then the algorithm will continue to perform steering for a client.

The uplink/downlink 6Ghz RSSI is estimated using the 2.4/5Ghz RSSI, AP maximum and current Tx power for 2.4/5Ghz and 6Ghz, and path loss difference between 2.4/5Ghz and 6Ghz. At association time, the 2.4/5Ghz RSSI is based on the association request RSSI. For periodic operations, the 2.4/5GHz RSSI is based on the client RSSI received in the statistics report. In one example, if the result for an estimated 6Ghz RSSI is equal or greater than a pre-configured value, then algorithm will trigger client steering to request a client to move to the 6Ghz band.

In summary, techniques herein provide for the ability to steer 6GHz capable clients to a 6GHz radio when such clients associate to a non-6GHz radio, which can help to increase wireless network performance by providing the best performing band and decreasing network congestion by load balancing between bands.