

UNITED STATES PATENT APPLICATION

For

WI-FI ADAPTATIVE 5/6 GHz BAND SELECTION

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## **Description:**

Due to the high cost of implementing 3 radios, many APs or Mesh APs will implement 2 radios: one 2.4 GHz radio and one 5GHz/6GHz switchable radio. The selection between the 5 GHz band and the 6 GHz band is a trade-off between giving the best QoE to Wi-Fi 6 devices or giving the best QoE to devices not supporting the 6 GHz band.

This idea proposes a new mechanism to dynamically select the best band between the 5 GHz and the 6 GHz bands. A process running on a Wi-Fi gateway will record what clients support the 5 GHz and/or the 6 GHz band, the behavior of each client (traffic type and traffic pattern throughout the day and the week) and the airtime utilization of the 2.4 and 5 GHz channels. Once the client behaviors are learned, the AP can dynamically select the 5 GHz or 6 GHz band for the best QoE across all users.

6 GHz is a new unlicensed band that is currently available in US and will be soon available in many other regions. While this new band is a tremendous opportunity for Wi-Fi, it will take many years before the average user can enjoy the benefit of this new band. Indeed, many APs or Mesh APs will implement only 2 radios due to the high cost of 3 radios. So APs will have one 2.4 GHz radio and one 5 GHz/6 GHz switchable radio.

Since most Wi-Fi deployments will have legacy devices for at least the next 5/6 years, a mechanism (running in the AP or the GTW or the cloud) is needed to set the AP in 5 GHz or 6 GHz mode for the best user experience. This mechanism will find the best tradeoff between:

- AP runs in 5 GHz => 6 GHz devices cannot benefit from this band. The 5 GHz and 2.4 GHz band may be overcrowded, especially in MDU settings.
- AP runs in 6 GHz => 6 GHz devices can benefit from this band. All other clients, however, will be left with the 2.4 GHz band that will become overcrowded and users will have a very bad QoE.

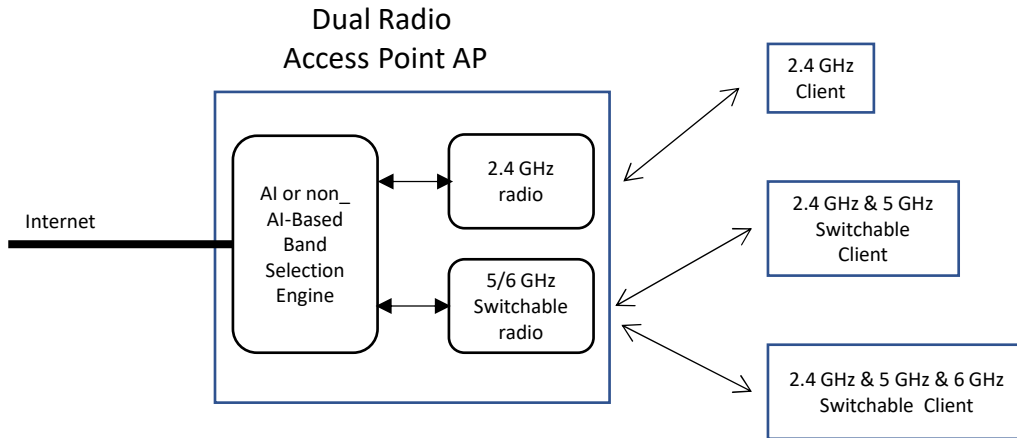
Many new Wi-Fi 6 Gateways will have 2 radios: 2.4 GHz and 5/6 GHz switchable. Without an intelligent mechanism to select between the 5 GHz and the 6 GHz band, either the 6 GHz band will not be used or the non 6 GHz clients will have a bad QoE.

Band selection mechanisms already exist. The availability of the new 6 GHz band is posing new challenges to Wi-Fi deployments that existing solutions cannot solve.

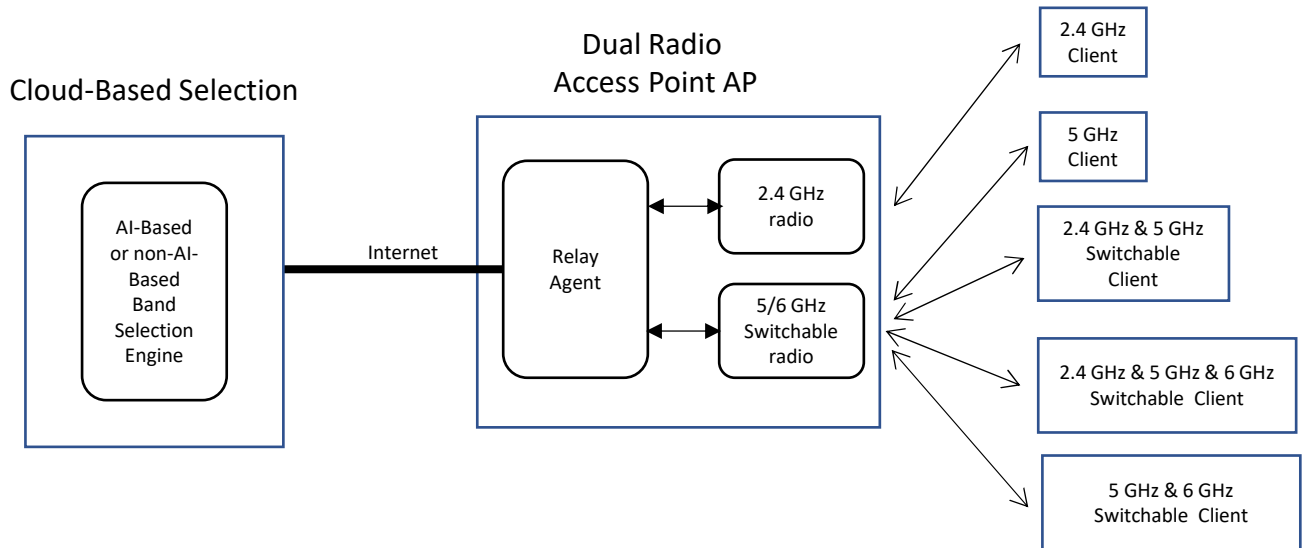
MSOs deploying Wi-Fi 6 at 6 GHz will give the best user experience to their subscribers.

Without such mechanism, APs with dual radio will either not benefit from 6 GHz band or provide non 6 GHz client a bad user experience. MSOs will support the 6 GHz band in their GTW with additional cost but may not use the 6 GHz band.

# Embedded Adaptive 5/6 GHz Band Selection



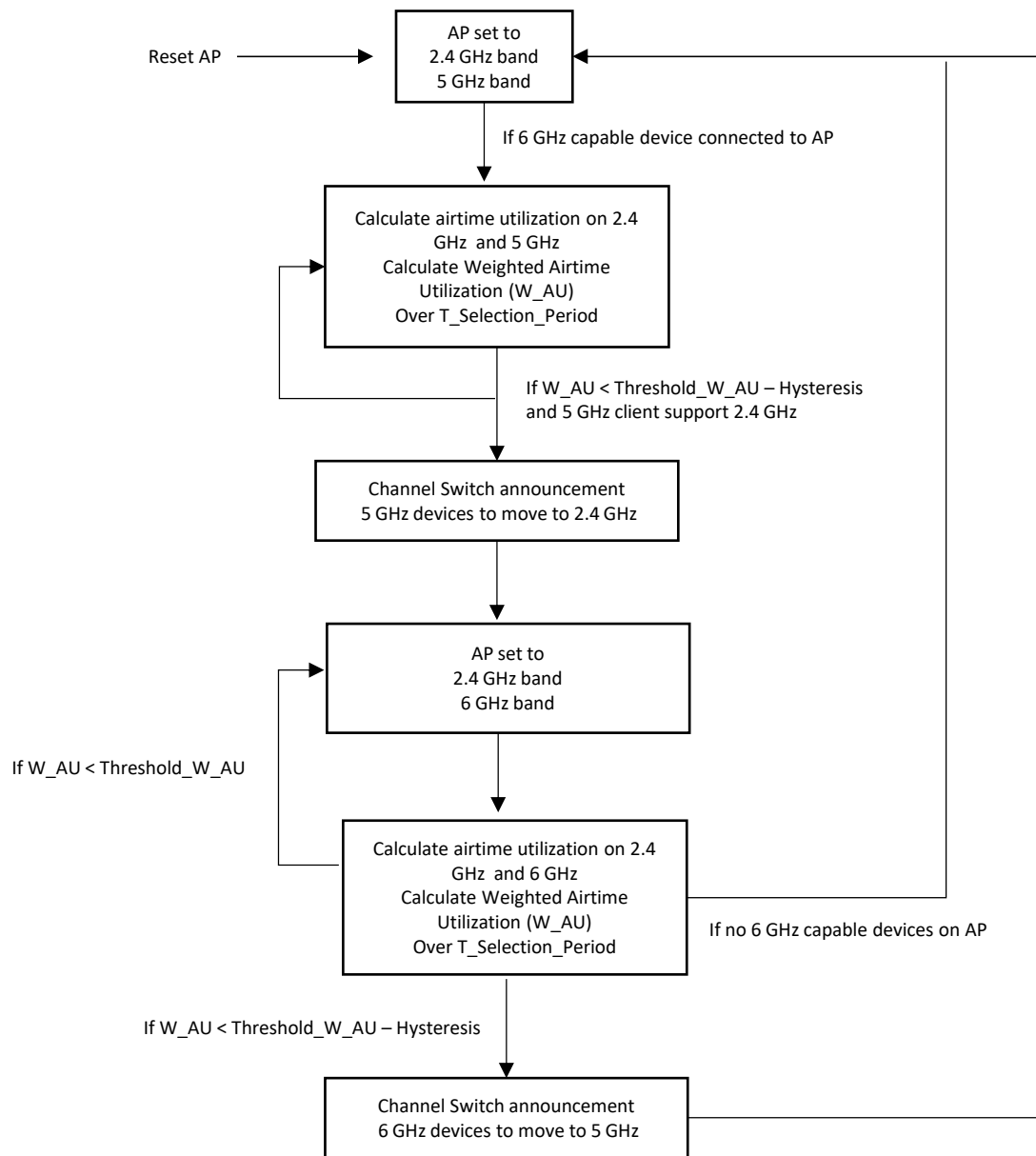
# Cloud-Based Adaptive 5 GHz /6 GHz Band Selection



Other claim (continuation) : can be extended to radios with more than 2 bands and/or APs with > 2 radios

Other claim (BT as another radio)

# 5 GHz / 6 GHz Band Selection



Non-AI based Selection  $W\_AU$  (Weighted Channel usage) =  $f(\text{airtime utilization on 2.4 GHz, 5 GHz, and 6 GHz, retries, RSSI, traffic QoS requirements per client, client\_capabilities, clients load})$

AI-based Selection  $W\_AU$  (Weighted Channel usage) =  $f(\text{airtime utilization on 2.4 GHz, 5 GHz, and 6 GHz, retries, RSSI, traffic QoS requirements per client, client\_capabilities, clients load, TOD, expected\_traffic\_type, expected\_band\_selection, expected\_clients\_on\_AP})$