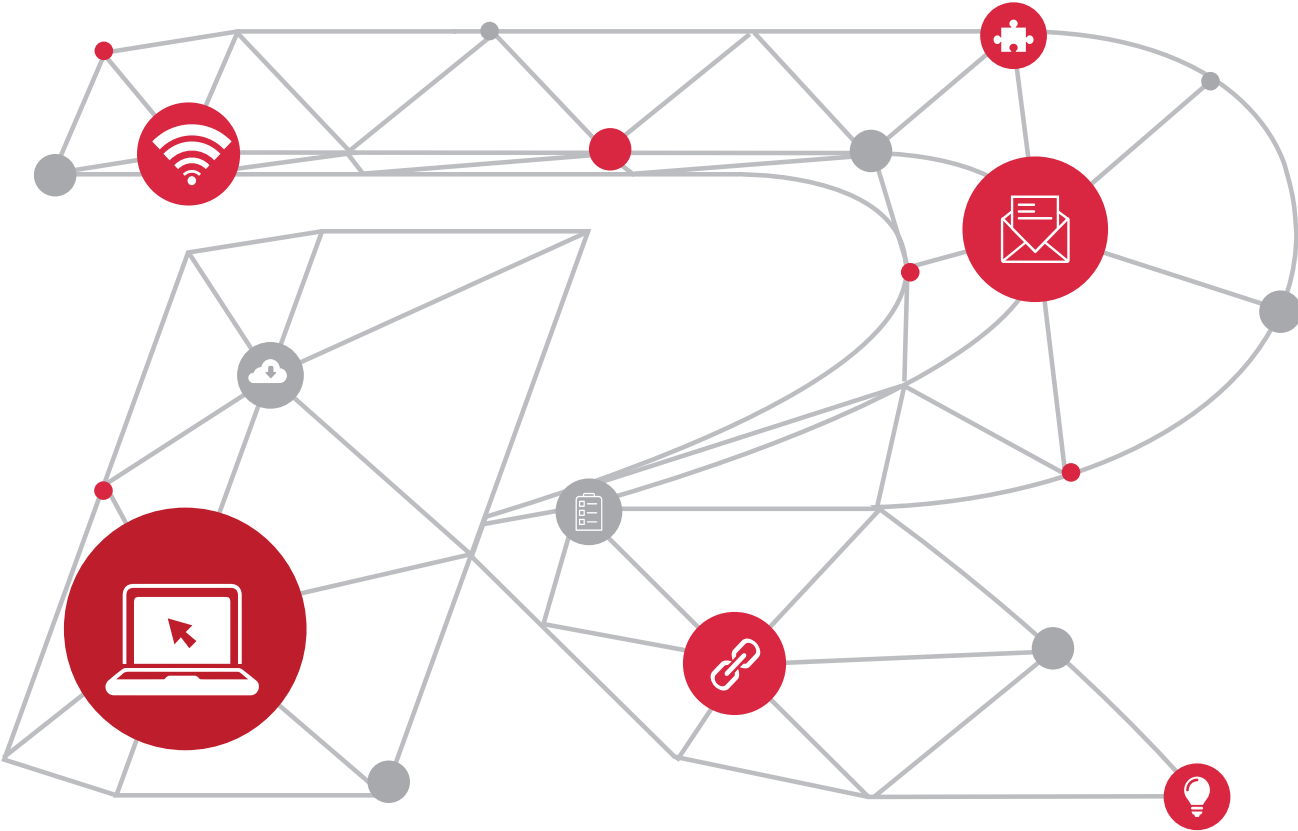


Ruijie Band Select

White Paper



Contents

Introduction.....	3
Technical Principle.....	4
Identifying a STA by a Dual-band AP.....	4
AP's Behavior after Band Select Is Introduced.....	5
Limitations	5
Conclusion.....	6

Introduction

This document describes the Band Select technology developed by Ruijie.

The major communications bands for IEEE 802.11 are divided into two bands:

- * **2.4 GHz (2.4 to 2.4835 GHz) for 802.11b/g/n**
- * **5 GHz (5.15 to 5.35 and 5.725 to 5.825 GHz) for 802.11a/n**

With the popularization of WLAN, there are increasingly many wireless service users, and most of them use dual-band STAs that support both 2.4 GHz and 5 GHz. However, 802.11b/g is more broadly applied than 802.11a, so most of the dual-band STAs operate at 2.4 GHz. As a result, the 2.4 GHz band is crowded while the 5 GHz band is wasted. Actually, the 5 GHz band has a higher access capacity. Specifically, the 2.4 GHz band supports a maximum of 3 non-overlapping communication channels, whereas the 5 GHz band provides more non-overlapping communication channels (5 in China and 24 in North America).

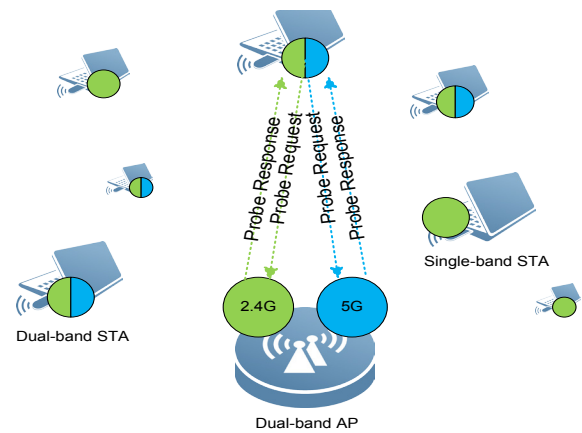
The Band Select technology leads dual-band STAs to access the 5 GHz band to reduce the pressure on the 2.4 GHz band, thereby improving the user experience.



The STA first broadcasts a probe frame over all the channels at its supported bands, and the probe frame includes information such as radio access rate supported by the STA. After receiving the probe frame, the AP that provides the WLAN access service returns a probe response to send its WLAN information to the STA. Generally, the STA collects all the received responses and displays the list of the accessible WLANs to the user for choice.

Figure 1 shows the process of a dual-band STA detecting an accessible WLAN provided by a dual-band AP. When the process is complete, the STA will detect two BSSIDs corresponding to two frequency bands of the WLAN. However, the SSIDs are the same, so the user cannot distinguish between them. If the user wants to access the WLAN, which frequency band is selected depends on the wireless driver used by the user, which is an uncontrollable factor for both the user and the AP.

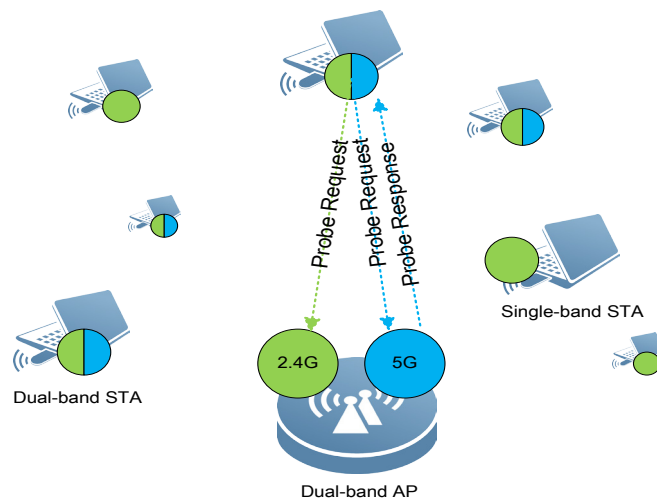
Figure 1 Dual-band STA Detecting WLAN



Technical Principle

The Band Select technology changes the AP's behavior during the WLAN detection, so as to lead the STA to operate at the 5 GHz band. Figure 2 shows the principle of the Band Select technology. Compared with Figure 1, Figure 2 does not show the 2.4 GHz band probe response.

Figure 2 Principle of Band Select



- Identifying a STA by a Dual-band AP

Before leading dual-band STA to access the 5 GHz band, the user should check whether the STA can operate at both bands.

A dual-band AP identifies a dual-band STA as follows:

- * **If the AP receives probe requests for both the 2.4 GHz band and the 5.0 GHz band, it is a dual-band STA.**
- * **If the AP receives a probe request from only the 2.4 GHz band, it is a 2.4 GHz STA.**
- * **If at the AP receives a probe request from only the 5 GHz band, it is a 5 GHz STA.**

Therefore, it more time-consuming to identify a single-band STA, because it takes some time to confirm that no probe request from the other band will be received.

The information about the STAs identified by the AP is stored so as to provide reference for a subsequent response policy. STA probe requests are broadcast messages. Therefore, an AP generally receives a large number of probe requests. It is unnecessary to store all of them, because some STAs are too far to associate to the AP. The Band Select technology enables the AP to store only the information about the STAs that may be associated. It selects these STAs based on their Received Signal Strength Indications (RSSIs). The RSSI threshold is configurable. For details, see the section "Configure an STA RSSI Threshold".

• AP's Behavior after Band Select Is Introduced

Before the STA is identified:

- * **The AP does not respond to the probe request for the 2.4 GHz band.**
- * **The AP does not respond to the probe request for the 5 GHz band.**
- * **After the STA is identified:**
- * **For a 2.4 GHz-only STA: The AP passively responds to the probe request, that is, the AP sends a response is sent after receiving several probe requests, only ensuring access to 2.4 GHz band.**
- * **For a 5 GHz-only STA: The AP responds to the probe request, ensuring effective access to the 5 GHz band.**
- * **For a dual-band STA: The AP does not respond to the probe request for the 2.4 GHz band while respond to the probe request for the 5 GHz band, thereby leading the STA to access the WLAN operating at the 5 GHz band.**

For the Band Select technology, the identified STAs fall into two types: The 2.4 GHz-only STAs are referred to "suppressed STAs", and the dual-band STAs "dual-band STAs". It is not necessary to differentiate between 5 GHz-only STAs and dual-band STAs.

The information about the two types of identified STAs will be stored. The user may switch the operating band of the STA, so the stored information must be updated.

Differentiated services are introduced in the Band Select to lead dual-band terminals to access the 5 GHz band with a higher access capacity, so as to improve service quality of the entire WLAN.

Limitations

Because the AP does not respond to the probe request for the 2.4 GHz band before identifying a STA, a 2.4 GHz-only STA cannot detect WLAN before being identified by the AP. This period of time is 20 seconds. That is to say, the 2.4 GHz-only STA may not discover an accessible WLAN within 20 seconds.

Assuming that it takes 7 seconds for a user to refresh the WLAN list, the 2.4 GHz-only STA can detect the accessible WLAN after refreshing the WLAN lists for at most three times. Therefore, if the user of the 2.4 GHz-only STA does not find the accessible WLAN when refreshing the WLAN list for the first time, the user needs to refresh the WLAN list again.

Conclusion

The Band Select technology leads dual-band STAs to access the 5 GHz band to reduce the pressure on the 2.4 GHz band, thereby improving the user experience.



Ruijie Networks Co.,Ltd

For further information, please visit our website <http://www.ruijienetworks.com>
Copyright © 2018 RuijieNetworks Co.,Ltd. All rights reserved. Ruijie reserves the right to change, modify, transfer, or otherwise revise this publication without notice, and the most current version of the publication shall be applicable.