OPL1000

ULTRA-LOW POWER 2.4GHZ WI-FI + BLUETOOTH SMART SOC

Adaptive DTIM Solution Guide

OPULINKS

REVISION HISTORY

Date	Version	Contents Updated
06/07/2018	0.1	• Initial Release
06/13/2018	0.2	• Update chapter 2.2

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

1. OUTLINE

DTIM (Delivery Traffic Indication Message) is used in the conventional power-saving mode, with adoption of multiple-point broadcasting in setting the DTIM interval through AP (Access Point), as DTIM interval unit of millisecond, with consensus of 100ms as beacon interval.

When DTIM characteristics are applied in AP, if STA has not activated PS (Power-Save) Mode, users will not experience any effect, but once STA activates PS, user will feel the effects in their data reception. When the set DTIM interval is too short, it will not have any power-saving effect, but if the interval is set too long, it will affect the quality of communication. The pros and cons of the setting of DTIM time interval are described in Table 1.

Table 1: Relationship Diagram between DTIM Interval and STA

STA Equipment / DTIM Interval	Pros	Cons
High (Long)	Power-Saving	Bad Performance
Low (Short)	High Performance Less Loading on AP Buffer Frame	Non Power-Saving

2. ADAPTIVE DTIM

OPL1000 software offers AT commands and API function port to set DTIM parameters and functions. When the system operates under WIFI Sleep Mode, DTIM time saved can deliver energy-saving objectives, DTIM setting can be omitted through AT commands or adopting API functions, which is outlined as follows:

2.1. AT command description

2.1.1. Adaptive DTIM AT Command

1. **Enquiry of the currently ignored DTIM Cycle Value**

```
at+wifimaccfg?
```

Parameter Description:

?	Reading of the currently ignored DTIM Cycle

2. **Set to ignore DTIM Cycle Value**

```
at+wifimaccfg=0,#value
```

Parameter Description:

0	Use DTIM Function (ID=0)
#Value	However many DTIM interval cycle will be ignored. 0: Not to ignore. Receive Beacon in every DTIM interval cycle. 1~10: Effectively ignore scope of DTIM fixed cycle

2.1.2. API Function

1. **Write in Set Value of Adaptive DTIM**

```
int wifi_config_set_skip_dtim(uint8_t value);
```

Description

1. This API will set Adaptive DTIM value in the shared storage and Flash. "int wifi_config_get_skip_dtim()" can be used to ensure the correctness of the set value.
2. This set value will have effect when the connection is established next, but we recommend re-connection with AP to ensure all set values working properly.

2. **Capture the set value of Adaptive DTIM**

```
int wifi_config_get_skip_dtim(uint8_t *value);
```

Description

Capture the set-value of current OPL1000 Wi-Fi Adaptive DTIM

2.2. Point of Usage in Time for Adaptive DTIM

When using the aforementioned AT command or API function, it needs to be undertaken before WIFI is connected. If it needs to be set during the connection process, the link needs to be severed before making connection with AP again.

In changing Adaptive DTIM cycle, it will immediately change the Listen Interval of MAC. However, according to 802.11 MAC standards, listen interval will notify AP the current value of the Listen Interval on the device end, during the period of Associate Request. If during connection process, users change the cycle of Adaptive DTIM, AP will not know the Listen Interval value currently used by users, so AP would assume the device has vanished, or gone offline.

This is the reason that this chapter recommends users that the connection needs to be severed before AP can be re-connected again, after users have changed Adaptive DTIM cycle.

2.2.1. How to Calculate Listening Interval

Calculation Formula:

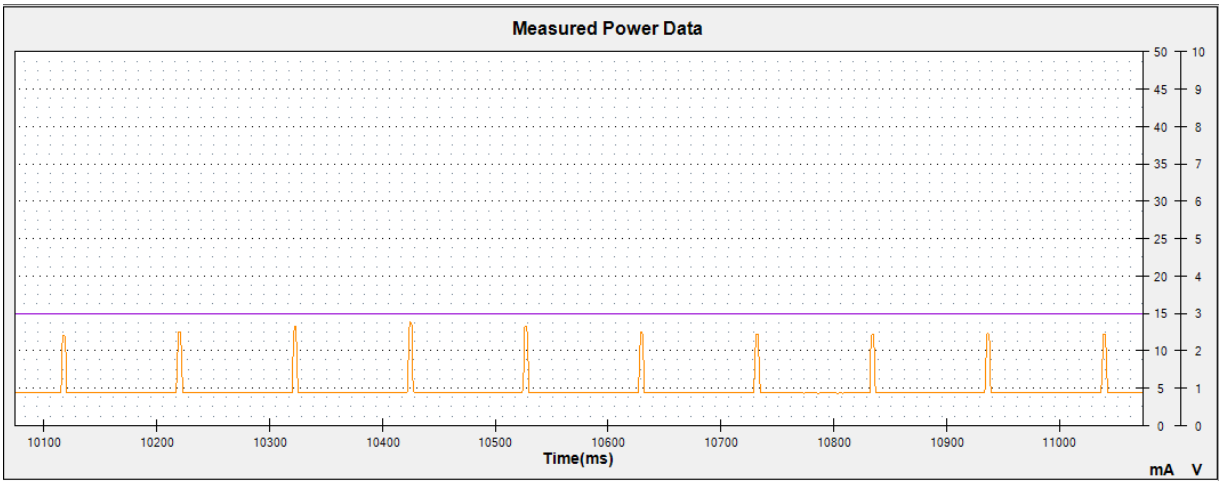
The value of Listen Interval is (Adaptive_DTIM + 1) * AP_DTIM_period.

> **Example**
>
> Adaptive_dtim = 10, AP DTIM period = 1, listen interval = 11
>
> Adaptive _dtim = 10, AP DTIM period = 3, listen interval = 33

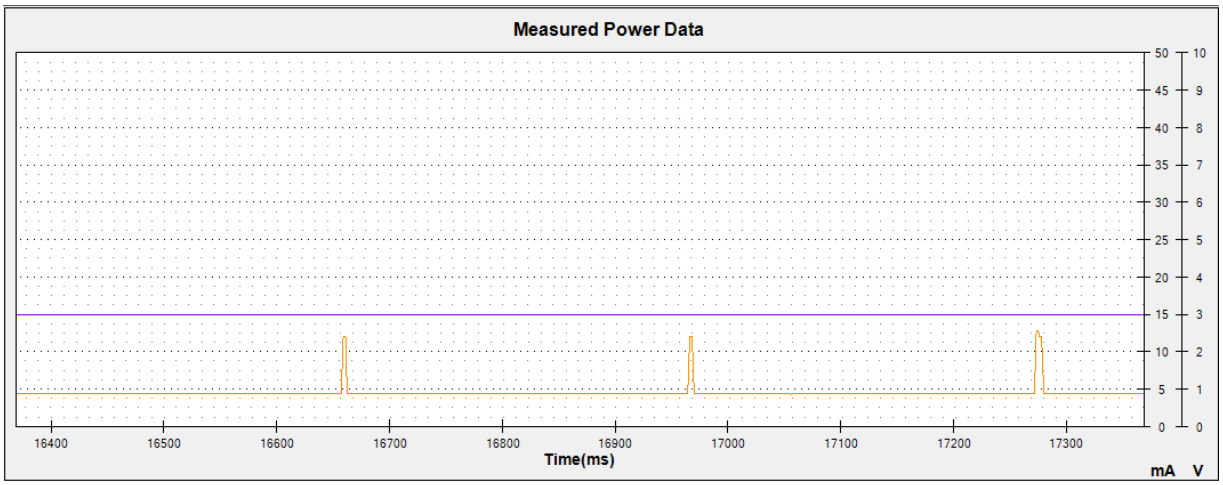
2.3. Applications

Below is the description of the operating result of omitting DTIM:

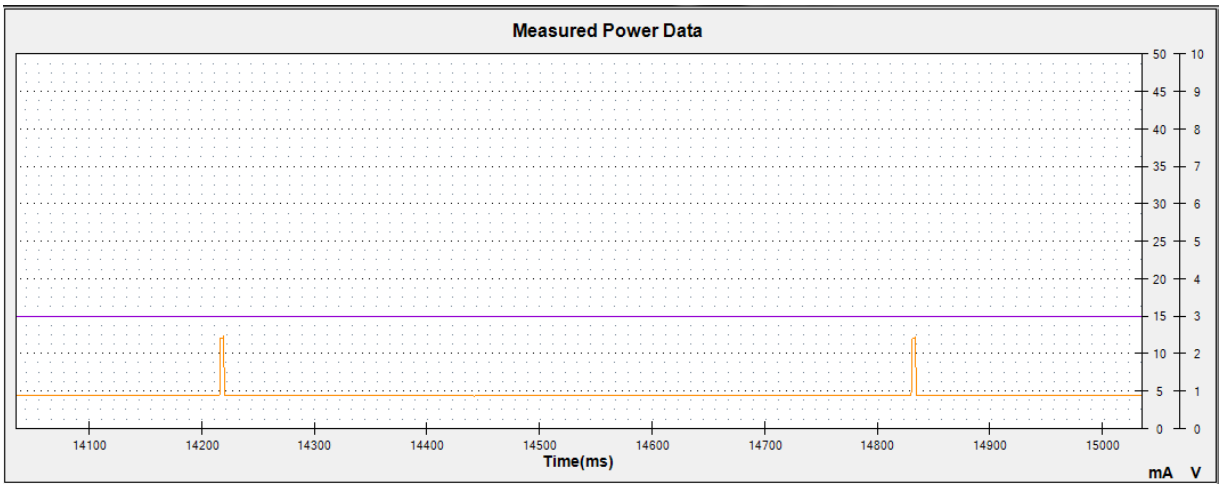
When setting an AP DTIM as "1", i.e. there should one reception every 100ms, and the device is connected to this AP, and measuring the variation of the received current, we can see the status of reception in the current flow meter: (This testing will no enable Sleep Mode)



By using AT Command to set device as 2 omitted DTIM, i.e. there would be reception and measurement of electric current variation for every 3 DTIM’ s, we can see the reception status in the electric current meter, as shown below: (This test will not enable Sleep Mode)



By using AT Command to set device as 5 omitted DTIM, i.e. there would be reception and measurement of electric current variation for every 6 DTIM’ s, we can see the reception status in the electric current meter, as shown below: (This test will not enable Sleep Mode)



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