

# User Manual

## DA16200 DA16600 DPM Dynamic Period Setting

UM-WI-030

### **Abstract**

*This document describes the use of DDPS of the DA16200 (DA16600).*

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## 1 Terms and Definitions

DPM	Dynamic Power save Module
DDPS	DPM Dynamic Period Setting
BSS	Basic Service Set
AP	Access Point
SSID	Service Set Identifier
RTOS	Real Time Operating System
TIM	Traffic Indicator Module
BUFP	Buffering Probe
UC	Unicast Packet

## 2 References

- [1] UM-WI-023, DA16200 EVK User Manual, Dialog Semiconductor.

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### 3 Introduction

DA16200 (DA16600) has a DPM Dynamic Period Setting (DDPS) function.

Access Points (AP) with WiFi BSS (Basic Server Set) support a power save option in the communication with each station. To support the power save functionality of a station, communication packets must be maintained when a station is in power save state. How long and how many packets the AP must keep for stations that are in a power save state plays an important role in the communication of the DA16200 (DA16600) Dynamic Power save Module (DPM). DDPS is the operation algorithm that checks what the buffering time must be for the DPM operation of the AP in the DA16200 (DA16600) station. To select the optimal TIM wake up period (interval) for a DPM operation, DDPS calculates the buffer size and time difference for the AP buffering time.

### 4 Operation Scenario

The DDPS configuration and operation has the following sequence.

1. The AP WiFi configuration is set with the `setup` console command, or via Provisioning. A WiFi configuration consist of AP SSID, Password, and network configuration.
2. DDPS in a WiFi configuration is enabled when DDPS is enabled in the `setup` console command, or when provisioned after a POR / RESET / REBOOT.
3. If DDPS is enabled at the time of the DPM setup, and connects to the first AP, then DDPS starts triggering in DPM state and enters DPM.
4. When in DPM state, TIM SW operates the DDPS.
5. When DDPS execution is completed and TIM SW wakes up the RTOS SW, RTOS is booted.
6. RTOS SW compares the value of the checking period with the rx beacon max count and the checking Probe count condition in the DDPS Check routine.
  - a. If DDPS Check condition is satisfied, then the Tim Wakeup Interval is set to 3 seconds.
  - b. If the DDPS Check condition is not satisfied, then the DPM interval set to 1 second.
7. DDPS is terminated as well as DPM and related operating services.

### 5 Enable DDPS

To enable and use DDPS, there are two methods:

- To use Provisioning
- To use the `setup` console command

To use the provisioning method, please contact our sales and assistant engineer.

To enable DDPS via the console, use the command `setup`. In that case, DDPS will operate automatically. For more information on the `setup` console command, see the DA16200 (DA16600) EVK User Manual [1].

```

Dialog DPM (Dynamic Power Management) ? [Yes/No/Quit] : y

DPM factors : Defaults ? [Yes/No/Quit] : n

DDPS Enable : Default ? [No/Yes/Quit] : y

DPM Keep Alive Time(0~600000 ms) ? [Quit] (Default 30000 ms) :

DPM User Wakeup Time(0~86400 Sec.) ? [Quit] (Default 0 Sec.) :

DPM TIM Wakeup Count(1~65535 dtim) ? [Quit] (Default 10) :
=====
DPM MODE           : Enable
  
```

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Dynamic Period Set : Enable
Keep Alive Time   : 30000 ms
User Wakeup Time  : 0 sec.
TIM Wakeup Count  : 10 dtim
=====
DPM CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
    
```

## 6 BUFP

The buffering probe (BUFP) state starts when DDPS is enabled and RTOS goes to sleep state. Figure 1 shows the state change during BUFP.

### 6.1 BUFP State Diagram

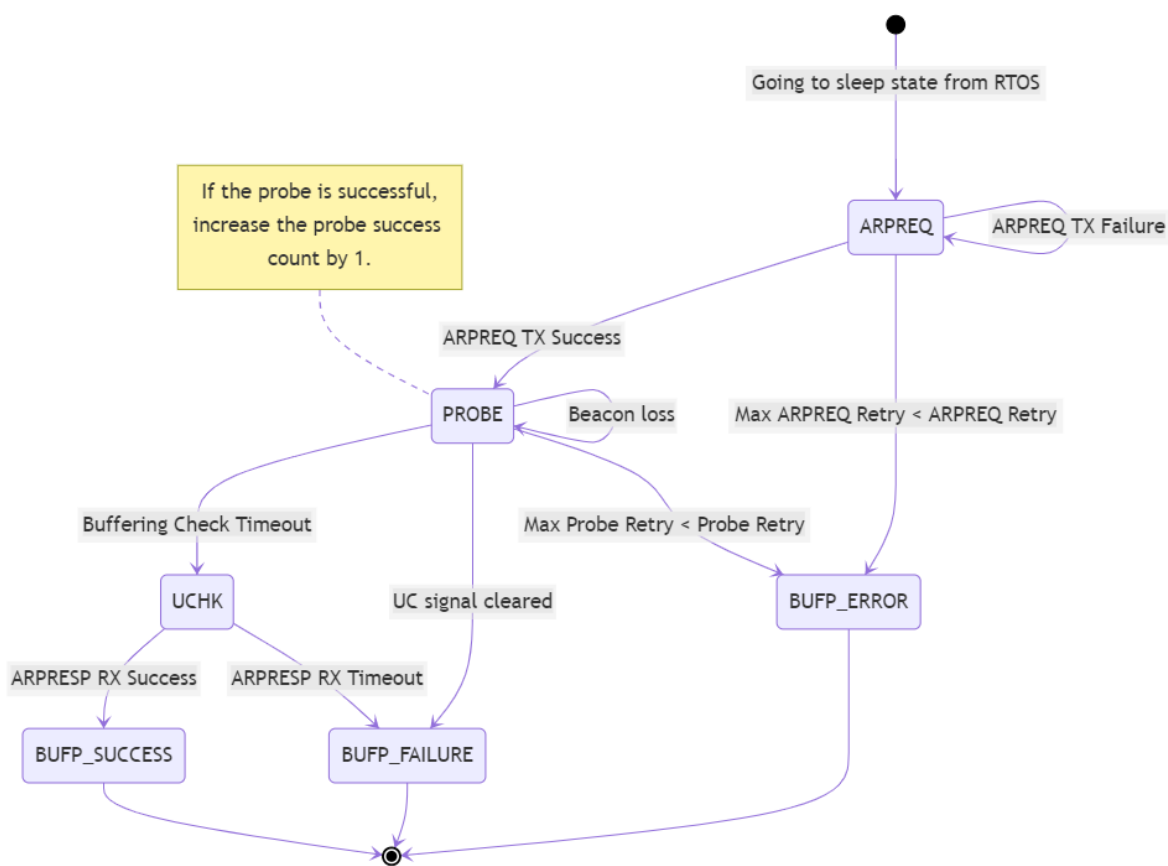


Figure 1: DDPS BUFP Block Diagram

Table 1: BUFP Main States

State	Description
ARPREQ	<ul style="list-style-type: none"> <li>State that the station transmits ARP request data to the AP</li> <li>Success when ACK is received from the AP</li> <li>If there is no ACK from the AP, retry ARPREQ data transmission</li> </ul>
PROBE	<ul style="list-style-type: none"> <li>State that BUFP measures AP UC buffering time</li> <li>Success when AP's UC signal is maintained until the probe timeout</li> <li>If AP's UC signal is cleared during the probe state, the probe fails</li> <li>If the beacon is not continuously received from the AP, retry the probe again</li> </ul>

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State	Description
UCHK	<ul style="list-style-type: none"> <li>State that the station waits for ARP REPLY data from the AP</li> <li>Success when ARP reply data is received from the AP until the UCHK timeout</li> </ul>
BUFP_SUCCESS	<ul style="list-style-type: none"> <li>State that BUFP was successful</li> </ul>
BUFP_FAILURE	<ul style="list-style-type: none"> <li>State that BUFP failed</li> <li>The probe failed or ARPRES data was not received</li> </ul>
BUFP_ERROR	<ul style="list-style-type: none"> <li>BUFP error state</li> <li>When the ARPREQ retry count has reached the maximum ARPREQ frame transmission count</li> <li>When the probe retry count has reached the maximum probe retry count</li> </ul>

### 6.2 When DDPS Changes the Sleep Time to 1 Second

When the BUFP fails 4 out of 5 times, DDPS estimates that the AP's UC buffering time is less than 3 seconds, and changes the sleep time to 1 second.

## 7 AP Test Report for DDPS

Table 2 shows the test results for each tested AP model on the DDPS functionality. Each AP was tested 100 times.

**Table 2: DDPS Result**

AP Model	DDPS 1s	PROBE MAX	PROBE MIN
360 F5C		5	5
360 F5S		5	4
360 P1		5	4
360 P4		5	5
360 V5S		5	5
AMPED ALLY-0091K		5	5
ANTIBANG A3		5	4
ASUS ACRH13		5	5
ASUS RT-AC1200GU	1s	0	0
ASUS RT-AC1750		5	5
ASUS RT-AC3200		5	5
ASUS RT-AC51UPLUS	1s	0	0
ASUS RT-AC5300		5	5
ASUS RT-AC58U		5	5
ASUS RT-AC66U		5	5
ASUS RT-AC87U		5	5
ASUS RT-AC88U		5	5
ASUS RT-N14UHP		5	5
ASUS TM-AC1900		5	5
BELKIN F7D6301		5	4

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AP Model	DDPS 1s	PROBE MAX	PROBE MIN
BELKIN F9K1002		5	3
BUFFALO WHR-300HP2D		4	2
BUFFALO WSR-1166DHP3		5	5
BUFFALO WSR-2533DHPL		5	4
CISCO RV110W-ECN		5	5
DLINK 605L		5	5
DLINK 616		5	5
DLINK 619L		5	5
DLINK 822		5	5
DLINK DIR-806A		5	5
DLINK DIR-820L		5	4
DLINK DIR-822P		5	5
DLINK DIR-823PRO		5	4
DLINK DIR-828		5	5
DLINK DIR-842		5	5
DLINK DIR850LW		5	4
DLINK DIR-880L		5	5
DLINK DIR-890L		5	5
ELECOM WRC-1167GEBKS		5	5
EZVIZ CS-X3C-8E		5	5
FASTCOM FAC1200R		5	4
FASTCOM FAC2100R	1s	0	0
FASTCOM FW313R		5	4
FASTCOM FW450R		5	5
FASTCOM FWR200		5	4
H3CMAGIC R100		5	5
H3CMAGIC R300		5	5
HIWIFI E30		5	4
HIWIFI HC5861B		5	4
HUAWEI GLORY-ROUTINGPRO		5	5
HUAWEI HONOR-X2		5	5
HUAWEI WS5100		5	5
HUAWEI WS5102		5	5
HUAWEI WS5200		5	5
HUAWEI WS550		5	4
HUAWEI WS832		5	5
HUAWEI WS851		5	5
HUMAX QUANTUM-T3Av2		5	5
HUMAX T10X		5	4

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AP Model	DDPS 1s	PROBE MAX	PROBE MIN
IODATA WNAC583R	1s	0	0
IODATA WNAC733GR	1s	0	0
IODATA WNAX1167	1s	0	0
IODATA WNPR2600G		5	5
IPTIME A1004	1s	0	0
IPTIME A2004NSR		5	4
IPTIME A300NS-BCM		5	5
IPTIME A7004M		5	4
IPTIME A3004NS-BCM		5	5
IPTIME A3004NS-BCM		5	5
IPTIME A8004ITL		5	4
IPTIME A804NS		5	4
IPTIME N604		5	4
IPTIME A604R		5	5
IPTIME N702BCM		5	5
IPTIME N704BCM		5	4
IPTIME N804V		5	5
LBLINK BL-AC1200D		5	4
LBLINK WR9000		5	4
LBLINK WR4000		5	4
LINKSYS E1200		5	4
LINKSYS EA6900		5	5
LINKSYS EA7500		5	5
LINKSYS EA8300		5	5
LINKSYS WRT1900AC		5	5
LINKSYS WRT300N		5	5
LINKSYS WRT3200ACM		5	4
LINKSYS WRT54GL		5	5
MERCURY C12G	1s	0	0
MERCURY D196G		5	5
MERCURY D19G		5	4
MERCURY D26GPro		5	5
MERCURY MW300R		5	4
MERCURY MW313R		5	4
MERCURY MW316R		5	5
MIKROTIK RB751U-2H	1s	2	0
MOTOROLA MR1900		5	1
MERCURY RUSH-1537N		5	5
NETCORE 360_P2		5	5



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AP Model	DDPS 1s	PROBE MAX	PROBE MIN
NETGEAR JWNR2000v2		5	5
NETGEAR ORBI		5	5
NETGEAR R6120		5	4
NETGEAR R6220		5	3
NETGEAR R7000		5	4
NETGEAR R8000		5	4
NETGEAR RAX120		5	5
NETGEAR RAX40		5	4
NETGEAR RAX80		5	5
NETGEAR WNDR3400v3		5	1
NETGEAR X10		5	5
NETIS M3200N		5	5
NETIS MF1200AC		5	5
NETIS WF2770	1s	0	0
NETIS WF2785		5	5
NETIS WF302		5	4
NEXT 504N		5	5
NEXT 7004N		5	5
NEXT 8004N		5	4
PHICOMM PSG1218	1s	0	0
PIXLINK WR07		5	4
SAMSUNG SWW3100BG		5	3
SAMSUNG SWW-3400RW		5	5
SAMSUNG ET-WV525		5	5
SEMA SAP-H310SR	1s	1	0
SYNOLOGY MR2200AC		5	5
SYNOLOGY RT2600AC		5	5
TENDA AC15		5	5
TENDA FH304		5	5
TENDA N318		5	3
TOTOLINK A2500R		5	5
TOTOLINK A3100R		5	5
TOTOLINK A780R		5	4
TOTOLINK A800R		5	5
TOTOLINK A850R		5	5
TOTOLINK N350RP		5	5
TOTOLINK N600R		5	5
TPLINK AD7200		5	4
TPLINK ARCHER-AX10		5	4

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AP Model	DDPS 1s	PROBE MAX	PROBE MIN
TPLINK ARCHER-C2600		5	5
TPLINK TL-WAR1200L		5	5
TPLINK TL-WDR8610		5	5
TPLINK TL-WDR8690		5	5
TPLINK WDR5600		5	4
TPLINK WDR5660		5	5
TPLINK WDR6500		5	5
TPLINK WDR7660		5	4
TPLINK WR2041		5	5
TPLINK WR842N		5	4
TPLINK WR880N		5	5
TPLINK WR940N		5	5
TRENDNET TEW-812DRU		5	1
TRENDNET TEW-827DRU		5	4
UNICORN AW		5	4
UTT A310	1s	0	0
UTT A655W	1s	0	0
UTT A755W		5	4
VOLANS G1		5	5
WAVLINK A33		0	0
WAVLINK N300		5	4
WAVLINK WN521N2A		0	0
WEVO 11AC-NASROUTER		5	4
WEVO HI1200AC		5	3
XIAOMI DVB4218CN		5	4
XIAOMI MIWIFI3	1s	1	0
XIAOMI MIWIFIPRO		5	5
XIAOMI R1CM	1s	0	0
XIAOMI R3AC		5	5
ZIO 2520N		5	5
ZIO 5500AC		5	5
ZIO FREEZIO		5	5

## Revision History

Revision	Date	Description
1.2	28-Mar-2022	Update logo, disclaimer, copyright.
1.1	25-Nov-2021	Title was changed.
1.0	29-Oct-2020	Initial version.

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**Status Definitions**

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.

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