MT7986 DFS Application Note

Alonso Hsu

Version History

Version	Date	Author (Optional)	Description
1.0	2021-09-16	Alonso	Initial draft

Static Check

- **CONFIG_MT_DFS_SUPPORT=y**
- **Key parameters in 5G profile**
  - **IEEE80211H=1**
  - **DfsEnable=1**
  - **DfsDedicatedZeroWait=0 (if set to 3, means Adjust ZW DFS enable)**
  - **RDRegion=FCC**
    - You may choose FCC or CE or JAP

Do-Not Switch Channel

- When testing radar detection rate, you can use the following command
  - iwpriv rax0 set RadarDetectMode=1
- RadarDetectMode would prevent DUT from jumping to another channel when detecting a radar signal

Do-Not Switch Channel

- **Log of detecting a radar signal**
  - **If radar signal is detected, pulse information log will be printed**

```
[ 2460.864000] [WrapDfsRddReportHandle]:  Radar detected !!!
[ 2460.880000] [WrapDfsRddReportHandle]:  ucRddIdx: 0
```

CAC Status Check

- **iwpriv rax0 show dfschinfo**
- **When switch to radar channel, you can use this command to check whether CAC is done**

```
root@OpenWrt:/# iwpriv rax0 show dfschinfo
[  305.463201] ----------------------------------------
[  305.463201]  ========================================
[  305.463201]
[  305.882255] [show_dfs_ch_info_proc][RDM]: DFS channel inf
[  305.899468] ========================================
[  305.899468]  band_idx: 0
[  305.907025] CH: 0,   BW: 0,  CAC cnt: 0,     CAC: 65
[  305.911370] ----------------------------------------
[  305.911370]  band_idx: 1
[  305.918928] CH: 100, BW: 2,  CAC cnt: 20,    CAC: 65
```

Bypass CAC

- iwpriv rax0 set ByPassCac=1
- When testing radar detection rate, you can use this command to finish CAC and let beacon come out earlier

NOP Check

- **Check which channels are in Non-Occupancy Period (NOP)**
  - **iwpriv rax0 show DfsNOP**

NOP Check

- **Example:**
  - **Ch52 – Ch64 NOP is 1774s**

```
# iwpriv rai0 show DfsNOP
[Show_DfsNonOccupancy_Proc]:
DfsChannelList[0].Channel = 1, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[1].Channel = 2, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[2].Channel = 3, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[3].Channel = 4, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[4].Channel = 5, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[5].Channel = 6, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[6].Channel = 7, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[7].Channel = 8, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[8].Channel = 9, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[9].Channel = 10, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[10].Channel = 11, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[11].Channel = 12, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[12].Channel = 13, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 1
DfsChannelList[13].Channel = 36, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[14].Channel = 40, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[15].Channel = 44, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[16].Channel = 48, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[17].Channel = 52, NonOccupancy = 1774, NOPClrCnt = 0, NOPSetByBw = 2, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[18].Channel = 56, NonOccupancy = 1774, NOPClrCnt = 0, NOPSetByBw = 2, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[19].Channel = 60, NonOccupancy = 1774, NOPClrCnt = 0, NOPSetByBw = 2, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[20].Channel = 64, NonOccupancy = 1774, NOPClrCnt = 0, NOPSetByBw = 2, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[21].Channel = 100, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[22].Channel = 104, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
DfsChannelList[23].Channel = 108, NonOccupancy = 0, NOPClrCnt = 0, NOPSetByBw = 0, NOPSaveForClear is 0, SuuportBwBitMap is 15
```

NOPSetByBw = 2 means this channel detects radar in BW80

- 0: BW20; 1: BW40; 2: BW80

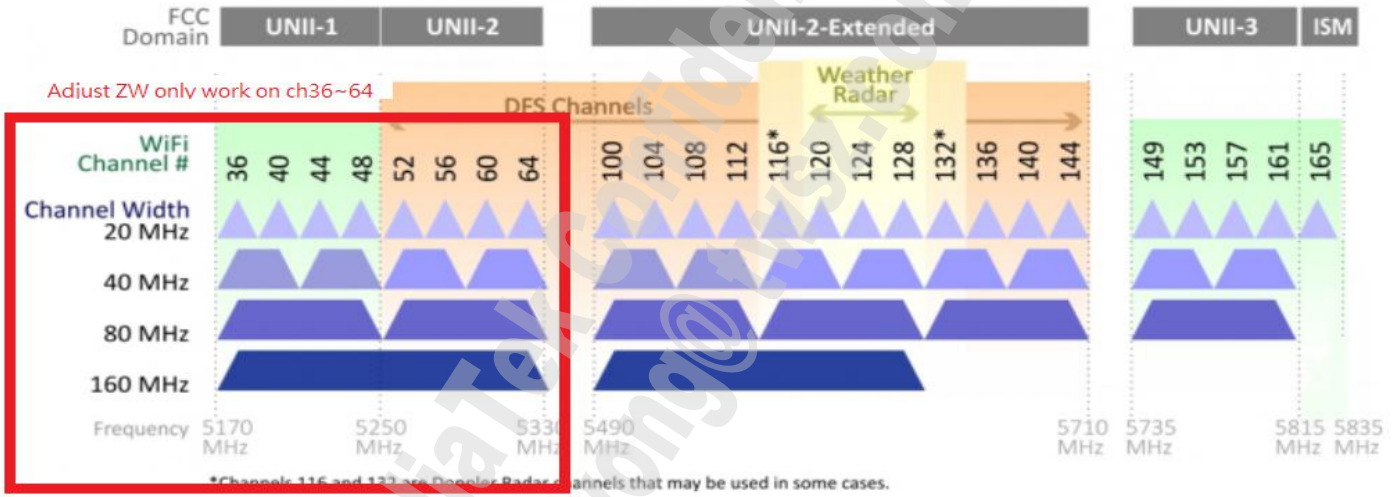
NOP Clean

- Set NOP of all channel to 0 second
  - iwpriv rax0 set DfsNOPClean=0
- We do not provide the flexibility of resetting NOP of a specific channel

Adjust ZW DFS

- DFS_ADJ_BW_ZERO_WAIT=y
- CONFIG_BACKGROUND_SCAN_SUPPORT=y
- Parameters in 5G profile
  - DfsEnable=1
  - DfsDedicatedZeroWait=3

Adjust ZW DFS



- **ZW only work when BW160 or BW80,ch52~64**

Recommended Debug Sequence

- HW: DUT RF Rx sensitivity check
- SW: DUT profile settings check
- LAB: Testing equipment check

Radar Simulation

- The following command is to forcibly activate driver to work as if detecting a Radar pulse
  - iwpriv rax0 set RDDReport=1 /*band1*/
  - iwpriv rax0 set RDDReport=2 /*dedicated path*/
- This is used to debug whether the driver behavior is correct

```
root@LEDE:/# iwpriv rax0 set RDDReport=1
[ 1738.581990] [WrapDfsRddReportHandle]:  Radar detected !!!!!!!!!!!!!!!!
[ 1738.588642] [WrapDfsRddReportHandle]:  ucRddIdx: 1
[ 1738.593438] [WrapDfsSetNonOccupancy]: band index: 1
```