QCS-AX

DFS Daemon

Introduction

QCS release software R6.4 introduces a new DFS method called Zero Wait CAC (ZCAC), which enables a subset of chains to go off channel and scan for radar. For 8x8 systems, four chains are used for radar scan and for a 5x5 systems, one chain is used for radar scan. In addition to ZCAC, a new daemon is also introduced, which prioritizes and manages the various CAC methods supported by the platform. ZCAC is integrated into this daemon and it is the only method for customers to enable this feature.

The behavior of the DFS daemon depends on the operating region (US versus EU) and the settings in the configuration file. This document describes how to enable the DFS daemon, enable ZCAC, and its expected behavior based on the default configuration.

ABBREVIATION AND ACRONYM

Abbreviation and Acronym	Description
DFS	Dynamic Frequency Selection
CAC	Channel Availability Check
NSM	Network Standby Mode
OCAC	Off–Channel Channel Availability Check
WCAC	Wideband Channel Availability Check
ZCAC	Zero Wait Channel Availability Check (Zero Wait DFS)
QCS	Quantenna Connectivity Solutions Division
QCS–AX	QSR10GU–AX and QSR5GU–AX family of chipsets

Enabling the DFS Daemon

By default, the DFS daemon is disabled. This feature does not support dynamic enable/disable through the qcsapi interface. It must be enabled in the platform's /mnt/jffs2/wireless_conf.txt file by setting dfs_mgmt configuration variable to 1.

Enabling dfs_mgmt is shown below:

```
quantenna # cat /mnt/jffs2/wireless_config.txt region=eu&qlink=0&staticip=0&start_down=0&maui=0&au-
tostart=1&iotd=0&bsa=0&nsm=1&dfs_mgmt=1&
interface=wifi0_0&mode=ap&bw=160&vht=1&channel=0&bf=1&pwr=19&qtm=0&band=11ax&pmf=0&
interface=wifi2_0&mode=ap&bw=40&vht_24g=1&channel=1&bf=0&pwr=19&qtm=0&band=11axng&scs=0
```
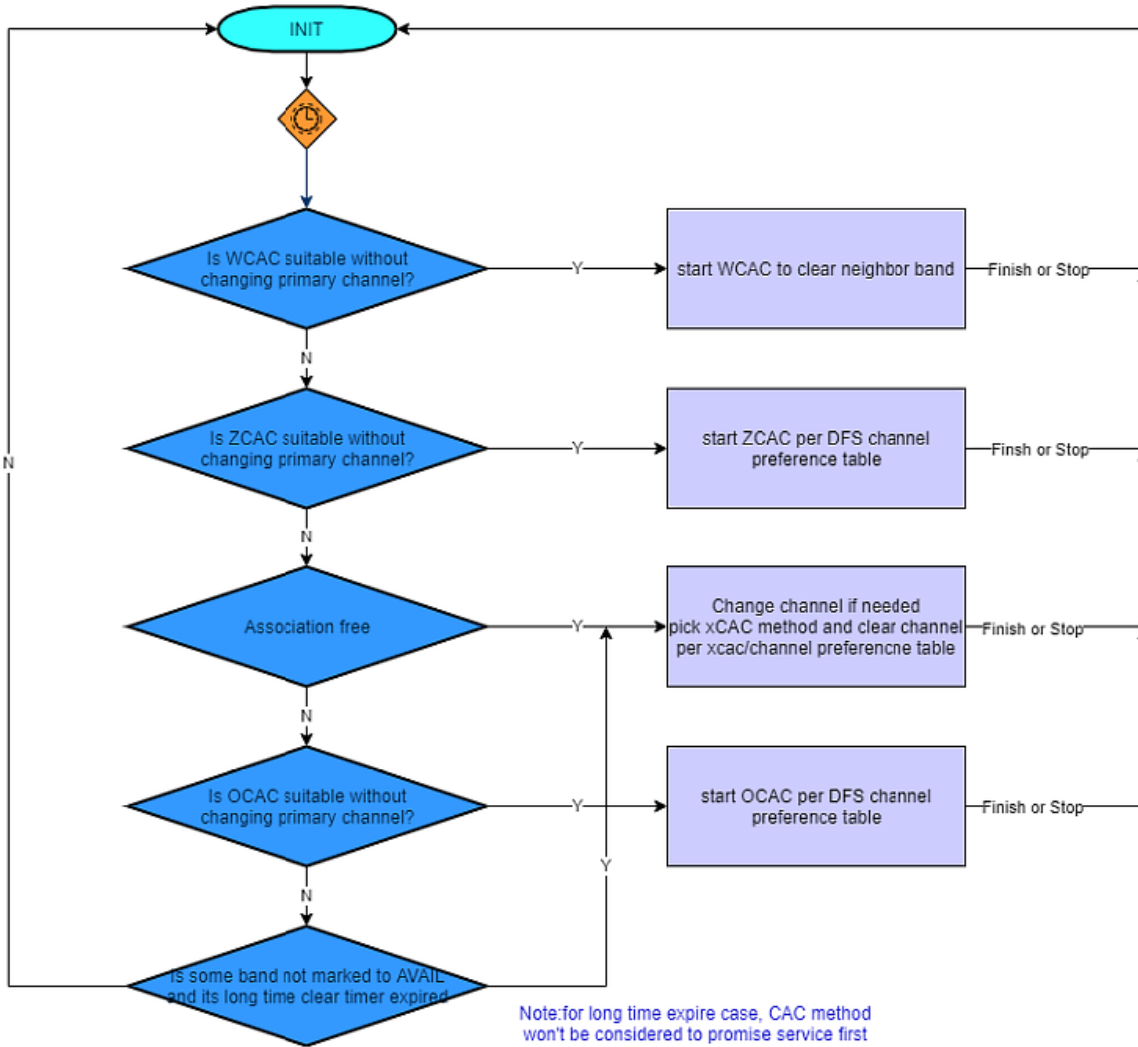
Logic Flow of DFS Daemon

Figure 1. Logic Flow of DFS Daemon

Configuration of the DFS Daemon

The DFS daemon is configured via /mnt/jffs2/dfs_mgmt_conf.txt file. This file should only be used to enable/disable ZCAC (no qcsapi supported to enable ZCAC) and NSM exit, which are both disabled by default.

Supported xCAC Methods

The default CAC methods that are enabled are WCAC and OCAC. ZCAC is disabled by default and may be enabled by modifying dfs_mgmt_conf.txt to set zcac_enable = 1.

Configuration to enable ZCAC is shown below:

```
# zcac method configuration
# 1 – zcac method can be used
# 0 – zcac method can't be used
zcac_enable=1
```

ZCAC Traffic Threshold

To maintain optimal radar detection probability of the scanned channel, the DFS daemon only allows ZCAC to be used when airtime utilization is below a threshold value. One of the two threshold values are used depending on region. Customers are recommended to use the default and not make any modifications.

Configuration entries for ZCAC threshold shown below:

```
# zcac method traffic level threshold for eu region range(1,30),
the percent of the airtime
# zcac can start if current traffic level less than the value
zcac_traffic_level_threshold_eu=25

# zcac method traffic level threshold for us region range(1,17),
the percent of the airtime
# zcac can start if current traffic level less than the value
zcac_traffic_level_threshold_us=15
```

xCAC Priority

The DFS management daemon chooses which xCAC method to use based on priority set in the dfs_mgmt_conf.txt file and the current operating mode of the system. Customers are recommended to use the default and not make any modifications.

The default priority for xCAC methods is:

Priority (Default)	xCAC
1	ZCAC
2	WCAC
3	OCAC
4	CAC

Preferred Channel Order

The DFS management daemon chooses the order for clearing channels based on a configuration set in dfs_mgmt_conf.txt. Customers are recommended to use the defaults.

Preferred channel order listed below:

Order	Operating Mode	
	160 MHz	80 MHz
1	CH36–CH64	CH100–CH112
2	CH100–CH128	CH52–CH64
3	NA	CH132–CH144
4	NA	CH116–CH128

For region EU, clearing of channels 132–144 is not currently supported. Channel 144 is not supported by EU.

Interoperability with Network Standby Mode (NSM)

The DFS management daemon is configured by default to not cause network standby mode to exit to perform xCAC. This setting may be changed by setting nsm_exit_allowed=1.

Enabling NSM exit shown below:

```
# NSM interact
# 1 – allow exit NSM mode
# 2 – don't allow to exit NSM mode
nsm_exit_allowed=1
```

DSF Daemon Startup

The DFS management daemon can be configured to startup with delays after power up or restarting of the daemon.

Configuration of DFS daemon startup is shown below:

```
# the dfs management start time after system start up, the unit
of the value is second
keep_silence_time=200
```

NOTE: Keep_silence_time delay allows standard DFS CAC to operate during first power up. AACS is also independent of DFS Daemon.

Debug Information

The DFS management daemon is configured to output debug logs to /var/log/dfsmgmt_log.txt at debug level 4. It is not recommended that customers modify this unless explicitly requested by QCS support team.

Questions/Answers

Q: How will DFS Daemon interact with standard power up CAC on DFS Channels?

A: There is a keep_silence_time timer that will delay DFS Daemon to start. This will allow standard CAC to operate during first power up or reset of the daemon.

Q: How will AACS interact with DFS Daemon?

A: These two are independent of each other

Q: There are other parameters in the configuration file dfs_mgmt_conf.txt. Why are some parameters not explained?

A: Parameters that are not explained are not created for specific end use control. Some are for additional debugging.

Q: US and EU have different DFS rules. EU allows freeing up DFS channel for later use, whereas US does not allow this. How does DFS Daemon handle this?

A: DFS Daemon is design to handle specific regional rules.

For EU: DFS Daemon will clear as many DFS channel as possible in advance. The DFS Daemon will schedule the DFS clear logic every two minutes.

For US: Picking best channel is not the DFS Daemon's role. The DFS Daemon is only an assistant for AACS. AACS picks a CAC required channel, and normal CAC will kick in to clear the channel. After CAC is done and channel is operational, DFS Daemon will eventually start due to the delay timer. DFS Daemon will check if there is a suitable method to clear channels without service interruption. If there is a suitable method, xCAC will be triggered and switch channel smoothly without service interruption. If there is no request from AACS Daemon, DFS manager will keep silent.

Q: How will ZCAC affect MU–MIMO operation?

A: There are thresholds that are set base on traffic load before the DFS Daemon (zCAC) to initiate. Normally during MU–MIMO with heavy load, zCAC will not initiate, therefore no affect to MU–MIMO operation. If traffic load is lite, zCAC operation can affect MU–MIMO grouping when zCAC is in operation. However, since traffic is lite, MU–MIMO performance gains are not optimized as not enough data to maximize the performance.

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