

Exemption Reason of FCC DFS Review (TQ4400e)

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Approval

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Revision History

Revision	Date	Originator	Description
1.0	2017/02/09	Ape Hou	First release

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Chapter 1. Purpose

The DFS sample of TQ4400e (FCC ID: RSL-TQ4400E) has been tested on Sep. 13, 2016 in US FCCs Lab. Allied Telesis's customers have a new request for the support of bigger gain antenna (10/16/19dBi). New firmware includes new TX power settings and GUIs for the support of new optional antenna (10/16/19dBi). Allied Telesis K.K. declares that TQ4400e's (FCC ID: RSL-TQ4400E) new firmware does not change any DFS algorithm and behavior (Please refer to Chapter 2 to see the detail). **Hope TQ4400e (FCC ID: RSL-TQ4400E) can exempt from sample request for certified equipment for FCC inspection.**

There are two main reasons:

1. New firmware does not replace default antenna (gain: 7dBi).

According to previous DFS test experience, Test Lab (BV-ADT) chooses minimal gain antenna (default antenna, gain: 7dBi) to do the DFS test. Hence, we think FCC does not need to test the same sample with same DFS function of TQ4400e (FCC ID: RSL-TQ4400E) twice.

2. New firmware does not change any DFS algorithm and behavior. (Please refer to Figure 1)

New firmware only changes the following two items which are related to 10/16/19dBi optional antenna.

- Add "Antenna Model Selection" in Web-GUI
- Add TX power setting for optional antennas (10/16/19dBi).

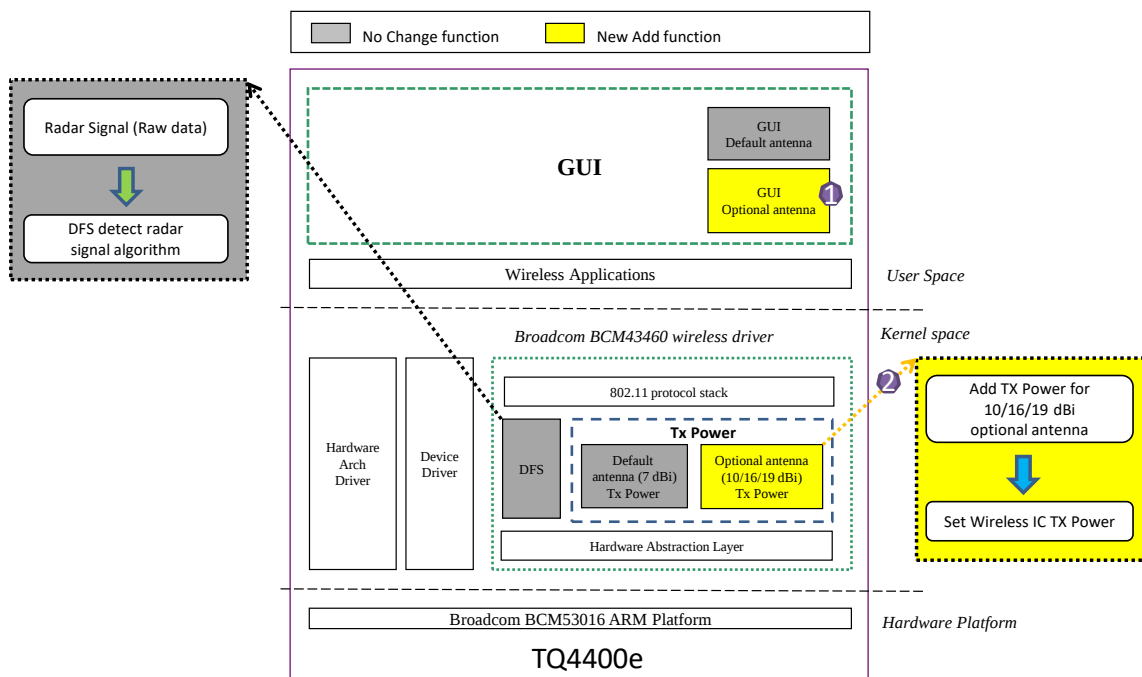


Figure 1 Feature difference between the firmware

Chapter 2. Modification in TQ4400e's new firmware

Table 1 Firmware difference

Item	Old Firmware (Default antenna)	New Firmware (Optional antenna)								
FCC ID	RSL-TQ4400E	Same as left side list.								
Differences in Chipset	BCM53016 x 1 BCM43460 x 2	Same as left side list.								
Differences in DFS functioning, circuitry, software, etc.	Tested on Sep. 13, 2016 in US FCC Lab.	DFS function is same as left side list.								
Antenna information and differences for the minimum gain antennas	Default antenna (Minimum gain): 5dBi antenna (2.4G) 7dBi antenna (5G) ----- Optional antenna: None	Default antenna (Minimum gain): Same as left side list. ----- Optional antenna: Support below three new antennas <table><tr><th>Antenna</th><th>Antenna gain</th></tr><tr><td>AT-AN2458-10DP (2.4G/5G)</td><td>8 dBi/10 dBi</td></tr><tr><td>AT-AN5158-16DP (5G)</td><td>16 dBi</td></tr><tr><td>AT-AN5158-19DP (5G)</td><td>19 dBi</td></tr></table>	Antenna	Antenna gain	AT-AN2458-10DP (2.4G/5G)	8 dBi/10 dBi	AT-AN5158-16DP (5G)	16 dBi	AT-AN5158-19DP (5G)	19 dBi
Antenna	Antenna gain									
AT-AN2458-10DP (2.4G/5G)	8 dBi/10 dBi									
AT-AN5158-16DP (5G)	16 dBi									
AT-AN5158-19DP (5G)	19 dBi									
Differences in channel range	Default antenna (Minimum gain): CH36-CH48, CH52-CH64, CH100-CH140, (Note: Channel 120~CH128 are disabled) CH149-CH165 ----- Optional antenna: None	Default antenna (Minimum gain): Same as left side list. ----- Optional antenna: Please see Table 2 (red range)								
Differences in Bandwidth	Default antenna (Minimum gain): 20/40/80MHz ----- Optional antenna: None	Default antenna (Minimum gain): Same as left side list. ----- Optional antenna: Please see Table 3 (red range)								
Software security required for new application – Are the GUIs the same?	Default antenna (Minimum gain): GUI Disabled (See Table 4) -----	Default antenna (Minimum gain): GUI Enabled and selectable (See Table 5) -----								

	Optional antenna: None	Optional antenna: Selectable (See Table 6, Table 7)
Differences between the products such as TX power, modulation, receivers, processing circuitry, etc.	Default antenna (Minimum gain): Support default antenna TX power ----- Optional antenna: None	Default antenna (Minimum gain): Same as left side list. ----- Optional antenna: Add new TX power for three new antennas.
Names of the test labs for various Grants	Only one test Lab (BV-ADT) (Bureau Veritas Consumer Products Services(H.K.) Ltd., Taoyuan Branch)	Only one test Lab (BV-ADT) (Bureau Veritas Consumer Products Services(H.K.) Ltd., Taoyuan Branch)

Table 2 Channel list difference between the firmware

Red region shows new added antenna in new firmware.

Country	Antenna (5G)	Antenna gain	CH36-CH48	CH52-CH64	CH100-CH140 (Note 1)	CH149-CH165
US	Default	7 dBi	☒	☒	☒	☒
	AT-AN2458-10DP	10 dBi	☒	☒	☒	☒
	AT-AN5158-16DP	16 dBi	☒	☒	☒	☒
	AT-AN5158-19DP	19 dBi	☐	☒	☒	☒

Note 1: Channel 120~CH128 are disabled in TQ4400e.

Table 3 Bandwidth difference between the firmware

Red region shows new added antenna in new firmware.

Country	Antenna (5G)	Antenna gain	20MHz	40MHz	80MHz
US	Default	7 dBi	☒	☒	☒
	AT-AN2458-10DP	10 dBi	☒	☒	☒
	AT-AN5158-16DP	16 dBi	☒	☒	☒
	AT-AN5158-19DP	19 dBi	☒	☒	☐

Table 4 Default Antenna Configuration in Old firmware

Antenna Model Selection in GUI is disabled.

Radio	GUI
2.4G/5G	Antenna Model Selection Default

Table 5 Default Antenna Configuration in New firmware

Antenna Model Selection in GUI is enabled and selectable.

Cable loss item is disabled automatically if users select default antenna.

Radio	GUI
2.4G/5G	Antenna Model Selection Default ▼ Cable Loss 0

Table 6 Optional Antenna Selection in New firmware

The radio of 2.4G GUI supports two antennas.

The radio of 5G GUI supports three antennas.

Radio	GUI
2.4G	Antenna Model Selection Default ▼ Default AT-AN2458-10DP
5G	Antenna Model Selection Default ▼ Default AT-AN2458-10DP AT-AN5158-16DP AT-AN5158-19DP

Table 7 Cable Loss Setting of Optional antenna in New firmware

Antenna Model	Antenna Gain	GUI
Default (default antenna)	2.4G: 5dBi 5G: 7dBi	Antenna Model Selection Default ▼ Cable Loss 0
AT-AN2458-10DB (Optional antenna)	2.4G: 8dBi 5G: 10dBi	Antenna Model Selection AT-AN2458-10DP ▼ Cable Loss 0 x 0.5dB (Range: 0-12)
AT-AN5158-16DB (Optional antenna)	5G: 16dBi	Antenna Model Selection AT-AN5158-16DP ▼ Cable Loss 0 x 0.5dB (Range: 0-12)
AT-AN5158-19DB (Optional antenna)	5G: 19dBi	Antenna Model Selection AT-AN5158-19DP ▼ Cable Loss 0 x 0.5dB (Range: 0-18)

Appendix: Antenna/cable Specification

Item	Detail Specification							
Default Antenna	Item #	Model Number	Description	Band	Type	Gain	Connector	Supplier's model name
	Default Antenna							
	0	Dipole antenna	Outdoor 2.4GHz dipole	2.4GHz	Dipole	5dBi	N type	N/A
Optional Antenna	0	Dipole antenna	Outdoor 5GHz dipole	5GHz	Dipole	7dBi	N type	N/A
	Item #	Model Number	Description	Band	Type	Gain	Connector	Supplier's model name
	Optional Antenna							
	1	AT-AN2458-10DP	2.4/5GHz, 10dBi gain, dual polarity, panel antenna	2.4/5GHz	Panel	8-10dBi	N type, 2 feed	HG2458-10DP
Cable	2	AT-AN5158-16DP	5GHz, 16dBi gain, dual polarity, 120° sector antenna	5GHz	Sector	16dBi	N type, 2 feed	HG5158-16DP-120
	3	AT-AN5158-19DP	5GHz, 19dBi gain, dual polarity, panel antenna	5GHz	Panel	19dBi	N type, 2 feed	HG4958-19DP
	Optional Cable							
	Item #	Model Number	Description	Cable Dia.	Length	Supplier's model name		
	1	AT-AN0001	RF coax cable, 1.2m, N-male to N-male connector	0.240 in. (6.1mm)	4.0ft (1.2m)	CA-NMNMT004		
	2	AT-AN0002	RF coax cable, 3.0m, N-male to N-male connector	0.405 in. (10.3mm)	10.0ft (3.0m)	CA3N010		
	3	AT-AN0003	RF coax cable, 6.1m, N-male to N-male connector	0.405 in. (10.3mm)	20.0ft (6.1m)	CA3N020		