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FCC

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FCC ID: X7CAP8120
Correspondence Reference Number: 40391
Form 731 Confirmation Number: EA455903

Attention: Jyun-Cheng Chen

Please find our responses to your comments on this application below:

1. A major change in this C2P2 application is "removing the integral antenna and using it externally and the addition of a new, higher gain, panel antenna." (C2PC Request Letter) Therefore, we expect to see two external antenna specifications for this Part 15 equipment. Converting an internal integral antenna to an external design typically would result in different RF characteristics. We do not infer antenna properties from photos. Please explain in the antenna technical document why the RF characteristics remain identical to the previous integral version (9/16 Response Letter)?

> Response: Antenna characteristics (gain, pattern, VSWR) for commercially available, detachable antennas are almost always determined independent of a radio device. The antenna manufacturers develop the antennas for use with many different radio devices.
>
> In this particular case, the Tyco antenna was mounted outside of the metal enclosure with cabling entering the enclosure to connect to the RF output on the internal radio modules for the “internal antenna configuration”.
>
> The external antenna version used longer cabling to connect to the RF ports located on the side of the metal enclosure, with additional cabling going from the RF ports to the RF outputs on the radio modules. As the cable loss of this configuration is higher than the internal antenna configuration, using the antenna gain values used in the internal configuration represented the worse case condition for the Tyco antenna.

2. The three photos provided for the TYCO antenna in the exhibit actually show two conflicting designs. The first two photos indicate that the antenna PCB is located inside a separate plastic housing while the last photo suggests attachment to the transmitter body with three mounting poles, an antenna reflector (?), and different type/length of RF cables. Please include in their respective technical descriptions internal and external photos of both antennas.

> Response: I am not sure which specific exhibit you are describing. For the exhibit titled “Tyco Antenna.pdf”, the photo on page 1 shows the Tyco antenna in its protective (plastic) enclosure. Page 2 of the same document, shows the antenna with the enclosure lid removed, making the actual antenna system visible. The photograph on page 3 shows the antenna pulled slightly out from the enclosure.
>
> The antenna is mounted to the enclosure via the 3 metal standoffs. The standoffs are not electrically connected to the PCB (mounting holes are not plated).

The RF cables are soldered to the bottom of the PCB, and then routed thru the strain reliefs on the enclosure.

There is a plastic mechanical stiffening piece (yellowish square) located on the inside. This is to provide support when the antenna enclosure is mounted.

3. Why the MIMO gain for the Laird antenna is calculated using only two elements instead of all 3 elements (Antenna Gain Summary)?

Response: The radio is a 2x2 radio, only two chains at any one time are transmitting. The third element is for receive.

4. The Laird antenna and the TYCO antenna are of different types. Data for both antennas should be presented in the EMC report. Currently, the EUT's conducted, radiated and DFS performance are all done with just one antenna type. Please explain or amend reports. Including, instead of quoting, any applicable reports from previous applications since there have been several previous C2PC filings.

Response: As the Tyco antenna is the same antenna as was approved in the original certification, and has had additional cable loss (see response #1 above), no RF testing was performed on the Tyco. This antenna was used for DFS testing. This is noted on page 11 of R82355_IC_FCC.pdf exhibit.

5. Based on the design, it appears that two Laird antennas can be connected to the EUT having two 802.11a/b/g/n modules. How would two Laird antennas affect the MIMO gain, the maximum conducted power, and MPE calculation?

Response: The two modules are restricted in their operation. One is configured to only operate in the 2.4GHz band; the other is configured to operate in the 5GHz band, see page 11 of R82355_IC_FCC.pdf exhibit. The MPE calculation includes the worse case condition of one 2.4GHz and one 5GHz operation using the Laird antenna.

6. 5150-5250 MHz is limited to indoor use only. Please explain how the applicant plans to comply to this rule with external antenna designs, given that the same product has an integral antenna version? In other words, why does the applicant believe that the indoor warning statement on Page 7 of the manual would be effective?

Response: Avaya has decided to require professional installation for the external antenna version of the device. Avaya has placed additional warning statements about indoor use in various informative guides (Installation Guide, Planning and Engineering Guide, and Quickstart Guide).

Revised Regulatory Guides have been provided.

7. The Laird external antenna S24517PT, according to the product specification published on the Laird company web page, meets IP-67 standard, operates at -30 degree, VU-resistant housing, and wall/mask mounting ready – all characteristics of outdoor applications. Please justify the selection of this antenna for an indoor deployment only product. Please also explain the discrepancy in antenna gains between the submitted exhibit and those on the Laird company product specification.

Response: Avaya does intend to provide an outdoor version of the AP8120 in the future and felt that adding the antenna to the current version would help that future project. Avaya is now requiring professional installation for the external antenna version of the device.

Regarding the antenna gain differences – uploaded is an email exchange between Avaya and Laird explaining the that data sheet did not include correction for the 36" RF pigtail that the Avaya version of the Laird antenna is using.

8. Per Part 15.407(a), for transmitting antenna directional gain greater than 6 dBi, both the maximum conducted power and the peak power spectral density shall be reduced by the amount in dB that the directional gain exceeds 6 dBi. If this equipment does not require professional installation (9/16 response), how does the power backoff rule be followed? Are there two packaging options with different power settings and antenna available for order and shipment? If not, what is the default power and default antenna? What if the customer order antenna separately and what mechanism exists preventing users from connecting one or two Laird antennas to the AP with higher power settings?

Response: The power calculations take into account the effective antenna gain greater than 6dBi. Refer to page 36 of R82355_IC_FCC.pdf exhibit. Notice that the power limit for the 5250-5350 MHz band has been reduced to 21.3dBm (24dBm – 2.66, antenna gain is 8.66dBi).

The professional installer will have the ability to select power settings depending on which antenna is being used.

9. Please explain why MPE calculation was based on two channel operation, one 2.4 GHz and one 5 GHz (Page 2 MPE report). Why 3 or more channel cases are not considered? The first example on Page 3 of the MPE report actually shows 3 channels.

Response: The MPE was based on two channel operation, as this is the most that the system is capable of doing. The table on page 3 showing 3 channel operation is a mistake and has been updated. See revised MPE calculation. Note, the revision does not change the worse case condition or final separation distance calculations.

10. With increased functionalities resulting from 3 stepped C2PC applications, regulatory compliance becomes a concern. Please provide description of hardware and/or software designs or business practices which prevent/minimize unauthorized selection or modification of country code, channel pool, transmit power, and the use of 5600-5650 MHz.

Response: Country code, channel pool, and non-use of the 5600-5650 MHz band are set (programmed into the firmware) at the factory prior to shipping. Neither the professional installer nor an end user will have the ability to change these settings. The professional installer will have the ability to change transmit power based on external antenna being used.

11. Per Part 15.203 and 15.204(c)(3), Chapter 2 of the Regulatory Information is applicable to FCC as well, not just Industry Canada.

Response: 15.203 – as noted on page 11, the external antenna configuration uses reverse SMA connectors. These connectors have been accepted in the past by the FCC as sufficient for compliance with 15.203.

15.204(c)(3) – This rule part does not specify that the list of antennas be included in the user's manual. It states…"Manufacturer's shall supply a list of acceptable antenna types with the application for equipment authorization of the intentional radiator." This list is provide on page 11 of the test report.

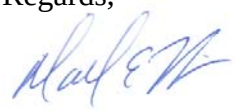
12. Why is Korean Class B statement (Page 6, Regulatory Information) embedded in FCC sections?

Response: I do not know why Avaya has structure the document in this manner. Avaya has been made aware. Since there is nothing in the FCC rules the prohibit such a structure, they intend to leave it as is at this time.

13. The 24.9 cm should be a typo on Page 6 (RF Radiation) of the Regulatory Information. The number concluded in the MPE report is 22.2 cm.

Response: Avaya would like to leave the 24.9cm separation distance. As this distance is greater than the MPE calculation, this represents a greater safety margin.

Regards,



Mark Hill
Staff Engineer

Uploaded Documents:
Regulatory Guides
Antenna email thread