



## RF Exposure Evaluation Declaration

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**FCC ID:** 2AHVQ-BNET101

**Applicant:** Barracuda Networks, Inc.

**Product:** Barracuda NextGen Firewall

**Model No.:** BNHW030

**Brand Name:** Barracuda

**FCC Classification:** Digital Transmission System (DTS)  
Unlicensed National Information Infrastructure (NII)

**FCC Rule Part(s):** FCC Part 2.1091

**Result:** Complies

**Reviewed By:**

*Jame Yuan*

Jame Yuan

**Approved By:**

*Robin Wu*

Robin Wu



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 2206RSU070-U4 | Rev. 01 | Initial Report | 07-22-2022 | Valid |
|               |         |                |            |       |

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## 1. General Information

### 1.1. Applicant

Barracuda Networks, Inc.

5225 Hellyer Ave. Suite 150, San Jose, California 95138, United States

## 1.2. Manufacturer

Barracuda Networks, Inc.

5225 Hellyer Ave. Suite 150, San Jose, California 95138, United States

### 1.3. Testing Facility

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <b>Test Site – MRT Suzhou Laboratory</b><br><b>Laboratory Location (Suzhou - Wuzhong)</b><br>D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China<br><b>Laboratory Location (Suzhou - SIP)</b><br>4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China<br><b>Laboratory Accreditations</b><br><div style="display: flex; justify-content: space-between;"> <span>A2LA: 3628.01</span> <span>CNAS: L10551</span> </div> <div style="display: flex; justify-content: space-between;"> <span>FCC: CN1166</span> <span>ISED: CN0001</span> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div>VCCI:</div> <input type="checkbox"/>R-20025     <input type="checkbox"/>G-20034     <input type="checkbox"/>C-20020     <input type="checkbox"/>T-20020<br/> <input type="checkbox"/>R-20141     <input type="checkbox"/>G-20134     <input type="checkbox"/>C-20103     <input type="checkbox"/>T-20104 </div> |
| <input type="checkbox"/>            | <b>Test Site – MRT Shenzhen Laboratory</b><br><b>Laboratory Location (Shenzhen)</b><br>1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen,<br>China<br><b>Laboratory Accreditations</b><br><div style="display: flex; justify-content: space-between;"> <span>A2LA: 3628.02</span> <span>CNAS: L10551</span> </div> <div style="display: flex; justify-content: space-between;"> <span>FCC: CN1284</span> <span>ISED: CN0105</span> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <input type="checkbox"/>            | <b>Test Site – MRT Taiwan Laboratory</b><br><b>Laboratory Location (Taiwan)</b><br>No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)<br><b>Laboratory Accreditations</b><br><div style="display: flex; justify-content: space-between;"> <span>TAF: L3261-190725</span> </div> <div style="display: flex; justify-content: space-between;"> <span>FCC: 291082, TW3261</span> <span>ISED: TW3261</span> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

#### 1.4. Product Information

|                                                                                                                                                                     |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Product Name                                                                                                                                                        | Barracuda NextGen Firewall           |
| Model No.                                                                                                                                                           | BNHW030                              |
| EUT Identification No.                                                                                                                                              | 20220627Sample#12, 20220705Sample#01 |
| Wi-Fi Specification                                                                                                                                                 | 802.11a/b/g/n/ac                     |
| Built-in Module Specification                                                                                                                                       | WCDMA/LTE (FCC ID: RI7LM960)         |
| Antenna Information                                                                                                                                                 | Refer to section 1.5                 |
| Working Voltage                                                                                                                                                     | AC/DC Adapter or PoE Adapter         |
| <p>Remark:</p> <p>The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.</p> |                                      |

#### 1.5. Antenna Details

##### Wi-Fi

| Antenna Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Frequency Band (MHz) | Tx Paths | Max Antenna Gain (dBi) | CDD Directional Gain (dBi) |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|------------------------|----------------------------|---------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                      |          |                        | For Power                  | For PSD |
| Dipole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2400 ~ 2483.5        | 2        | 2.0                    | 2.0                        | 5.01    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5150 ~ 5850          | 2        | 2.0                    | 2.0                        | 5.01    |
| <p>Note: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.</p> <p>For CDD transmissions, directional gain is calculated as follows, <math>N_{ANT} = 2</math>, <math>N_{SS} = 1</math>.</p> <p>If all antennas have the same gain, <math>G_{ANT}</math>, Directional gain = <math>G_{ANT} + \text{Array Gain}</math>, where Array Gain is as follows.</p> <ul style="list-style-type: none"> <li>For power spectral density (PSD) measurements on all devices,<br/> <math>\text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01</math>;</li> <li>For power measurements on IEEE 802.11 devices,<br/> <math>\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4</math>;</li> </ul> |                      |          |                        |                            |         |

##### WCDMA/LTE

| Part No.          | Antenna Type | Frequency Band (MHz) | Max Antenna Gain (dBi) |
|-------------------|--------------|----------------------|------------------------|
| 1M, MA-29-12      | Dipole       | Less 1000            | 2.0                    |
|                   |              | Above 1000           | 2.0                    |
| 3M, C108P300E0216 | Dipole       | Less 1000            | 1.5                    |
|                   |              | Above 1000           | 2.0                    |

### **1.6. Applied Standards**

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01

## 2. RF Exposure Evaluation

### 2.1. Test Limits

According to FCC §1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

| Frequency Range<br>(MHz)                                  | Electric Field<br>Strength (V/m) | Magnetic Field<br>Strength (A/m) | Power Density<br>(mW/cm <sup>2</sup> ) | Average Time<br>(Minutes) |
|-----------------------------------------------------------|----------------------------------|----------------------------------|----------------------------------------|---------------------------|
| (A) Limits for Occupational/ Control Exposures            |                                  |                                  |                                        |                           |
| 0.3-3.0                                                   | 614                              | 1.63                             | *(100)                                 | ≤6                        |
| 3.0-30                                                    | 1842/f                           | 4.89/f                           | *(900/f <sup>2</sup> )                 | <6                        |
| 30-300                                                    | 61.4                             | 0.163                            | 1.0                                    | <6                        |
| 300-1,500                                                 | --                               | --                               | f/300                                  | <6                        |
| 1,500-100,000                                             | --                               | --                               | 5                                      | <6                        |
| (B) Limits for General Population/ Uncontrolled Exposures |                                  |                                  |                                        |                           |
| 0.3-1.34                                                  | 614                              | 1.63                             | *(100)                                 | <30                       |
| 1.34-30                                                   | 824/f                            | 2.19/f                           | *(180/f <sup>2</sup> )                 | <30                       |
| 30-300                                                    | 27.5                             | 0.073                            | 0.2                                    | <30                       |
| 300-1,500                                                 | --                               | --                               | f/1500                                 | <30                       |
| 1,500-100,000                                             | --                               | --                               | 1.0                                    | <30                       |

f= frequency in MHz. \* = Plane-wave equivalent power density.

## 2.1. MPE Exemptions

**For single RF sources** (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

**(Option A)** The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

**(Option B)** Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold  $P$  (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P$  is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

$d$  = the separation distance (cm);

**(Option C)** Or using Table 1 and the minimum separation distance ( $R$  in meters) from the body of a nearby person for the frequency ( $f$  in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply,  $R$  must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical

dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

| RF Source Frequency (MHz) | Threshold ERP (watts) |
|---------------------------|-----------------------|
| 0.3-1.34                  | $1920R^2$             |
| 1.34-30                   | $3450R^2/f^2$         |
| 30-300                    | $3.83R^2$             |
| 300-1,500                 | $0.0128R^2f$          |
| 1,500-100,000             | $19.2R^2$             |

**For multiple RF sources:** Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

**a** = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

**b** = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

**c** = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum

distance including existing evaluated transmitters.

$P_i$  = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source  $i$  at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$  = the exemption threshold power ( $P_{th}$ ) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source  $i$ .

$ERP_j$  = the ERP of fixed, mobile, or portable RF source  $j$ .

$ERP_{th,j}$  = exemption threshold ERP for fixed, mobile, or portable RF source  $j$ , at a distance of at least  $\lambda/2\pi$  according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section.

**Evaluated<sub>k</sub>** = the maximum reported SAR or MPE of fixed, mobile, or portable RF source  $k$  either in the device or at the transmitter site from an existing evaluation at the location of exposure.

**Exposure Limit<sub>k</sub>** = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source  $k$ , as applicable from §1.1310 of this chapter.

## 2.2. Calculated Result

|           |                            |
|-----------|----------------------------|
| Product   | Barracuda NextGen Firewall |
| Test Item | RF Exposure Evaluation     |

| Test Mode       | Frequency Band (MHz)                        | Turn-up Conducted Power (dBm) | Antenna Gain (dBi) | Max ERP (dBm) |
|-----------------|---------------------------------------------|-------------------------------|--------------------|---------------|
| 802.11b/g/n/ax  | 2412 ~ 2462                                 | 20.0                          | 2.0                | 19.85         |
| 802.11a/n/ac/ax | 5180 ~ 5320,<br>5500 ~ 5720,<br>5745 ~ 5825 | 16.0                          | 2.0                | 15.85         |
| LTE Band 2      | 1850 ~ 1910                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 4      | 1710 ~ 1755                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 5      | 824 ~ 849                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 7      | 2500 ~ 2570                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 12     | 699 ~ 716                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 13     | 777 ~ 787                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 14     | 788 ~ 798                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 17     | 704 ~ 716                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 18     | 815 ~ 830                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 19     | 830 ~ 845                                   | 24.50                         | 2.0                | 24.35         |
| LTE Band 25     | 1850 ~ 1915                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 26     | 814~849                                     | 24.50                         | 2.0                | 24.35         |
| LTE Band 30     | 2305 ~ 2315                                 | 22.00                         | 2.0                | 21.85         |
| LTE Band 38     | 2570 ~ 2620                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 41     | 2496 ~ 2690                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 66     | 1710 ~ 1780                                 | 24.50                         | 2.0                | 24.35         |
| LTE Band 71     | 663 ~ 698                                   | 24.50                         | 2.0                | 24.35         |
| WCDMA Band 2    | 1850 ~ 1910                                 | 24.00                         | 2.0                | 23.85         |
| WCDMA Band 4    | 1710 ~ 1755                                 | 24.00                         | 2.0                | 23.85         |
| WCDMA Band 5    | 824 ~ 849                                   | 24.00                         | 2.0                | 23.85         |

Remark:

1. The Max Conducted power was extracted from the Modular tune-up power.
2. The Max ERP (dBm) = Max Conducted Total Power (dBm) + Antenna Gain (dBi) - 2.15.
3. Tune-up power was declared by manufacturer.

### For single RF source, Option C

| Test Mode    | Frequency Band (MHz)                        | $\lambda / 2 \pi$ (m) | R (m) | Max ERP (W) | Threshold ERP (W) |
|--------------|---------------------------------------------|-----------------------|-------|-------------|-------------------|
| Wi-Fi 2.4GHz | 2412 ~ 2462                                 | 0.0198                | 0.20  | 0.0966      | 0.7680            |
| Wi-Fi 5GHz   | 5180 ~ 5320,<br>5500 ~ 5720,<br>5745 ~ 5825 | 0.0092                | 0.20  | 0.0385      | 0.7680            |
| LTE Band 2   | 1850 ~ 1910                                 | 0.0258                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 4   | 1710 ~ 1755                                 | 0.0279                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 5   | 824 ~ 849                                   | 0.0579                | 0.20  | 0.2723      | 0.4219            |
| LTE Band 7   | 2500 ~ 2570                                 | 0.0191                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 12  | 699 ~ 716                                   | 0.0683                | 0.20  | 0.2723      | 0.3579            |
| LTE Band 13  | 777 ~ 787                                   | 0.0614                | 0.20  | 0.2723      | 0.3978            |
| LTE Band 14  | 788 ~ 798                                   | 0.0606                | 0.20  | 0.2723      | 0.4035            |
| LTE Band 17  | 704 ~ 716                                   | 0.0678                | 0.20  | 0.2723      | 0.3604            |
| LTE Band 18  | 815 ~ 830                                   | 0.0586                | 0.20  | 0.2723      | 0.4173            |
| LTE Band 19  | 830 ~ 845                                   | 0.0575                | 0.20  | 0.2723      | 0.4250            |
| LTE Band 25  | 1850 ~ 1915                                 | 0.0258                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 26  | 814 ~ 849                                   | 0.0587                | 0.20  | 0.2723      | 0.4168            |
| LTE Band 30  | 2305 ~ 2315                                 | 0.0207                | 0.20  | 0.1531      | 0.7680            |
| LTE Band 38  | 2570 ~ 2620                                 | 0.0186                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 41  | 2496 ~ 2690                                 | 0.0191                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 66  | 1710 ~ 1780                                 | 0.0279                | 0.20  | 0.2723      | 0.7680            |
| LTE Band 71  | 663 ~ 698                                   | 0.0720                | 0.20  | 0.2723      | 0.3395            |
| WCDMA Band 2 | 1850 ~ 1910                                 | 0.0258                | 0.20  | 0.2427      | 0.7680            |
| WCDMA Band 4 | 1710 ~ 1755                                 | 0.0279                | 0.20  | 0.2427      | 0.7680            |
| WCDMA Band 5 | 824 ~ 849                                   | 0.0579                | 0.20  | 0.2427      | 0.7680            |

Remark: R is from user manual.

### For multiple RF sources

The EUT supports Wi-Fi + LTE or WCDMA simultaneous transmissions.

So the Max Simultaneous Transmission =  $0.0966/0.7680 + 0.2723/0.3395 = 0.93 < 1$

Therefore, the device qualifies for RF exposure test exemption.

The End