



# RF Exposure Evaluation Declaration

For

**Product Name : 802.11n Wireless ADSL2+ 4-port Gateway**

**MODEL: P-660HN-T1A , P-660HN-T3A**

**Trade Name: ZyXEL**

**FCC ID: I88P660HNT1A**

**Report No.: KS100623B03-RP**

**Issued to**

**ZyXEL Communications Corporation**

**No. 6, Innovation Rd.II Science Based Industrial  
Park,Hsin-Chu,Taiwan**

**Prepared by**

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**Issued Date: July 16, 2010**



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## Test Report Certification

<b>Product name:</b>	802.11n Wireless ADSL2+ 4-port Gateway
<b>Model Number:</b>	P-660HN-T1A, P-660HN-T3A
<b>Model discrepancy:</b>	They are identical product except for their differential market
<b>Trade Name:</b>	ZyXEL
<b>FCC ID:</b>	I88P660HNT1A
<b>Device Category:</b>	Production unit
<b>Date of Receipt:</b>	June 23, 2010~July 16, 2010
<b>Applicant:</b>	ZyXEL Communications Corporation No. 6, Innovation Rd.II Science Based Industrial Park,Hsin-Chu,Taiwan
<b>Manufacturer:</b>	ZyXEL Communications (WuXi) CO., Ltd Wuxi 60#-E,Minshan Road,New District,Wuxi Jiangsu, PRC
<b>Applicable Standard</b>	FCC OET 65
<b>Test Result</b>	Complied
<b>Performed Location</b>	<b>KunShan Laboratory</b> No.10 Weiye Rd., Innovation park, Eco&Tec, Development Zone, KunShan City, Jiangsu, China. TEL: +86-512-5735-5888 / FAX: +86-512-5737-0818 FCC Registration Number: 238958

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## 1. FACILITIES AND ACCREDITATIONS

### 1.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

**No.10 Weiye Rd., Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.**

The sites are constructed in conformance with the requirements of ANSI C63.4:2003 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 1.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	A2LA, FCC
<b>Japan</b>	VCCI
<b>Canada</b>	INDUSTRY CANADA,
<b>Taiwan</b>	TAF
<b>China</b>	CNAS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>Canada</b>	Industry Canada
<b>Japan</b>	VCCI
<b>Taiwan</b>	BSMI
<b>USA</b>	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>



## 2. RF EXPOSURE EVALUATION

### 2.1. 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 (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
<b>(A) Limits for Occupational/ Control Exposures</b>				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
<b>(B) Limits for General Population/ Uncontrolled Exposures</b>				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

#### Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where  $E$  = Field strength in Volts / meter

$P$  = Power in Watts

$G$  = Numeric antenna gain

$d$  = distance between observation point and center of the radiator in cm

$S$  = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

Where  $d$  = Distance in cm

$P$  = Power in mW

$G$  = Numeric antenna gain

$S$  = Power density in mW / cm<sup>2</sup>



## 2.2. EUT SPECIFICATION

<b>EUT</b>	802.11n Wireless ADSL2+ Gateway
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure ( $S = 5\text{mW}/\text{cm}^2$ ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ( $S=1\text{mW}/\text{cm}^2$ )
<b>Antenna diversity</b>	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	IEEE 802.11b mode: 15.70dBm(37.2mW) IEEE 802.11g mode: 14.21dBm(26.4mW) IEEE 802.11gn Standard-20 MHz Channel mode: 14.20 dBm (26.3mW) IEEE 802.11gn Wide-40 MHz Channel mode: 14.33 dBm (27.1mw)
<b>Antenna gain (Max)</b>	Gain 3.5dBi(2.24)(2.4GHz)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

**Remark:**

1. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
2. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.



## 2.3. TEST RESULT OF RF EXPOSURE EVALUATION

### Antenna Gain:

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.5dBi or 2.24 in Numeric Antenna gain.

### Output Power into Antenna & RF Exposure Evaluation Distance:

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (mW)	Power Density at d = 20 cm (mW/cm <sup>2</sup> )
IEEE 802.11b	2.412GHz ~ 2.462	37.20	0.0166
IEEE 802.11g	2.412GHz ~ 2.462	26.40	0.0118
IEEE 802.11gn (20MHz)	2.412GHz ~ 2.462	26.30	0.0117
IEEE 802.11gn (40MHz)	2.422GHz ~ 2.452	27.10	0.0121

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.)