



3.5 GHz Spectrum Survey for 7919 Silverton Ave, San Diego 92126-6340

3-25-2008

ABSTRACT

The following report summarizes the findings of a 3.4 GHz to 3.6 GHz spectral survey conducted at the Nextwave Broadband, Inc. Miramar facility in San Diego, CA.

60 MHz of spectrum has been identified as clear of any other usage, allowing ample guard band for those that do appear to occupy some channels within the span.

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1 Omni Directional Testing

The first stage of the spectrum survey was to erect a 3.5 Hz Omni directional antenna atop the Miramar Silverton Avenue facility, and take measurements over a five day period. The antenna is specified at 11 dBi gain with a 9 degree vertical beam width, vertical polarization from 3.4 GHz to 3.7 GHz.

1.1 Test Setup

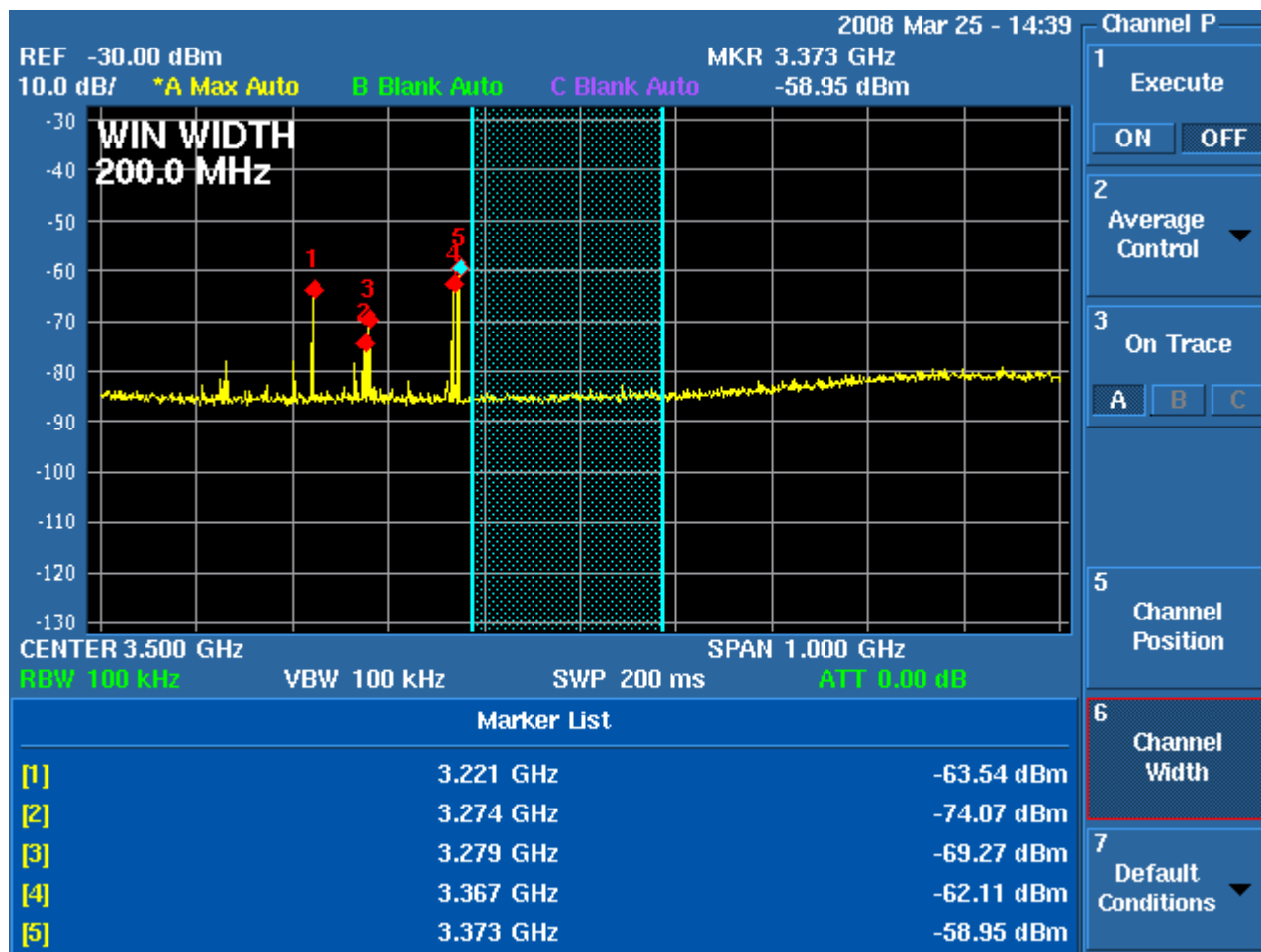
The antenna was mounted to a four meter pole on the roof of the building, and 10 meters above the ground with a clear unobstructed view in the direction of all proposed testing.

See Appendix A for antenna specifications. All spectrum analyzer screen captures were taken using an Advantest U3751 Spectrum Analyzer.



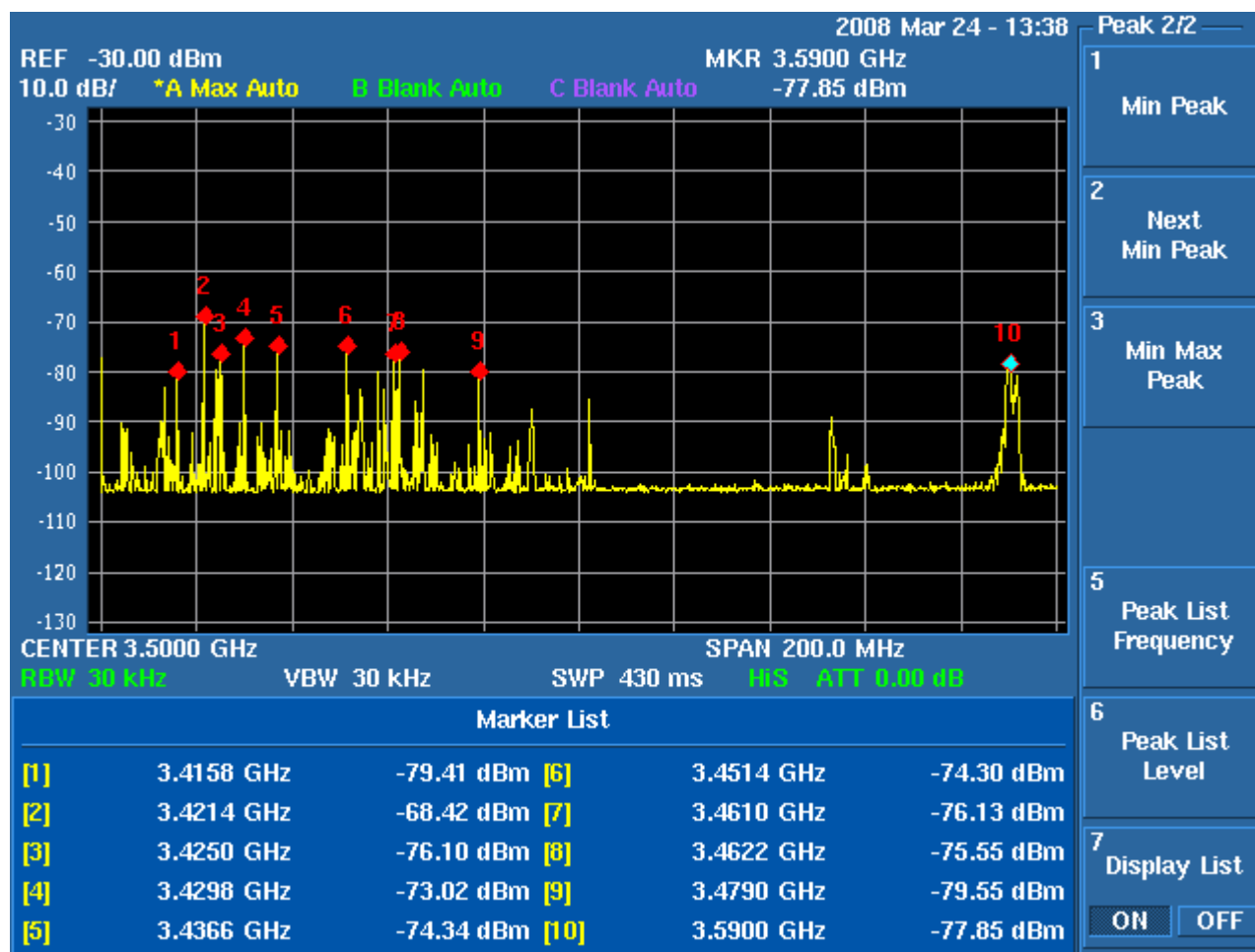
1.2 Wideband Analysis

The following screen capture illustrates the all signals captured in a span of 1 GHz centered on 3.5 GHz. The shaded area spans 3.4 GHz to 3.6 Hz and appears clear of usage.



1.3 72 Hour Max-Hold Analysis

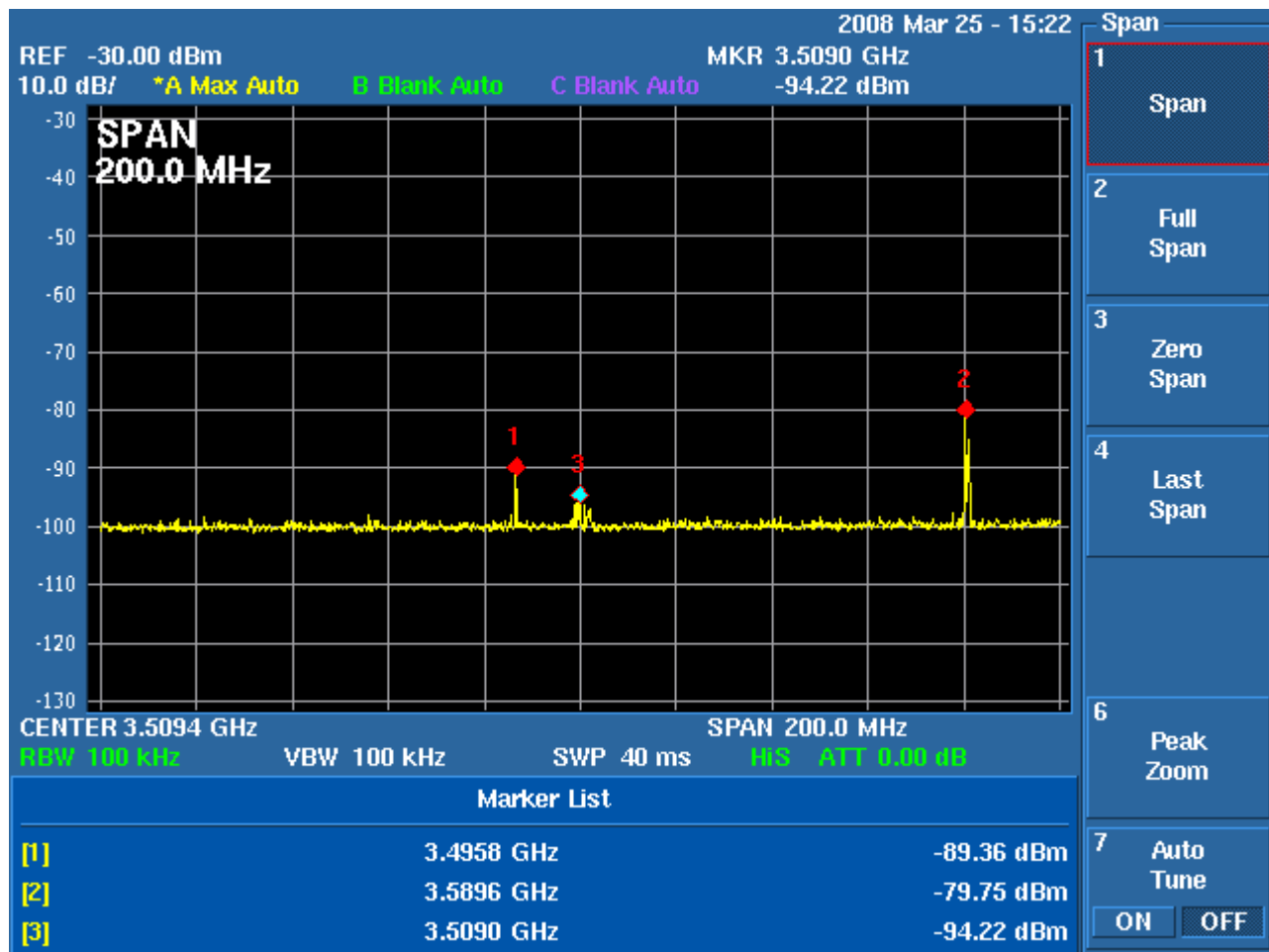
The following screen shows all peaks captured over a 72 hour period from March 21st at 3:30pm to March 24th, 2008 at 3:30pm. Note that zero dB input attenuation and High-Sensitivity (LNA) were used for the measurement. Due to the extreme sensitivity (high gain) of the test setup it is not clear whether some of the transient signals were generated by analyzer overload. However, no signals occurred in the quadrant just right of center of the span.



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1.4 Three Hour Mid-Day Max Hold Measurement

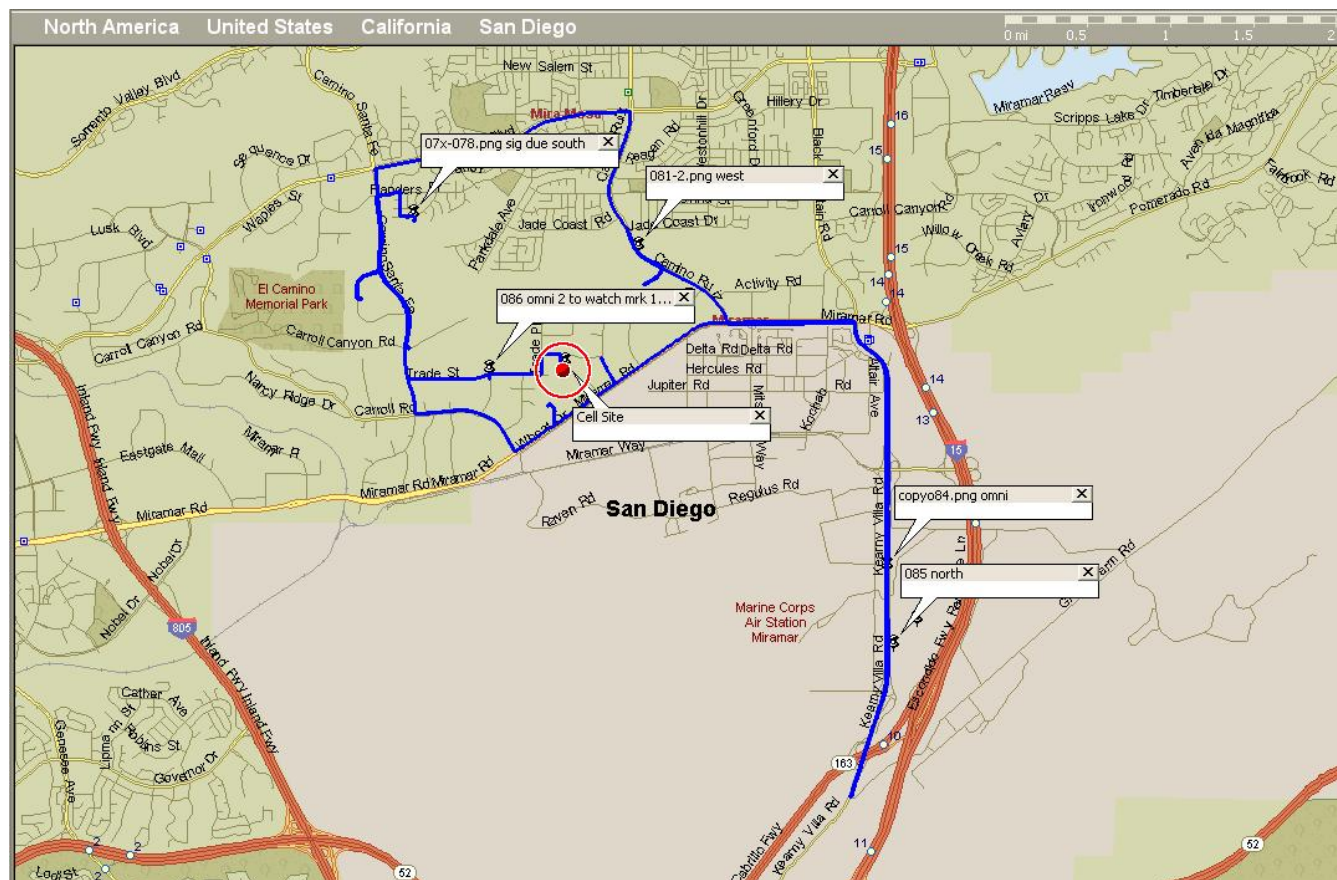
The following max hold measurement was taken on March 25th, 2008 from 1pm to 4pm in the afternoon. Note that the signal spikes in roughly the lower half of the span did not materialize. However, three distinct signals did appear with some consistency. They are periodic signals rather than continuous.



2 Mobile Testing with a Directional Antenna

These tests were an attempt to locate signals within the 200 MHz span. A 3.5 GHz directional antenna was mounted to a plastic pole, and used to sweep through 360 degrees during the drive route of the area.

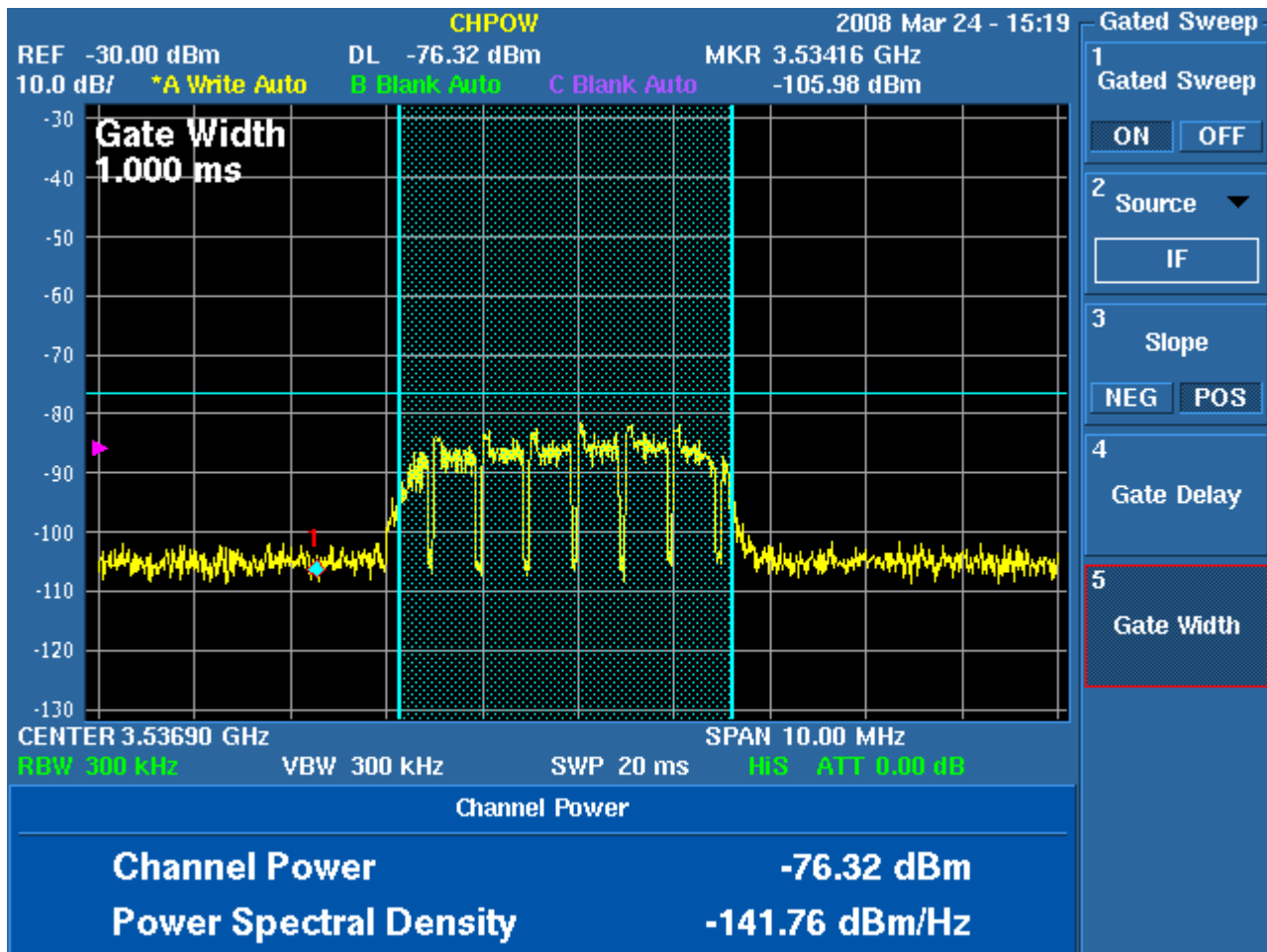
Specific spectrum “snapshots” were taken at numerous locations as illustrated in the map below (See Appendix A for antenna specifications and test setup). The route traveled is shown in blue. The proposed cell site test location is shown in red.



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2.1 3.5369 GHz Signal (3 MHz wide, 800 usec long with 50 % duty cycle)

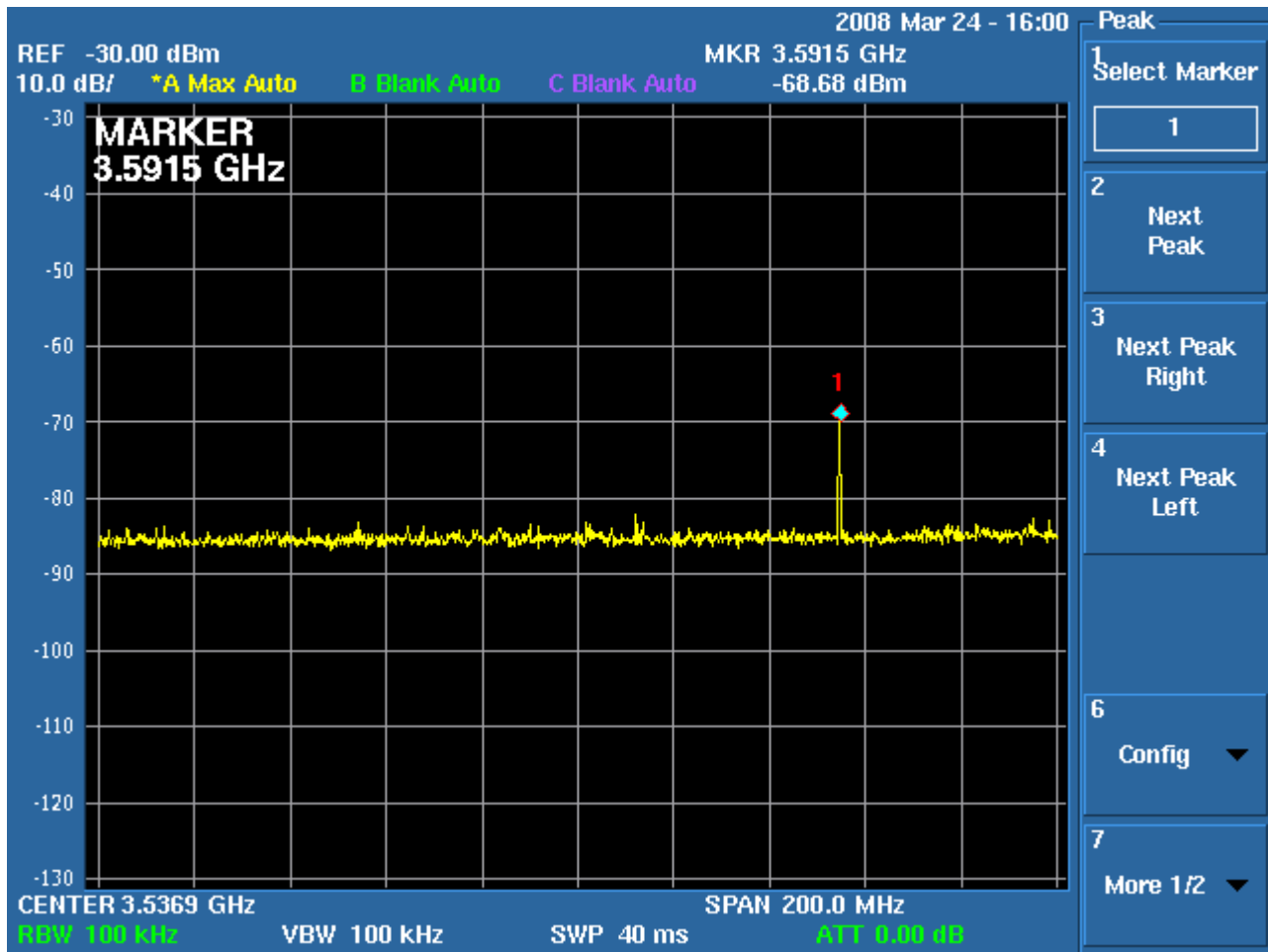
The following signal was located at a rock and gravel processing business located in a valley one half mile north west of the cell site. The periodic signal below was not visible to the cell site antenna (most likely due to its low lying valley location), but it was nonetheless discovered during the mobile test and should be avoided.



2.2 1.5.2 3.590 GHz (approx)

This signal is represented as Marker #2 from the cell site captured data in Section 1.4 of this report. From the mobile survey, it appears to be generated far to the north (as observed from the southernmost and cell site collection points).

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2.3 3.4958 GHz and 3.509 GHz Signals

The originating point of either of these signals could not be located. They are probably quite distant or “hidden” within the industrial park arena of the greater Miramar area.

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3 Conclusion

The data from this survey shows that signals from other users do reside in the 3.4 GHz to 3.6 GHz span of frequency. However, if the following rules are applied, no interference to other users should occur.

For testing purposes, all frequencies between the range of 3.505 GHz and 3.585 GHz may be used with the following exceptions:

3.500 GHz Center Frequency $\pm$ 5 MHz guard band

3.537 GHz Center Frequency $\pm$ 5 MHz guard band

Appendix A: 3.5 GHz Antenna Specifications



Innovative Solutions For Wireless Communications

3.5 GHz 11 dBi Professional Omnidirectional Antenna for 802.16e, WiMAX and Wireless LAN Systems - Model: HG3511U-PRO

Applications and Features

Applications:

- 3.5 GHz Band Applications
- Wireless LAN systems
- IEEE 802.16e Applications
- WiMAX
- Mobile WiMAX
- SOFDM
- Multipoint Applications

Features:



- Superior performance
- Heavy duty industrial grade design
- All weather operation
- DC Ground lightning protection
- Integral N-Female Connector
- Supplied with mast mounting kit
- RoHS Compliant



Description

The HyperGain® HG3511U-PRO is a professional high gain omni-directional base station WiFi antenna designed and optimized for the 3.5GHz band. Typical applications include IEEE 802.16e, WiMAX and Mobile WiMAX applications. This antenna is ideally suited for multipoint applications where long range and wide coverage is desired.

The HG3511U-PRO construction features a heavy-duty fiberglass radome for durability and aesthetics. Designed to operate in the harshest of environments, the HG3511U-PRO far exceeds other omni-directional antennas. The included mounting system features heavy-duty stainless steel mast clamps, allowing installation on masts from 1.4 inches (35 mm) up to 2.0 inches (50 mm) diameter. This antenna features an integral N-Female connector.

Specifications

Electrical Specifications

Frequency	3400-3700 MHz
Gain	11 dBi
Polarization	Vertical
Downtilt	0°
Vertical Beam Width	9°
Horizontal Beam Width	360°
Impedance	50 Ohm
Max. Input Power	150 Watts
VSWR	< 1.6:1 avg.
Lightning Protection	DC Ground



Innovative Solutions For Wireless Communications

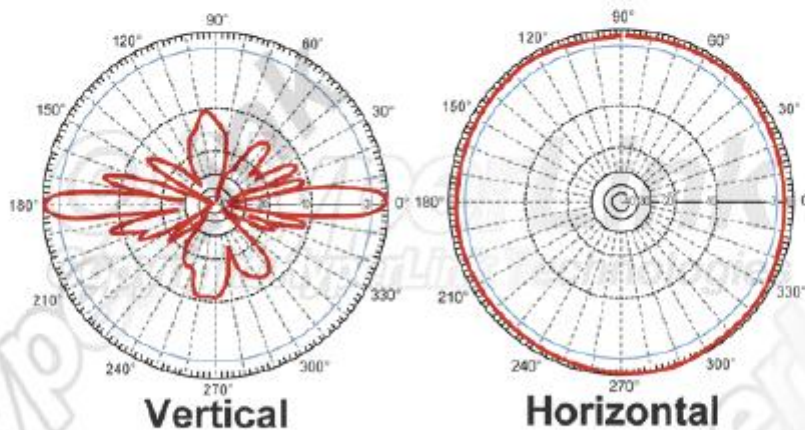
Mechanical Specifications

Weight	1.5 lbs (0.7kg)
Length	24.4 in. (0.6m)
Base Diameter	2.28 in. (57.9mm)
Radome Diameter	2.04 in. (51.8mm)
Radome Material	Fiberglass
Mounting	1.4 in. (35 mm) to 2.0 in. (50 mm) dia mast
Rated Wind Velocity	137 MPH/S (220Km/S)
Operating Temperature	-40° C to 85° C (-40° F to 185° F)
Connector	Integral N-Female
RoHS Compliant	Yes

Wind Loading Data

Wind Speed (MPH)	Loading
100	6 lb.
125	10 lb.

RF Antenna Patterns



Guaranteed Quality

This product is backed by Hyperlink's Limited Warranty.



Innovative Solutions For Wireless Communications

2.3 GHz to 6.5 GHz Ultra-Wideband (UWB) 8 dBi Radome Enclosed Log Periodic Antenna

Applications and Features

- Applications:**
- 802.11a, 802.11b, 802.11g and 802.11n access points and routers
 - 802.16 and 802.20 applications
 - WiMAX Technology
 - WiFi Systems
 - Homeland Security and Public Safety Services: Fire, Police, Security

Features:



- Ultra-Wideband design
- Ideal for use with multiband access points and routers
- Superior performance
- Compact size, low profile and easy to mount
- 9 inch coax lead



Model: HG2458-08LP

Description

Superior Performance

The HyperGain® HG2458-08LP is a high performance ultra wide band log periodic antenna designed to operate from 2.3 GHz to 6.5 GHz. This Ultra-Wideband design eliminates the need to purchase different antennas for each frequency. This simplifies installations since the same antenna can be used for a wide array of wireless applications where wide coverage is desired. The broadband characteristics of the antenna enables it to operate over a very wide frequency range with consistent gain. This antenna features 8 dBi of gain and a 60 degree beam width. This antenna is ideal for use with the following applications:

- ◊ 2.3 GHz WCS/CDMA band
- ◊ 2.4 GHz 802.11a, 802.11b, 802.11g and 802.11n
- ◊ 2.3-2.5 GHz, 2.5-2.7 GHz, 3.4-3.5 GHz and 3.3-3.9 GHz WiMAX
- ◊ 2.6 GHz MMDS, 802.16, 802.20
- ◊ 3.5 GHz 802.16e
- ◊ 4.9 GHz homeland security band
- ◊ 5.3 GHz, 5.4 GHz and 5.8 GHz 802.11a
- ◊ 5.8 GHz ISM, UNII and Mesh Networks

Rugged and Weatherproof

The internal components of this antenna are enclosed within a UV-stable white fiberglass radome for all-weather operation. It is supplied with a swivel mast mount kit.



Innovative Solutions For Wireless Communications

Specifications

Electrical Specifications

Frequency	2300-6500 MHz
Gain	8 dBi
Horizontal Beam Width	80 degrees
Vertical Beam Width	60 degrees
Impedance	50 Ohm
Max. Input Power	50 Watts
VSWR	≤1.5:1
Front to Back Ratio	≥20 dB

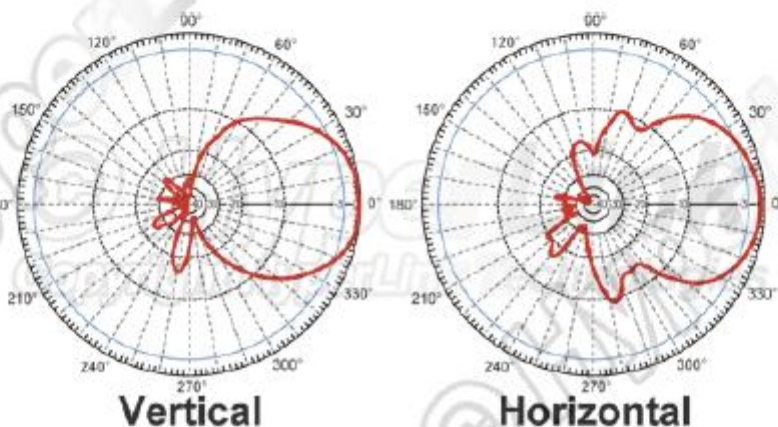
Mechanical Specifications

Weight	1.3 lbs. (.6 kg)
Dimensions L x H x W	6.3 x 3.5 x 1.3 in (162 x 90 x 33 mm)
Radome Material	UV-stable white fiberglass
Operating Temperature	-40° C to 85° C (-40° F to 185° F)
Mounting	1.5" (40 mm) to 1.9" (50 mm) dia. masts
Polarization	Vertical

Wind Loading Data

Wind Speed (MPH)	Loading
100	8.9 lb.
125	13.8 lb.

Antenna Gain Patterns



Guaranteed Quality

This product is backed by Hyperlink's Limited Warranty.