Document Number	ENG-82012
Revision	0.1
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Cisco 3.5GHz Point-to-Multipoint Broadband Wireless Alpha Trial Technical Summary

Modification History

Rev	Date	Originator	Comment
0.1	2 October, 2000	Joseph Cheung	Draft

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1. Purpose

This document summarizes the technical parameters of the Cisco 3.5GHz point-to-multipoint broadband wireless Alpha test network. The information contained in this document shall be used for application of an experimental license from the FCC.

2. Technical Details

2.1. Proposed Developmental Sites

There are two headend sites and multiple subscriber sites involved in this experimental operation. See Exhibit 2. The two headend sites are installed on buildings Cisco Systems Inc.'s San Jose campus. Multiple subscriber sites will be installed within 5-mile radius of each headend site and in the coverage area provided by the headend antennas (see Exhibit 2). Up to 10 subscriber sites are deployed for this developmental operation. Table 4 shows a list of headend and subscriber site locations.

2.2. Proposed Operating Parameters

Exhibit 1 is a summary of the operating parameters of the headend sites. The headend sites are deployed in Cisco Building 14 (3625 Cisco Way, San Jose, CA95134) and Cisco Building O (10 West Tasman Drive, San Jose, CA95134). A 90-degree beamwidth, horizontal polarized antenna was selected for the headend site. Two sectors of coverage, each sector with two antennas for diversity reception will be installed on Cisco Building 14. One sector of coverage with two antennas for diversity reception will be installed on Cisco Building O headend site. Antenna orientation is shown in Exhibit 2. The specified ERP is the maximum that will be radiated from any site.

The experimental operation will use equipment that is not type accepted because the equipment is still under development.

Average power, rather than peak power, is the appropriate power measurement for digital transmission.

The headend transverters employed will be rated for an output power of up to 2.5 Watts (4dBW). This power, in conjunction with a Remec AMH2000-1 headend antenna, will produce a maximum EIRP of 20.5 dBW. All transmitting antennas will be horizontally polorized and will be limited to a height less than 20 feet above the roof of each of the headend sites.

The technical parameters for the headend transmitter installation to be utilized are described in Table 1.

Table 1: Technical parameters of headend transmitter.

Item	Parameter	Description
1	Frequency	3475-3487 MHz
2	EIRP	Not exceeding 20.5 dBW using transverter output of 2.5 Watts[1]
3	Transmitting antenna: Gain Polarization Orientation Height to center (AGL)	Remec AMH2000-1 16±0.5dBi Horizontal See exhibit 1 & 2 Not exceeding 20 feet above the roof of any building
4	Point of Communication	Communicate with subscribers located within 5 miles radius
5	Type of service	Fixed
6	Location of Transverter	See exhibit 1 and 2
7	Control	Each station will be under the control of the applicant
8	FAA Concerns	No antenna will be installed that will increase the height of any man-made structure by more than 20 feet
9	Beamwidth	The 3dB beamwidth of each antenna will be 90 degrees
10	Emission	6MHz, 3MHz and 1.5MHz.

[1] Average power, rather than peak power, is the appropriate power measurement for digital transmission. The transmitters are actually "transceivers", which are a combination of receiver and transmitter, manufactured by Cisco Systems, Inc.

Item	Parameter	Description
11	Modulation Density	OFDM

Two classes of subscriber units are used in this developmental operation: standard power and high power. The standard power subscriber unit is rated for a maximum transmit power of 0.63 Watt (-2dBW) in 1.5MHz bandwidth, 0.32 Watt (-5dBW) in 3MHz bandwidth and 0.16 Watt (-8dBW) in 6MHz bandwidth. The standard power subscriber unit operates with an integrated antenna. The high power subscriber unit is rated for a maximum transmit power of 3.2 Watts (5dBW) in 1.5MHz bandwidth, 3.2 Watts (5dBW) in 3MHz bandwidth and 1.6 Watts (2dBW) in 6MHz bandwidth. The high power subscriber unit operates with an external antenna.

The standard power subscriber transverters employed will be rated for an output power of up to 0.63 Watt. This power, in conjunction with an integrated antenna with 20.5±0.5dBi gain, will produce an EIRP of 18.5±0.5 dBW. All transmitting antennas will be horizontally polorized and will be limited to a height less than 20 feet above the roof of each of the subscriber sites. A transportable subscriber site installed in a van will be deployed. The antenna height of the transportable subscriber is adjustable to a maximum of 55 feet above ground level.

The technical parameters for the *standard power* subscriber transmitter are described in Table 2.

Table 2: Technical parameters of standard power subscriber transmitter.

Item	Parameter	Description
1	Frequency	3425 – 3437 MHz
2	EIRP	Not exceeding 19 dBW using transverter output of 0.63 Watts over 1.5MHz bandwidth[2]
3	Transmitting antenna: Gain Polarization Orientation Height to center (AGL)	Integrated antenna 20.5±0.5dBi Horizontal Point towards serving headend site. See exhibit 1 Not exceeding 20 feet above the roof of any building
4	Point of Communication	See Exhibit 1.
5	Type of service	Fixed
6	Location of Transverter	See exhibit 1 and 2
7	Control	Each station will be under the control of the applicant
8	FAA Concerns	No antenna will be installed that will increase the height of any man-made structure by more than 20 feet
9	Beamwidth	The beamwidth of each antenna will be 14±1 degrees
10	Emission	6MHz, 3MHz and 1.5MHz
11	Modulation Density	OFDM

The high power subscriber transverters employed will be rated for an output power of up to 3.2 Watts. This power, in conjunction with an integrated antenna with TBD dBi gain, will produce an EIRP of TBD dBW. All transmitting antennas will be horizontally polorized and will be limited to a height less than 20 feet above the roof of each of the subscriber sites. A transportable subscriber site installed in a van will be deployed. The antenna height of the transportable subscriber is adjustable to a maximum of 55 feet above ground level.

The technical parameters for the *high power* subscriber transmitter are described in Table 3.

[2] Average power, rather than peak power, is the appropriate power measurement for digital transmission. The transmitters are actually "transceivers", which are a combination of receiver and transmitter, manufactured by Cisco Systems, Inc.

Table 3: Technical parameters of high power subscriber unit.

Item	Parameter	Description
1	Frequency	3400.5 to 3412.5 MHz
2	EIRP	Not exceeding TBD dBW using transverter output of 3.2 Watts (35dBm)[3]
3	Transmitting antenna: Gain Polarization Orientation Height to center (AGL)	TBD TBD dBi Horizontal See exhibit 1 Not exceeding 20 feet above the roof of any building
4	Point of Communication	Point towards serving headend site. See Exhibit 1.
5	Type of service	Fixed
6	Location of Transverter	See exhibit 1 and 2
7	Control	Each station will be under the control of the applicant
8	FAA Concerns	No antenna will be installed that will increase the height of any man-made structure by more than 20 feet
9	Beamwidth	The beamwidth of each antenna will be ?? degrees
10	Emission	6MHz, 3MHz and 1.5MHz.
11	Modulation Density	OFDM

Table 4 lists the proposed headend site and subscriber site locations for this developmental operation.

Table 4: Location of headend and subscriber sites.

Site	Location	Address	Latitude	Longitude
HE	Building 14	3625 Cisco Way, San Jose, CA 95134	37°24'16"	121°55'58"
HE	Building O	10 W. Tasman Dr. , San Jose, CA 95134	37°24'32"	121°56'43"
SU	Building D	170 W. Tasman Dr. , San Jose, CA 95134	37°24'31"	121°57'07"
SU	Building P	125 W. Tasman Dr. , San Jose, CA 95134	37°24'36"	121°56'54"
SU	Building K	225 W. Tasman Dr. , San Jose, CA 95134	37°24'40"	121°57'05"
SU	Building 8	3750 Zanker Rd. , San Jose, CA 95134	37°24'44"	121°56'04"
SU	Building 9	260 E. Tasman Dr. , San Jose, CA 95134	37°24'44"	121°55'57"
SU	Building 2	3800 Zanker Rd. , San Jose, CA 95134	37°24'48"	121°56'10"
SU	Building I	285 W. Tasman Dr. , San Jose, CA 95134	37°24'42"	121°57'13"
SU	Building H	250 W. Tasman Dr. , San Jose, CA 95134	37°24'36"	121°57'24"
SU	N/A	Transportable SU located up to 5 miles from HE site location	N/A	N/A

[3] Average power, rather than peak power, is the appropriate power measurement for digital transmission. The transmitters are actually "transceivers", which are a combination of receiver and transmitter, manufactured by Cisco Systems, Inc.

3. Exhibits

3.1. Exhibit 1: System Parameters for the Proposed Developmental Operation

Table 5 summarizes the system parameters for the proposed developmental operation.

Table 5: HE System Parameters.

TRANSMIT SITE NAME	LATITUDE	LONGITUDE	RECEIVE SITE DISTANCE	GND MSL FT	C/R AGL FT	MAX ERP DBW	POL
Bldg-O	37°24'32"	121°56'43"	Within 5 miles radius	60	80	20.5	H
Bldg-14	37°24'16"	121°55'58"	Within 5 miles radius	30	50	20.5	H

3.2. Exhibit 2: Locations and orientation of headend sites..

Headend location	Antenna ID	Antenna orientation	Comments
Cisco Building 14	HE14-W-ANT1 HE14-W-ANT2	297 degrees relative to magnetic north 297 degrees relative to magnetic north	Two antennas used for diversity reception
Cisco Building 14	HE14-E-ANT1 HE14-E-ANT2	117 degrees relative to magnetic north 117 degrees relative to magnetic north	Two antennas used for diversity reception
Cisco Building O	HEO-W-ANT1 HEO-W-ANT2	332 degrees relative to magnetic north 332 degrees relative to magnetic north	Two antennas used for diversity reception

3.3. Exhibit 3: Elevation View

Figure 1 shows the elevation view of the headend antenna installation.

Figure 1: Elevation view of headend antenna installation.

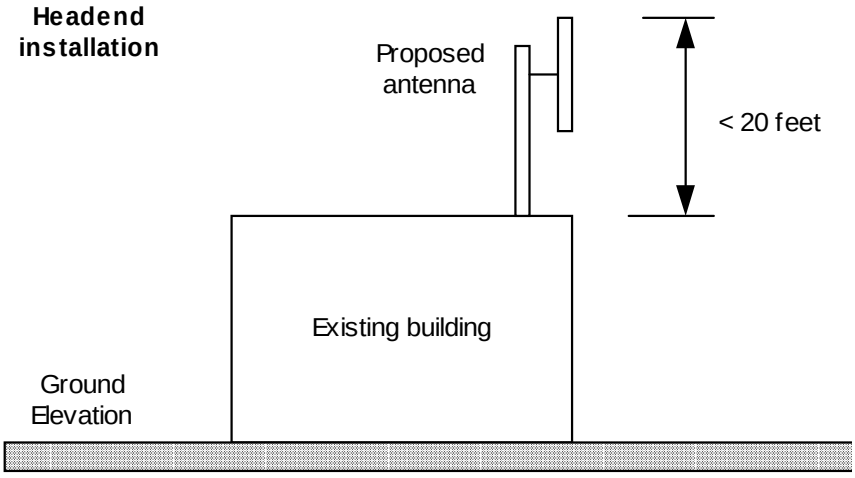


Figure 2 shows the elevation view of the subscriber unit antenna installation.

Figure 2: Elevation view of subscriber unit antenna installation.

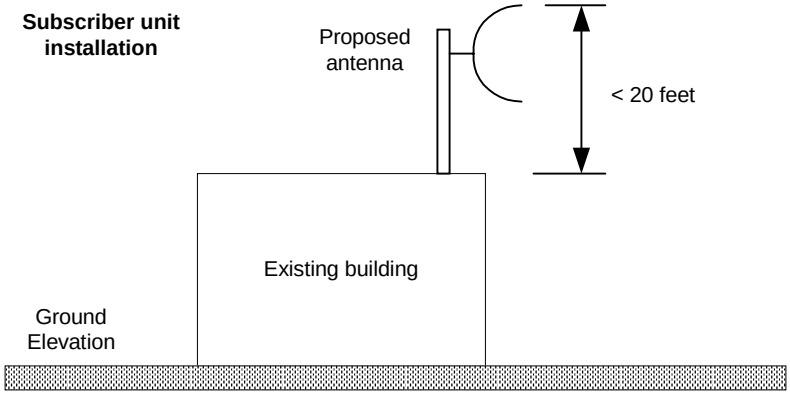
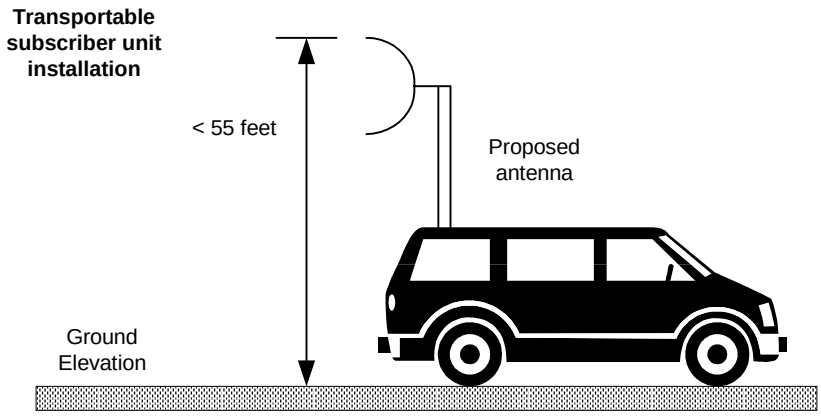


Figure 3 shows the elevation view of antenna installation on the transportable subscriber unit.

Figure 3: Elevation view of antenna installation on the transportable subscriber unit.



3.4. Exhibit 4: Antenna radiation pattern

Figure 4 and Figure 5 show the azimuth and elevation radiation pattern for the headend antenna, respectively.

Figure 4: Azimuth radiation pattern of headend antenna AMH2000-1.

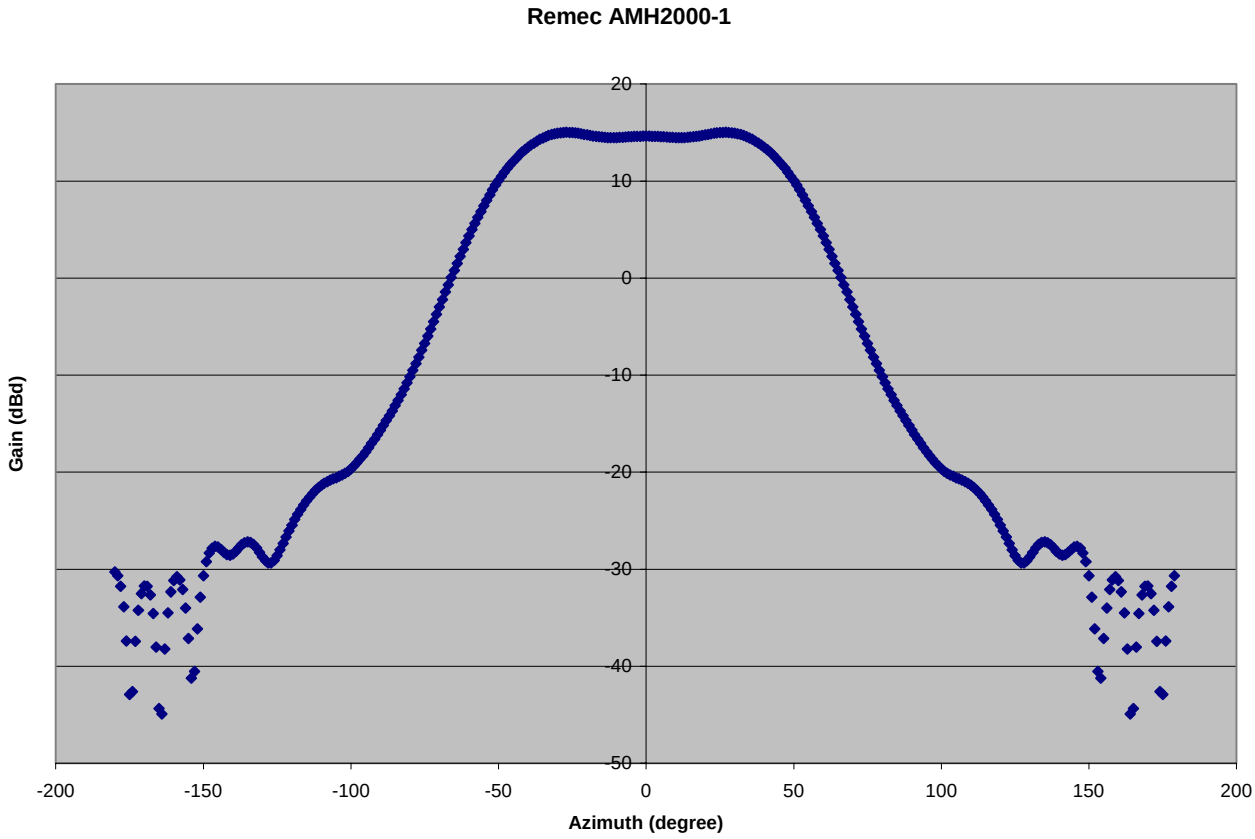


Figure 5: Elevation radiation pattern of headend antenna AMH2000-1.