RoamAbout 802.11
Outdoor Antenna
Site Preparation Guide

9033153

CABLETRON SYSTEMS

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Order Number: 9033153

Web Site: http://www.cabletron.com/wireless

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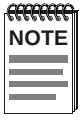
Site Preparation Guide

Overview

This guide describes the site requirements that are needed for the successful installation of RoamAbout Outdoor Antennas. It is intended for sales engineers or site evaluators.

The outdoor antenna uses RF antenna technology, which lets you extend your LAN from building to building. Use the RoamAbout outdoor antenna as a solution when connecting buildings across distances as an alternative to costly T1 leased lines.

Before you start the installation process, ensure that all the requirements described here are met.



If after reviewing this document you require additional technical information or support prior to ordering product, see the RoamAbout web site listed on page iii or contact your authorized Cabletron Sales Representative.

Requirements

Lightning protection

A lightning rod must be placed close to the antenna mast or wall bracket. This is required to protect the antenna from direct lightning strikes.

Grounding system

Direct earth grounding of the antenna and the lightning arrestor is necessary to protect the installation from lightning and the build-up of static electricity. The wireless device and the lightning arrestor must be connected to the same ground. The antenna and the mounting structure require a separate earth ground connection.

Check with a certified antenna installer to make sure the antenna is properly grounded.

Line of sight

Spread spectrum systems for LANs are complete point-to-point systems and require a clear line of sight from location to location. Zone widths of the beam depend on the distance between the antennas. The defined radius is an area that is widest at its center. The table below shows the zone radius required at 2.4 GHz.

Figure 1: Clear Line of Sight

Antenna height requirements (mast):

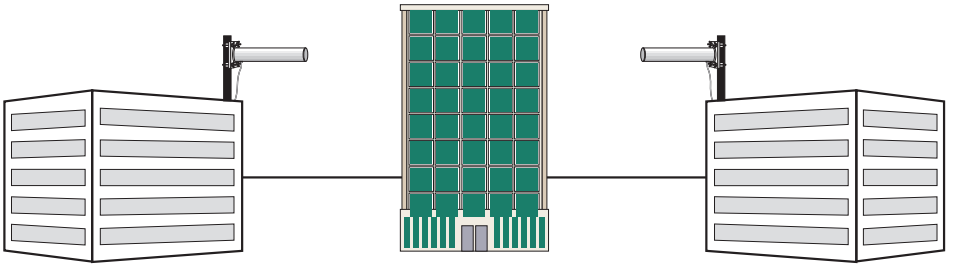
- At least 5 feet (1.5 meters) above the roof line if you are mounting it on a roof.
- High enough to achieve a line of sight if you are mounting it on the wall of a building.

Note: The installer is responsible for local building codes.

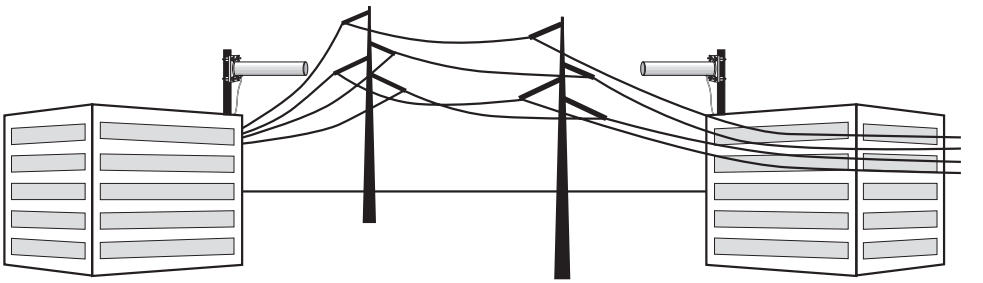
Line of sight is defined as:

- No obstacles in the direct path between the two antennas
- No obstacles within a defined radius around the antenna beam
- Clear of neighboring buildings, trees, power lines, and other obstructions

Figure 2: Potential Obstacles to Line of Sight (not to scale)



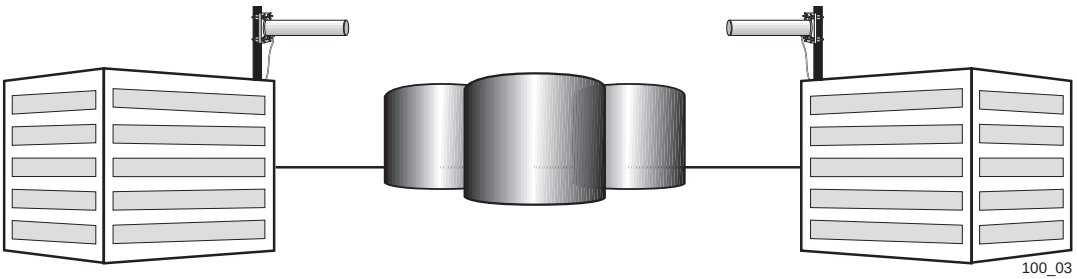
Building blocking line of sight



Power lines blocking line of sight

Trees blocking line of sight

Figure 3: Large Reflecting Surfaces



Large storage tanks which are common in industrial areas

Factors that can reduce antenna range

Large reflecting surfaces that are parallel or partly perpendicular to the radio signal cause reflections of the radio signal. Examples of reflecting surfaces are buildings with low-emissivity (low-e) glass, crowded parking lots, water, moist earth, moist vegetation, and above-ground power or telephone lines.

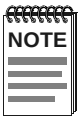
Because surrounding objects such as trees, power lines, other antennas, and the like seriously reduce efficiency of the antenna, it is very important to mount the antenna as high and clear of obstacles as possible.

Ensure that the cable between the antenna and lightning arrestor is at least 3 feet (0.9 meters) away from high-voltage or high-current cable.

Required Data for Antenna Installation Company

The Fresnel Zone

You need a clear line-of-sight between antennas to set up an outdoor installation that meets your requirements in terms of range and throughput performance.



A *wireless outdoor antenna installation that lacks sufficient clearance will suffer from poor performance. When radio performance is poor, the network response is poor as well, due to many retransmission attempts of lost data frames.*

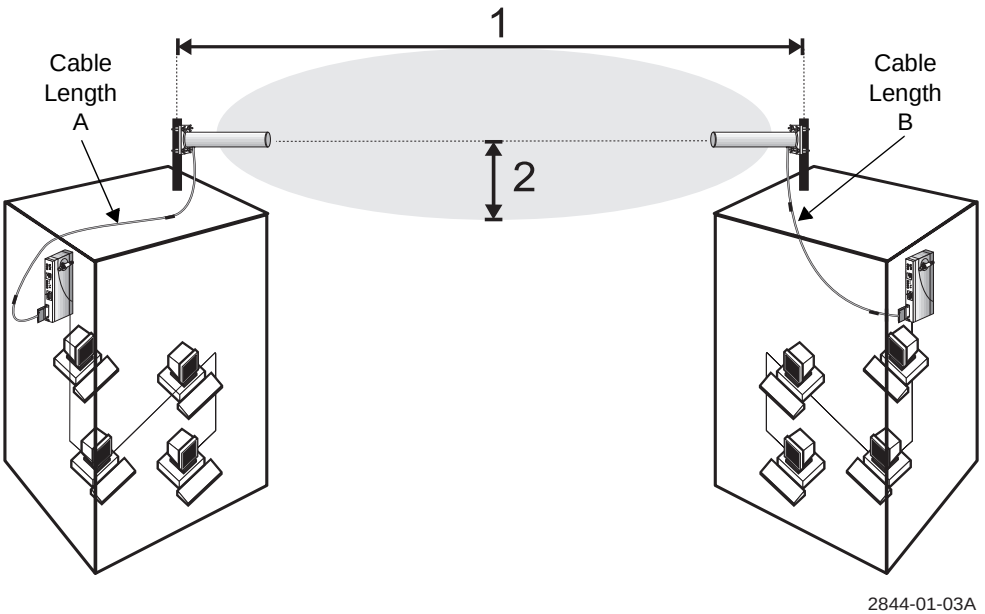
The shape of the radio beam, also defined as the Fresnel Zone, is bulged in the middle. The exact shape and width of the Fresnel Zone is determined by the path length and frequency of the radio signal.

If any significant part of the Fresnel Zone is obstructed, a portion of radio energy is lost, resulting in reduced performance. For optimal performance, you must ensure that the antenna products you choose, in combination with the height of the antenna installation above ground, will provide sufficient clearance to allow your antenna installation to cover the distance between the two wireless sites.

As shown in Figure 4, there are two major variables that determine the shape of the Fresnel Zone:

- The distance between the antennas (1).
- The minimum clearance required for optimal performance (2).

Figure 4: Fresnel Zone



Refer to the following table to determine the minimum clearance required for your installation as defined by the distance between the antennas.

Distance Between Antennas (1)		**Minimum Clearance Required (2)**	
kilometers	(miles)	meters	(feet)
2.1	(1.3)	5.8	(19.1)
3.5	(2.2)	7.8	(25.7)
6.5	(4.0)	11.1	(36.5)
9.6	(6.0)	14.4	(47.4)

Other Considerations

The strength of each transmitted signal must be considered when planning your antenna installation. Two parameters are usually listed to indicate transmitted signal strength: *output power* of the radio transmitter, and *gain* of the antenna system.

- Output Power of radio equipment is often subject to maximum limits as defined by local radio regulations. Consequently output power is not by definition the way to enhance wireless performance.
- High gain antennas are larger in size than low gain antennas, and are characterized by a narrow focus of the radio beam. These two characteristics make it more difficult to aim the antennas, and/or adjust antenna alignment to optimize the performance of the wireless point-to-point link.

With these points in mind, the design of antennas and components supplied with the RoamAbout Outdoor Kit are based upon the following principles:

- An output power and antenna gain that comply with the maximum limits as defined by local governing bodies concerning radio transmissions.
- Enhanced radio sensitivity for optimal reception of RoamAbout radio signals transmitted by remote antennas.

The following distances are required before contacting the Antenna Installation Company:

Distance between the antennas: _____

Cable length needed at building A: _____

Cable length needed at building B: _____

Height of building A: _____

Height of building B: _____

All possible obstacles which can interfere with the defined radius: _____

_____

_____

Antenna Options

RoamAbout 14-dBi Directional Antenna

The RoamAbout 14-dBi Directional Antenna is a high-gain antenna for the 2.4 GHz frequency band.

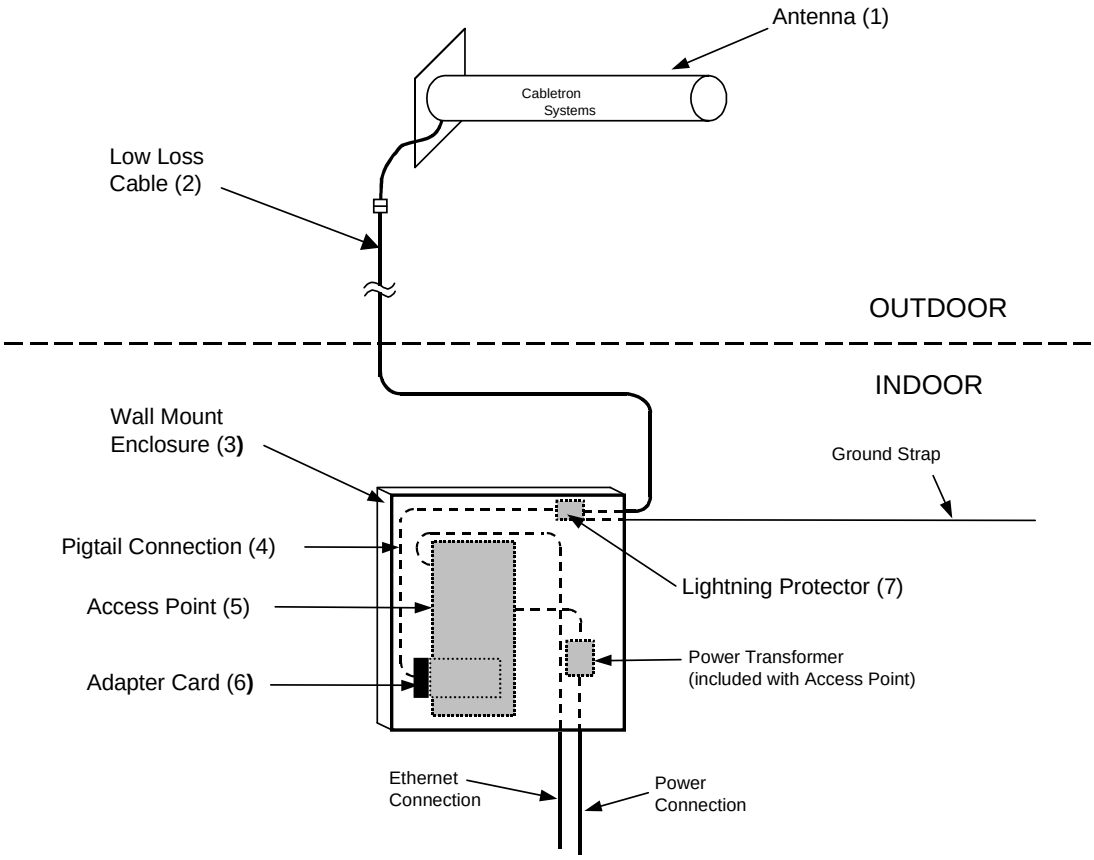
The antenna is a totally enclosed 16-element Yagi designed for point-to-point communications.

It has a typical VSWR of 1.5:1 and is less than 2:1 over the entire frequency band. The gain is 14-dBi and the half-power beamwidth is 30 degrees. This antenna is normally mounted on a mast and is vertically polarized.

Mechanical	
• Size	45.7 cm (18 in)
• Mounting Method	• Vertical mast with an outside diameter between 35 mm (1.4 in) and 42 mm (1.6 in) using u-bolts.
	• Wall using plugs and screws.
Cable	
• Type	RG-58A/U, 50 ohm low-loss coax
• Length	20 cm (7.5 in)
• Color	White
Connector	
• FCC Countries	Reverse Polarity-N (Male)
• ETSI Countries	Standard-N (Female)
• France	Standard-N (Female)
• Japan	Standard-N (Female)
Electrical	
• Frequency Range	2.4 GHz
• VSWR	Less than 2:1, 1.5:1 Nominal
• Nominal Impedance	50 Ohms
• Gain	14-dBi
• Front-to-Back Ratio	greater than 20 dB
• Half-Power Beamwidth	(-3dB)
• Vertical (E-plane °)	30.8 Degrees
• Horizontal (H-plane °)	31.4 Degrees
• Polarization	Linear, Vertical or Horizontal
Antenna Environment	
• Operating Temperature	+60°C (140°F) - 40°C (-40°F)
• Wind/survival (mph)	At least 128 km/h (80 mph)[a]
• Wind Surface Area	7.56 square cm (0.248 square ft)

a. At least 104 km/h (65 mph) with 1.25 cm (0.5 in) ice.

Figure 5: Typical Outdoor Yagi Configuration



The following lists components and part numbers typically used in an outdoor antenna configuration. Refer to the RoamAbout web site listed on page iii for the latest information.

#	Packaged Kit/ Component	Component Part Numbers by Domain			
		FCC	ETSI*	France & Spain	Japan
	OUTDOOR ANTENNA KIT Contents:	***CSIEB-AA***	***CSIEB-AB***	***CSIEB-AF***	***CSIEB-AJ***
1	Antenna	CSIES-AA-Y14	CSIES-AB-Y14	CSIES-AB-Y14	CSIES-AB-Y14
2	50' Low-Loss Cable**	CSIES-AA-C50	CSIES-AB-C50	CSIES-AB-C50	CSIES-AB-C50
3	Wall Mount Enclosure	CSIAP-WM	CSIAP-WM	CSIAP-WM	CSIAP-WM
4	Pigtail Connection	CSIES-AA-PT50	CSIES-AB-PT50	CSIES-AB-PT50	CSIES-AB-PT50
5	Access Point	CSIAP-CA	CSIAP-CA	CSIAP-CA	CSIAP-CA
6	Adapter Card	CSIBB-AA	CSILB-AB	CSILB-AF	CSILB-AJ
7	Lightning Protector	CSIES-AA-LP	CSIES-AB-LP	CSIES-AB-LP	CSIES-AB-LP

*European Telecommunications Standards Institute

**20' and 75' Low-Loss cables are also available.

RoamAbout 7-dBi Omni-Directional Antenna

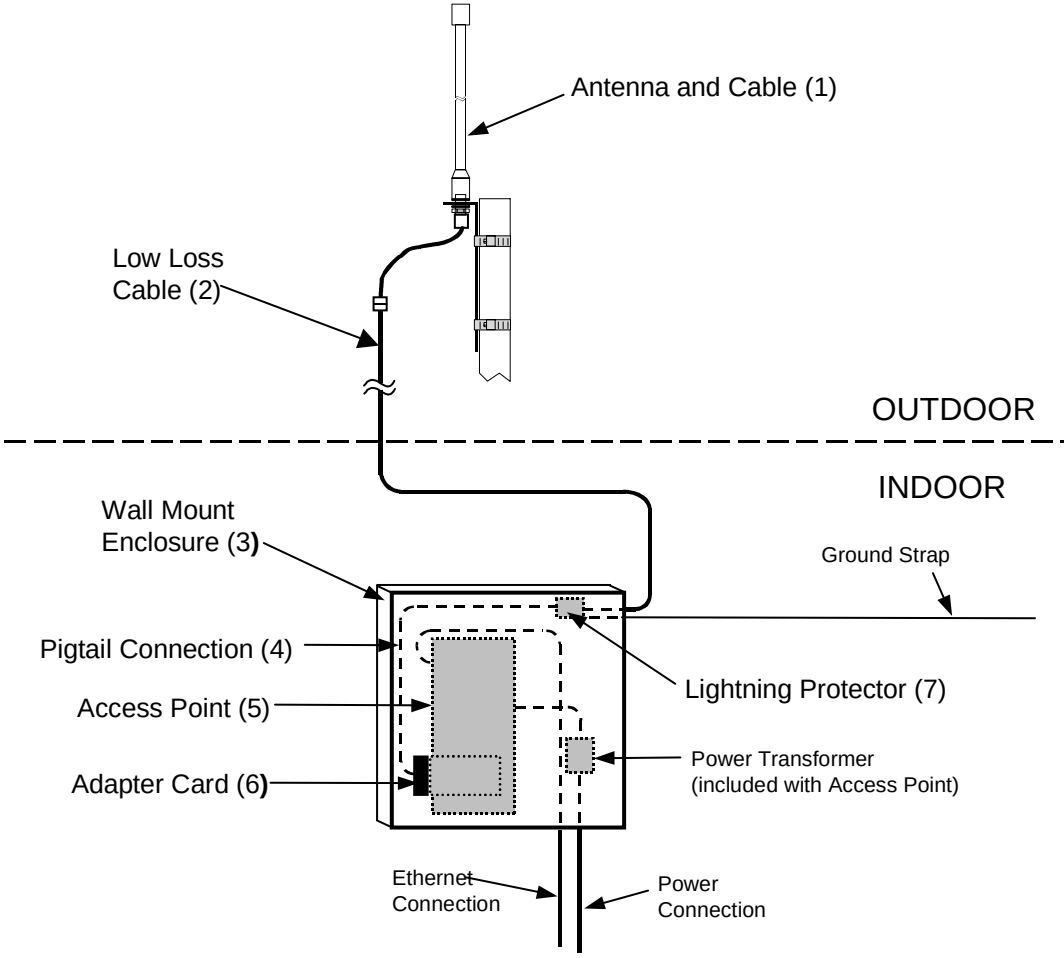
The RoamAbout 7-dBi Omni-Directional Antenna is a broadband antenna for the 2.4 GHz frequency band featuring an omni-directional pattern with a nominal gain of 7 dBi.

This antenna is encapsulated in a weatherproof protective covering. With the hardware provided, this vertically-polarized antenna can be mounted on an antenna mast with an outside diameter of up to 51mm (2 in).

Mechanical	
• Size	45.7 cm (18 in)
• Mounting method	Clamps to vertical mast with outside diameter up to 51mm (2 in)
Cable	
• Type	RG-58A/U, 50 ohm low-loss coax
• Length	15 cm (6 in)
• Color	White
Connector	
• FCC Countries	Reverse Polarity-N (male)
• ETSI Countries	Standard-N (female)
• France	Standard-N (female)
• Japan	Standard-N (female)
Electrical	
• Frequency Range	2.4 GHz
• VSWR	Less than 2:1 Nominal
• Nominal Impedance	50 Ohms
• Gain	7-dBi
• Polarization	Linear Vertical
Antenna Environment	
• Operating Temperature	+60°C (140°F) - 40°C (-40°F)
• Wind/survival (mph)	At least 128 km/h (80 mph)[a]
• Wind Surface Area	7.56 square cm (0.248 square feet)

a. At least 104 km/h (65 mph) with 1.25 cm (0.5 in) ice.

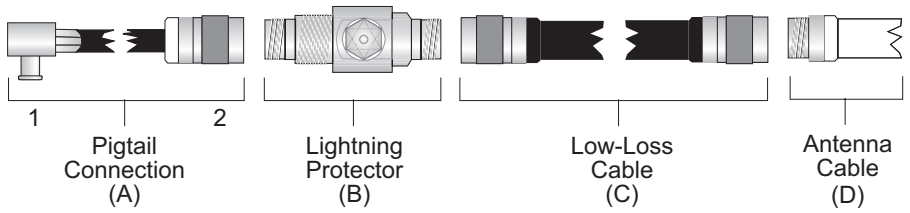
Figure 6: Typical Omni-Directional Antenna Configuration

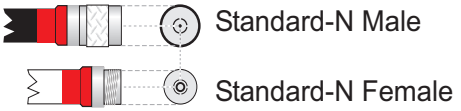
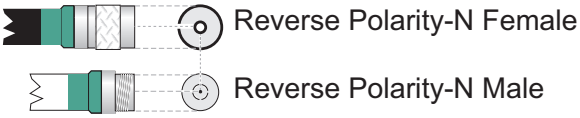


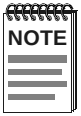
#	Component
1	7-dBi Omni-Directional Antenna
2	Low-Loss Cable: 6m (20 ft), 15m (50 ft), or 22m (75 ft)
3	Wall Mount Enclosure
4	Pigtail Connection
5	Access Point
6	Adapter Card
7	Lightning Protector

Verify Component Connector Polarity

The components supplied with your Outdoor Antenna Kit are configured with either Standard-N connectors or Reverse Polarity-N connectors, subject to the country where the kit was purchased. Refer to the following table to verify that the polarity of each connector is correct for your installation.



	ETSI Countries, France, Spain, and Japan	FCC Countries
		
A	1 - PC Card connector 2 - Standard-N Male	1 - PC Card connector 2 - Reverse Polarity-N Female
B	Standard-N Female on both ends	Reverse Polarity-N Male on both ends
C	Standard-N Male on both ends	Reverse Polarity-N Female on both ends
D	Standard-N Female	Reverse Polarity-N Male



The term Male or Female does not refer to the connector thread, but to its center pin.

- *Male connectors have a solid center pin.*
- *Female connectors have a hollow center pin*

If you wish to purchase individual components, make sure you specify the correct N-Type connectors to match the configuration that applies to your country.

Reviewing the Site Preparation Checklist

Lightning protection

_√_ Determine the mounting location for the lightning rod (positioned near the antenna).

_√_ Ensure an earth ground location for the antenna structure and lightning arrestor.

Mounting requirements

_√_ Determine the type of mounting that is required (tripod, wall mount, etc.)

_√_ Consider that three guy wires are needed for each 10-foot (3 meter) section of the mast; for example, 20 feet of mast requires six guy wires.

Line of sight

_√_ Determine the mounting location for the antenna.

_√_ Ensure that the back of the antenna is clear.

_√_ Ensure that remote and local antennas can see each other.

_√_ Ensure that no obstacles are in the direct path or within the defined zone of the two sites.

_√_ Consider whether any RF interference is present.

Installation Requirements

_√_ Determine the best location for the Access Point.

_√_ Determine the length of cable required from the antenna to the Access Point.

_√_ Ensure the location has an accessible Ethernet connection.

_√_ Ensure the location has accessible power.

_√_ Determine the distance between buildings.

For Additional Assistance

If you are purchasing your system through a Channel Partner, contact that Channel Partner for assistance.

If you are purchasing your system from Cabletron, contact Cabletron using one of the following methods:

World Wide Web	http://www.cabletron.com http://www.cabletron.com/wireless
Phone	(603) 332-9400
Internet mail	http://www.cabletron.com/support/forms /email-support.form
FTP Login Password	ftp://ftp.cabletron.com/ *anonymous* *your email address*
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