Mounting Solutions for Wi-Fi Access Points

A division of Chatsworth Products

APPLICATION NOTE

Radio Frequency Signal loss through Model 3030 Fiberglass Bollards and Model 3032 Polyethylene Bollards

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Introduction

Oberon's Netpoint™ Model 3030 Fiberglass and Model 3032 Polyethylene Wireless Bollards are ideal for extending wireless and Wi-Fi coverage into open public spaces such as parks, outdoor malls and bus stops. The wireless bollard can be used to mount the Wi-Fi AP in locations where Wi-Fi coverage is most needed and avoid the need to mount on buildings or light poles. These rugged bollards are weather-proof and tamper-resistant, designed to protect wireless equipment in open public areas. The polyethylene or fiberglass construction is virtually transparent to wireless signal. These bollards are large enough for outdoor APs, omni-directional and directional antennas, and small network switches from most vendors.

Wi-Fi Bollards

Oberon's Model 3030 Wi-Fi bollards are constructed of a heavy-duty, quarter-inch-thick, centrifugal-cast fiberglass composite (65% glass, 35% resin). Fiberglass, like its glass and resin constituents, is considered low-loss material. It does not have reflective or absorptive properties. (Certain types of glass used in building construction, such as low-emissivity glass, or E-glass, is very reflective, and is problematic for radio frequency signals. However, the glass used in fiberglass is not "E-glass.") The fiberglass is painted with a low-loss, UV-resistant paint.

The Model 3032 Wi-Fi bollard is formed from a low-loss, rotomolded Polyethylene plastic with color embedded in the plastic. Plastics in general are low-loss materials from a signal transmission standpoint. Polyethylene in particular has a low dielectric constant and is low-loss.

In order to verify the low signal loss of the Wi-Fi bollards, a test setup was created to measure signal loss through each style.

Test Set-up

The test set-up consists of a Cisco 2800 Wi-Fi access point mounted on the Model 3032 or 3030 equipment stand, and a Dell laptop client device with *WiFiInfoView* installed to report the Received Signal Strength Indication (RSSI). *WiFiInfoView* communicates with the 802.11ac enabled device to report the signal strength information in two bands. The testing is performed with the AP and Client devices inside separated by 30 feet. The indoor environment may represent a more "reflective" environment than outdoors but is not thought to impact the overall measurement result.

Measurements

40 individual measurements of the RSSI were collected at both 2.4 GHz and 5.3 GHz, with the bollards removed from the equipment stand ("Bollard off"), and then with the bollards on the equipment stand and covering the AP ("Bollard on").

When the bollard was on, it was rotated 90 degrees every ten measurements to account for potential variations in loss from azimuth position.

Model 3030 Fiberglass Bollard

The Model 3030 bollard is constructed with low-loss fiberglass material, and the paint is a non-metallic, non-conductive outdoor paint with low-loss characteristics. On the interior of the bollard, a fiberglass pole is used to support APs and antennas. The fiberglass pole will minimize the impact on AP and antenna patterns.

For the Model 3030 fiberglass bollard, the measured results appear to be consistent with literature reports, wherein the loss at 5.3GHz is 2.3 dB and at 2.4 GHz is 0.9 dB. For wireless design purposes, it may be prudent to perform the wireless site survey with the AP in the bollard, or perhaps lowering the AP power by 2 dB or 3 dB, to emulate the AP or antenna being inside the Model 3030 fiberglass bollard.

Results – Model 3030 Fiberglass Bollard

MEASUREMENT	**BAND**	**BAND**
RSSI	**2.5 GHz**	**5.3 GHz**
Bollard off, avg. of 40 measurements	-46.1 dBm	-54.8 dBm
Bollard on, avg. of 40 measurements at 4 angles	-47.0 dBm	-57.1 dBm
Loss through bollard	0.9 dB	2.3 dB

Model 3032 Polyethylene Bollard

The loss through the Model 3032 Polyethylene plastic is very low and may be difficult to discern in practice. For wireless design purposes, it may not be necessary to make adjustments in the placement of access points or power settings due to the bollard.

Results – Model 3030 Fiberglass Bollard

FREQUENCY	**2.4 GHz**	**5.3GHz**
Bollard Off Avg. RSSI	-42.8 dBm	-52.3 dBm
Bollard On Avg. RSSI	-42.9 dBm	-53.0 dBm
Bollard Loss	0.1 dB	0.7 dB

