

Meeting the Challenges of Expanding Wi-Fi Outdoors

Extra: How Social Distancing is Changing the Wireless Landscape

Now more than ever, wireless installers face requirements for ubiquitous outdoor Wi-Fi coverage throughout corporate and college campuses, retail and hospitality environments, municipal areas such as parks and outdoor facilities, and just about any public space. Network designers and installers need to place Wi-Fi access points in diverse and often challenging locations.

While outdoor-rated access points and antennas are ruggedized for outdoor use, the challenge is to protect the installed equipment while concealing it or minimizing the aesthetic impact.

Oberon offers a number of products that are designed to help the network designer achieve the best solution in terms of network performance, maintenance and aesthetics.

Outdoor Network Considerations

Wi-Fi integrators often need to extend the premise network into outdoor areas in college, healthcare, corporate campuses and smart city applications. The outdoor installation creates its own challenges for the premise network designer and installer (NDI) as it involves Outside Plant considerations different from day-to-day indoor network installation challenges. The NDI must carefully consider equipment physical protection, weather protection, temperature extremes, solar loading, aesthetics, lightning protection and installation costs, which are typically much higher than in an indoor installation.



In many cases, the NDI will consider mounting access points on building walls or on top of buildings, on existing outdoor lighting poles, or even in or on the ground. These fall-back installation methods face resistance from campus stake holders due to issues regarding aesthetics, maintenance, powering, protection, performance and location.

THIS IS THE EDGE

Adapt accordingly.

Social Distancing: Changing the Outdoor Wireless Landscape

Work-From-Anywhere Model

In the next year, many people will continue to work outside the office. The trend may continue beyond the current pandemic as companies consider the advantages of a permanent remote workforce, whether entire or in combination with onsite presence. The demand for alternative workspaces includes outdoor spaces such as restaurant seating, parks and courtyards.



Returning to the Corporate Workplace

As large portions of the workforce move back to the office, the open indoor workspaces of the last decade may give way to more separated and isolated indoor workspaces and gathering around the water cooler may be discouraged for some time to come. Outdoor spaces play a role in creating safer places to gather while maintaining distancing, and companies are preparing for the increased demand for outdoor connectivity.



Healthcare Industry Considerations

Outdoor testing facilities require additional infrastructure and wireless support. Even routine doctor visits may require patients to wait in their cars for appointments, and often only the patient is permitted inside the building, creating additional demand for outdoor connectivity.



Keeping Campuses Connected

Campuses seek to create appealing outdoor spaces as an alternative to grouping indoors, creating new areas for dining, studying and class breaks. Many universities have extended the time between classes so that the rooms can be sanitized. Demand for ever-increasing outdoor wireless capacity, already important consideration for many campus networks, is skyrocketing as students make more use of outdoor spaces.



School Days

K-12 schools in temperate climates are constructing outdoor student learning spaces to accommodate more students in light of limitations of students permitted in classrooms. Other schools use distance learning or shift schedules, and students without access to quality internet connections can use school Wi-Fi from within vehicles in order to download and upload the day's information and assignments.



Dining

Restaurants are preparing for uncertainty. Where capacity is limited indoors, demand moves outside. The growth of work-from-anywhere models will put additional pressure on facilities used as alternate workspaces.



Explore Further

Deploying Temporary or Permanent Wi-Fi Networks Outside the Healthcare Facility

<https://oberoninc.com/insights/deploying-wireless-outside-healthcare-facilities/>

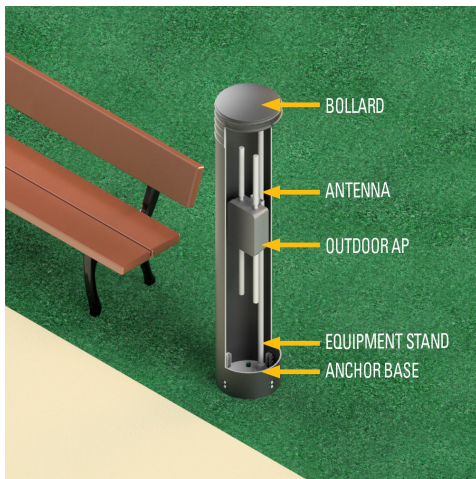
Outdoor Wi-Fi for Schools

<https://oberoninc.com/insights/outdoor-wi-fi-for-schools/>

Oberon's NetPoint™ Wireless Bollards

Oberon has developed the Wi-Fi Bollard™ as a purpose-built, stand-alone facility to assist the Wi-Fi network designer and installer achieve multiple difficult objectives. Oberon's Wi-Fi Bollards are comprised of an internal anchor base, an equipment stand for antennas and access points, the bollard cover, and, optionally, a UL listed, NEMA 4 work-box for AC line-powered circuits.

Oberon's Wi-Fi Bollards come in two styles: the general purpose Model 3032, which has a low-loss rotomolded polyethylene plastic bollard, and the heavy-duty Model 3030, a low-loss, cast fiberglass bollard. Both are available in a variety of colors, including custom colors.



Oberon Model 3032 Polyethylene rotomolded bollard cutaway view showing components (AP and antennas not included)



Oberon Model 3032 Polyethylene rotomolded bollard cutaway view showing components with Aruba AP-570 series access point (AP and antennas not included)



Oberon Model 3032 in a landscaped setting



NetPoint™ Wireless Bollards: Ideal for Wi-Fi

Oberon constructs the bollards with materials that can provide the durability required for the application and simultaneously minimize the impact on the wireless signal.

Oberon engineers have tested the bollards for RF loss in a laboratory setting. An access point was set-up on the bollard equipment stand, and a client device (laptop) was set up with a simple application called WiFiInfoView (https://www.nirsoft.net/utis/wifi_information_view.html).

The client device was placed on a table top 30' from the access point. The AP and client device are not moved during the test. The Model 3030 is tested separately from the Model 3032, because they each have a different equipment stand and anchor base.

The testing consisted of making 10 recordings in a row of the Received Signal Strength Indication (RSSI) reported by WiFiInfoView on the client device, at both 2.4 GHz and 5.3 GHz. The measurements are made with the bollard initially off the stand, and then the bollard is placed on the stand, thereby covering the AP, and the 10 recordings are repeated.

The bollard is then rotated 90°, and the measurements are repeated, with bollard off, then on. These measurements are repeated with the bollard rotated to 0°, 90°, 180° and 270° positions. The idea was to determine if there was variation in loss through the bollard depending on the "side" of the bollard. No sensitivity in loss was recorded as a function of bollard rotation, which was expected, because the bollards are uniform cylinders.

The total number of measurements made was then:

(Recordings) X (Frequencies) X (bollard on/off) X (Angle of bollard)

(10) X (2) X (2) X (4) = 160 measurements

Model 3030 Fiberglass Bollard

Frequency	2.4 GHz	5.3GHz
Bollard Off Avg. RSSI	-46.1 dBm	-54.8 dBm
Bollard On Avg. RSSI	-47.0 dBm	-57.1 dBm
Bollard Loss	0.9 dB	2.3 dB

Signal Loss Through the Bollard

Model 3032 Polyethylene 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

The loss through the Polyethylene plastic at both 2.4 GHz and 5.3 GHz is low, and may be difficult to discern in practice. The loss through the Fiberglass is a little higher, and is a consideration in wireless network design, particularly in the 5 GHz band. It may be prudent to perform the wireless site survey with the AP in the bollard, or perhaps AP power reduced by 2 dB, to emulate being inside the bollard.

The measurements are consistent with reported RF loss through the types of material, respectively.

Benefits to the Network Design

Wi-Fi Bollards assist the Network Designer and Installer (NDI) with outdoor Wi-Fi in the following manner:

- **Performance** – The Wi-Fi Bollard allows the designer to place the AP and antenna precisely where it is needed – near the client devices. Conversely, installation on buildings or existing light poles puts the APs where the structure is, typically not where the Wi-Fi signal is desired.
- **Protection** – the Wi-Fi Bollard protects the equipment (APs, antennas, cables, media converters, power injectors, etc.) from tampering, vandalism and the elements. Equipment mounted in bollards is less likely to be affected by lightning than equipment mounted on top of buildings or light poles.
- **Aesthetics** – the Wi-Fi Bollards conceal the equipment in a visually benign enclosure. The Wi-Fi Bollards are available in a variety of shapes, colors and sizes to suit the designer.
- **Installation and Maintenance** – the Wi-Fi Bollard is at ground level, and does not require a lift to install and service.

Antenna and AP Concealment on Exterior Walls

Oberon's product offering includes the 3001 series enclosures for AP and antenna concealment on exterior walls. The 3001 is a heavy-duty plastic frame with a white plastic shroud hinged to it. The hinged cover is large enough to conceal outdoor APs and antennas from most Wi-Fi vendors. The 3001 cover is a low-loss white ABS material which can be painted to suit the environment.

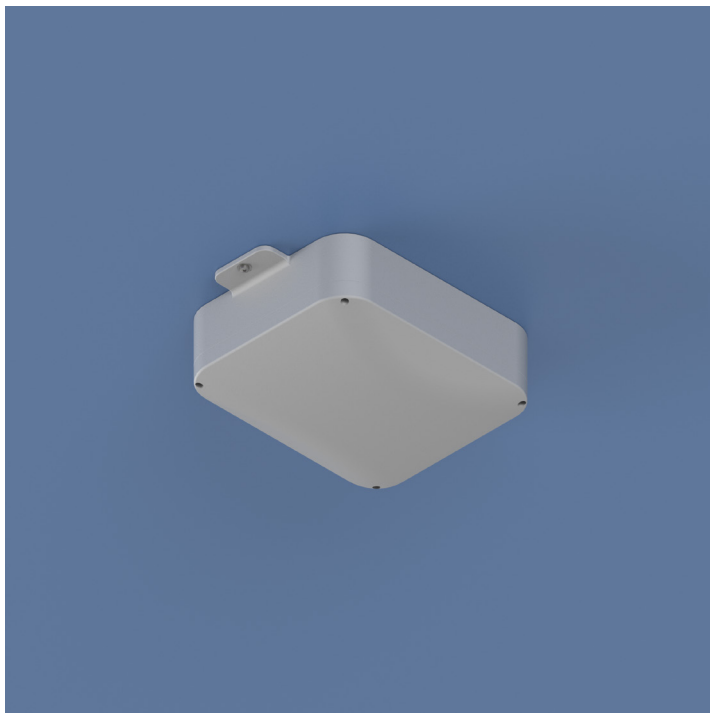


Oberon Model 3001 Wall mount with hinged cover. This product is designed to conceal outdoor APs, antennas and associated cabling on walls. The low-loss plastic cover can be painted.

Skybar™ NEMA 4 Enclosures

Oberon's Skybar products are NEMA 4 water-resistant enclosures designed specifically for wireless applications.

Typical industrial NEMA 4 enclosures are metallic or may have lots of metal components. And, they have a very "industrial" look, with large hinges and door latching mechanisms. The Oberon Skybar products feature all low-loss plastic and are designed with smooth featureless back-boxes and covers which are easily painted for access point or antenna concealment. Skybar products are available in a variety of sizes, making it simple to select the right enclosure for each application.



Oberon Model 1020 compact NEMA 4 enclosure protects smaller APs. Shown with right-angle wall mounting bracket accessory.



Oberon Model 1021 NEMA 4 enclosure shown with AP and antenna. The Skybar line features smooth surfaces which are easily painted for AP and antenna concealment.

Best Practices

Oberon recommends the following to Wi-Fi NDIs when designing outdoor networks:

- Place the access point close to where Wi-Fi clients will aggregate, such as building entrances, bus stops, swimming pools and parking lots. Use antennas (directive or omni-directional) suitable for the application.
 - Perform a site survey with access point and antenna at the planned location to get an accurate coverage map.
 - Use outdoor access points and equipment suitable for the local environment.
 - Consider solar loading on the equipment. Direct sunshine will impact equipment more than ambient temperature.
-
- Conductors entering buildings from outside should be appropriately surge/lightning protected.
 - Mount AC line circuits in a UL listed, NEMA 4 work-box.
 - Use tamper-resistant screws or hardware to install the equipment or bollard.
 - Consider using the Wi-Fi Bollard as an outside consolidation point. The bollard may provide additional power and data connectivity with installed outlets.



About Oberon

Oberon offers the widest selection of indoor and outdoor wireless enclosures and aesthetic mounting solutions for securing wireless infrastructure in virtually every venue. Oberon's products are used where RF coverage, infrastructure security, environmental robustness, and aesthetics are paramount in the network implementation. Oberon is a division of Chatsworth Products.

While every effort has been made to ensure the accuracy of all information, CPI does not accept liability for any errors or omissions and reserves the right to change information and descriptions of listed services and products.

©2020 Oberon. All rights reserved. Wi-Tile, Envelop, H-Plane, Hi-Bar, Skybar, M-Frame and NetPoint are trademarks of Oberon, a division of Chatsworth Products. All other trademarks belong to their respective companies.