Grounding Overview for Outdoor Access Points

Power plays a big role in the performance of outdoor access points. Additionally, there are numerous elements to consider with outdoor deployments, including lightning strikes. This article outlines how to mitigate lightning and other adverse electrical events.

Grounding

If the Meraki Outdoor is installed and exposed to the elements, it should be properly grounded to prevent damage to the AP, connected networking equipment, and the mounting structure. The Outdoor can suffer several types of failure in the field due to a lack of grounding.

Avoiding a Lightning strike

Antennas are magnets for static electricity in the environment. The element of an antenna and its ground structure collect energy through exposure and channel it through the access point to get rid of it. The best way to avoid damage to your antenna is to choose one that can be safety grounded to the support structure. This is primarily a concern with dish or large panel antennas. For smaller antennas, the ground of the antenna connector (the outermost exposed part of an RP-SMA or N type connector) should have a cable wiring it to ground.

In the case of the MR58, using the supplied ground wire for the metal casing will provide grounding for all the antennas. For the Meraki Outdoor and Solar, a wire with a ¼” ring connector should be run from the base of the antenna to a nearby grounding point.

Protecting the Antenna(s)

A direct strike will destroy any antenna. The best chance of avoiding damage to an antenna from a lightning strike is to prevent a strike from occurring. Structures can be equipped with structural "lightning-rods" in accordance with building codes and recommendations for the area.

Protecting the Access Point

The best way to protect the AP itself from direct strike is to avoid a strike. However, in the event of a strike, some protection for the hardware can be achieved through the use of a surge arrester. A lightning surge arrester installs on the base of the antenna, between the antenna and the RF connector on the AP housing. It contains a fuse device (generally a fast acting gas discharge fuse) that triggers during a strike and channels the energy to a local grounding point. Surge arrestors have a small amount of signal loss, but are a worthwhile investment for access points installed in hard to reach areas or high up and likely to attract strikes.

Protecting the Structure

The ground structure for the access point, the antennas, and the cables should all be built in accordance with building codes. On any given mounting structure, a protection system typically includes a rooftop network of conductors, multiple paths to the ground, connections to the metallic portion of the structure and a grounding network.

Protecting the interior network and electronics

In the event of a strike that damages or destroys the access point installed outside, it is important to isolate and protect any equipment inside. Excess energy on the access point that can’t find it’s way to local earth ground will transfer to the interior equipment over the communication and power cable. A surge arrester designed for use with Cat-5/6 cable should be used to prevent damage to equipment that is not directly exposed to the elements.
Static Buildup

Static buildup can cause slow and irreversible damage to the access point. This may present itself as a reduction in Transmit Power and Receive sensitivity over time, or may show as a sudden death of Ethernet communication on the active port(s). Excess static in the environment builds up on the antenna element or system ground, damaging the sensitive components when the concentration is high.

Static is especially noticeable when conditions are suitable for thunderstorms. Warm, dry, and windy conditions dramatically increase the failure rate of unprotected equipment. Damage from static buildup can be prevented with proper grounding. It is suggested to install a grounding strap from the antenna ground to a well designed local earth ground. A grounding strap can be made from a ring lug terminal (1/4” thin metal ring) and a medium length stranded copper wire (no more than 5 meters, suggested gauge AWG 14 or lower). It can be connected to the RPSMA connector on a outdoor below the antenna. (There is 1-2mm of space below the bottom of the antenna and above the enclosure nut). The other end of the wire should be firmly attached to a grounding structure.

Surges from the LAN

A shielded CAT 5 Ethernet cable connected to a third-party PoE with surge protection only protects the unit from power surges originating on the Ethernet cable or wired uplink device (e.g. your switch).