

Below is an excerpt from an email I just sent to a Distributor in another country about ground current and how to educate their customers (PLEASE READ):

Yes, best practice is to stress to customers the importance of proper grounding especially with the SMART DC units (not including the WS-26-400-IDC) we sell as their power supplies are not isolated which means that earth ground and DC negative are bonded in the switch.

Most DC chargers also bond earth ground to DC negative and lastly “most” radios WISPs use such as UBNT, MIMOSA, Cambium, and so on also bond POE DC negative to chassis/earth (tower) ground.

Then the Ethernet cable becomes the bond between 2 ground potentials.

If there is a bad electric motor or other appliance such as an AC compressor that is going bad it can inject ground current often at harmonics far above 50/60 Hz which damages the switches and or radios.

Also ground current can come from the electrical provider as your electric company usually hands off hot/neutral/ground and the ground they hand you is bonded to neighboring electrical services so if you have say an industrial park nearby and they have failing electrical motors and poor grounding this ground current can enter your site from the provider.

It is always best practice to add additional electrical service ground rods to handle any ground current coming in from off site and or ground current generated on site. If the service ground rods are poor and there is a surge of ground current it will seek out the path of least resistance which is often the nicely newly installed tower ground rods and the path for the ground current is through the switch and across the Ethernet cable through the radio to the tower to the tower ground rods – POOF.

Often ground current damage occurs during rain events as water wicks down the service ground rods increasing their resistance to ground. Often rain events are during electrical storms and people often mistake ground current damage as storm damage (surges) and this is incorrect.

It is also practice in the telecom industry to make sure there is ONE ground potential for the entire site meaning BOND electrical service ground rods to tower ground rods with heavy gauge wire.

I have been a WISP for 20+ years and until I understood what ground current was I lost equipment all the time. Now I only lose equipment when someone messes with the grounding improvement we put at sites we use that are leased and are messed with by the site owner or other tenants of the tower.

Now as of this past few months we made changes to our AC switch models to make them more isolated in hopes to better survive poor grounding but our SMART DC models WS-8-150-DC / WS-12-250-DC / WS-26-500-DC will require a redesign of the power supplies which we are contemplating but again if people do proper grounding this is not an issue.

Rules of thumb for WISPs.

Add NEW additional ground rods to existing electrical service and or double the usual required # of ground rods for NEW electrical services. Here in the US code requires 2 so we add 2 more = 4

Always bond electrical service ground rods to tower grounding system if at all possible. If not then for sure add additional service ground rods to make sure tower ground path never looks better than service ground path.

Never plug in cable to ports with POE already turned ON and always make sure the device is compatible and you use the correct POE option. The second most common RMA damage is from shorted cables or incorrect POE option applies which fries the Ethernet Transformer and sometimes the entire switch as it can create a conductive path for POE current to enter the PHY/SOC, all depends on how the Ethernet Transformer fries.

Here are 2 good posts to make sure customers read:

<https://forum.netonix.com/viewtopic.php?f=6&t=1178#p8809>

<https://forum.netonix.com/viewtopic.php?f=6&t=1215#p9040>

With the WS-12-DC and WS-26-DC make sure the power supplies they use are ISOLATED power supplies meaning earth ground is not bonded to DC negative and follow the grounding suggestions above.

Ground current damage usually results with the current sensors being damaged whereas shorted cables usually does not harm the current sensors it just fries the Transformer and sometimes the SOC. Ethernet Transformer damage usually can only be seen when the Transformer is removed and flipped over as seen in previous pictures I sent you.

Another common mistake people do is run Ethernet Copper cable from one device on one electrical service/panel to another device on another electrical service/panel which will have different ground potential and thus the Ethernet cable becomes the BOND or ground loop. Now ground current from the one service with the higher resistance to ground will try and cross the Ethernet Cable. One should always use FIBER when connecting devices across different ground potentials.

99% of all WISP equipment damage is from ground current (I own a WISP)

Another common cause for damage is a shorted cable or incorrect POE option applied to device.

Here are some good posts on grounding:

<https://forum.netonix.com/viewtopic.php?f=30&t=2786#p19279>

<https://forum.netonix.com/viewtopic.php?f=30&t=1816>

<https://forum.netonix.com/viewtopic.php?f=30&t=188>

<https://forum.netonix.com/viewtopic.php?f=17&t=1786&start=30#p13447>

<https://forum.netonix.com/viewtopic.php?f=30&t=1429>

Read the posts above but the basics are as follow:

Tower ground rods must be bonded to electrical service ground rods HEAVY #2 wire.

I always add 1 or 2 "new" ground rods to older existing electrical services.

In the event bonding service rods to tower rods is not possible then definitely add additional NEW ground rods to electrical service to help prevent service ground current from ever seeing tower ground rods as a better path to ground.

One last thing, Electrical and Ethernet Surge suppressors will do nothing to prevent ground current surges and damage. Think about it, how surge suppressors work is to shunt excess voltage to ground but there is nothing in them to prevent ground current from simply passing right through.

In fact I use ZERO Ethernet Surge suppressors in my entire WISP, I do though use GOOD electrical surge suppressors to combat electrical surges.