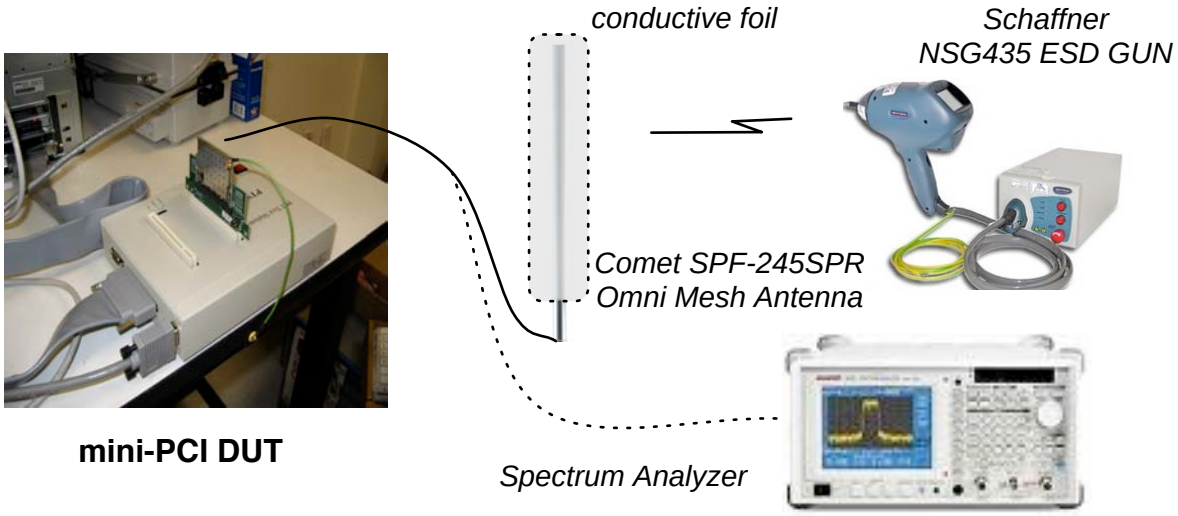
XR2 RF SURGE STUDY

Background: In our interactions with customers over the past year, we have noticed by far the biggest issue with using commodity 802.11 mini-PCI cards in wireless links requiring high reliability is the suspectability of the radio to ESD and surge events. In our testing, we found that a surge of as little as 5kV can permanently damage a typical Atheros based mini-PCI card and result in the "deaf" effect commonly talked about in the WISP community. A special feature of the XR2 card is it has a highly effective *integrated* RF Surge protection circuit built into the card which will keep the radio safe from surge events -- something not found in any other 802.11 Atheros based card avaiable on the market



Test Setup: The DUT was placed in a mini-PCI adapter box with dedicated power supply. The box was connected to a host PC running a program called Atheros Radio Test (ART) which was used to exercise the radio in continuous TX mode. The DUT RF port was connected to the popular Comet SPF-245SPR omni antenna often used in mesh applications. A conductive foil was placed over the antenna to simulate an ESD suspectible environment. While the DUT was transmitting, a Schaffner NSG435 ESD Gun was used to discharge energy to the foil in +/-1kV increments. The discharge process was reiterated twice and the foil was grounded after each discharge to reset the setup to ground potential.

	DISCHARGE LEVEL														
Card	+/-1kV	+/-2kV	+/-3kV	+/-4kV	+/-5kV	+/-6kV	+/-7kV	+/-8kV	+/-9kV	+/-10kV	+/-11kV	+/-12kV	+/-13kV	+/-14kV	+/-15kV
Atheros Vendor C	PASS	PASS	PASS	PASS	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**
Atheros Vendor E	PASS	PASS	PASS	PASS	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**
Atheros Vendor W	PASS	PASS	PASS	PASS	PASS	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**
Atheros Vendor Z	PASS	PASS	PASS	PASS	PASS	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**	**FAIL**
Ubiquiti XR2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	**FAIL**

Results and Conclusion: All the competitor cards tested failed the RF Surge testing in the 5-6 kV range. Once the failure occured, the card became permanently damaged with approximately 20dB of signal loss in both TX and RX directions -- what operators often report as the "going deaf" effect. Meanwhile, the Ubiquiti XR2 was able to achieve surge immunity up to +/-14kV -- a significant improvement. It is important to note that +6kV discharge is a realtively small value -- for example human ESD contact is rated to +/-4kV and weather induced discharge can often be much higher. For applications requiring high reliability and especially those using antennas susceptible to surge (omnis for example), the XR2 is highly recommended.