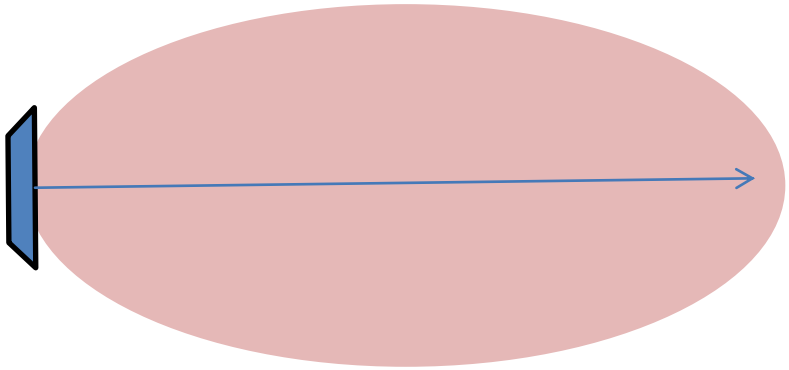
RFID Expert's Corner

A New Paradigm for RFID Reader Antennas

RJ Burkholder, Research Professor of Electromagnetics and RF at The Ohio State University[1]

For years RFID system designers have trusted in the old reliable patch antenna to solve all their reader antenna needs. But how reliable is it? If you were to picture the beam, it would look something like a spotlight:

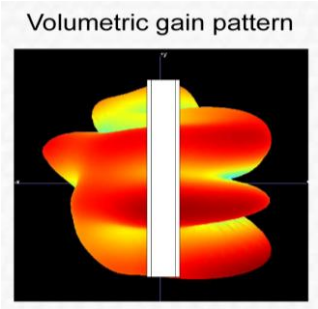


"Spotlight" pattern of a typical UHF RFID patch antenna.

This might be good if you're looking for tags that are far away and in a specific location, but not good for tags that may be close to the antenna but outside the beam. Also, in most portal and item-level applications you don't want to see tags that are far away because that makes it difficult to localize the tags of interest.

What's the solution? Well, we can crank down the power on the RFID reader, but that doesn't solve the spotlight problem. We can use more antennas to try and fill in the gaps in the illumination, but that is a Band-Aid solution at best and one never really knows if all the gaps are covered. Another possibility is the so-called "near-field antenna" (an oxymoron to antenna designers), but these have a very limited range and are not practical for covering large volumes.

The NeWave philosophy is to not use a spotlight to do the job of a fluorescent light. The latter does a much better job of uniformly illuminating a room. By analogy, the Wave antenna is designed for reliable high-diversity high-density coverage of a finite volume around the antenna:



High-diversity pattern of the Wave antenna.

It's what we call a "distributed antenna" because it emanates waves all along its length like a fluorescent lightbulb. It also naturally creates interlocking beams traveling in different directions

[1] The opinions expressed on this webpage are the author's and do not necessarily represent the opinions of The Ohio State University.

to provide much better polarization diversity than a single beam. This design is ideal for item-level applications because tags can be localized to a certain volume around the antenna, and there are no gaps in the coverage.

The concept of an antenna that creates localized coverage of a given volume is a new paradigm for item-level RFID applications. It enables the establishment of zones within a larger environment such as a warehouse or retail store, making it possible to locate tags quickly and perform inventories at the push of a button, the Holy Grail of item-level RFID technology.

Next blog: Why the reader antenna is the most important component of an RFID system.