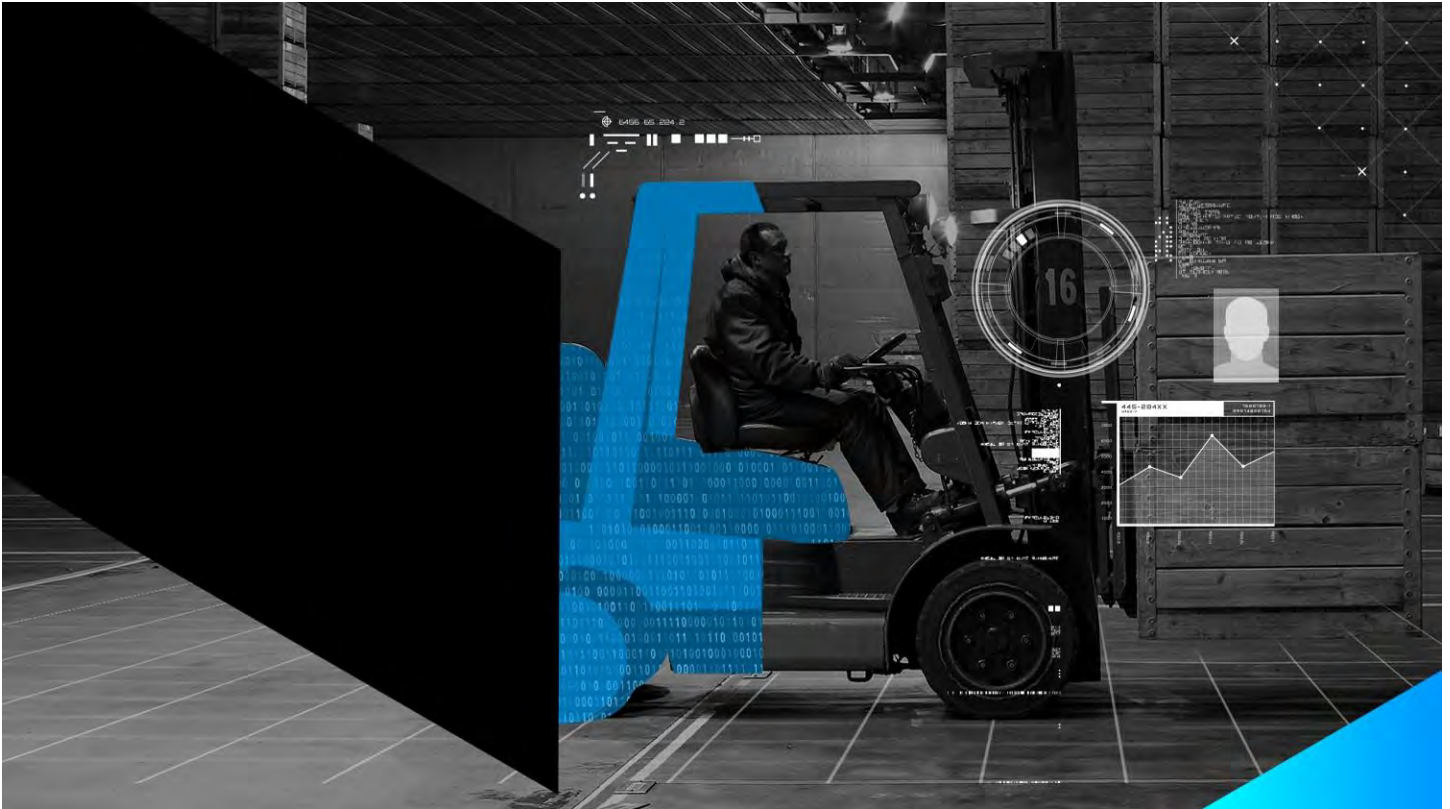# Active RFID – Track Your Assets

GETTING STARTED

Several years ago, the EMP Technical Group put together a Passive RFID (Radio Frequency Identification) Project Guide A document we would share with customers in the early stages of discussing a new, Passive RFID project. The guide asked several questions to be considered when trying to determine if Passive RFID is the right choice for a project. The Project Guide contained questions about the practicality of tagging products with RFID tags, the types of RFID readers needed, what software would be needed for encoding and reading the tags. And the final blow to many potential RFID projects: what to do with all the collected data.

In the last few years, the EMP Tech Group has become one of Zebra Technology's "go to" partners for Location Solutions platform which include a variety of Real Time Location System (RTLS) technologies. These products add a layer of complexity and capabilities to asset tracking. Now, in addition to all the standard questions we had customers asking themselves about Passive RFID, there is an additional layer of thought that needs to go into an active tag project. Plus, many of these systems now combine both active and passive RFID tags as well as barcodes into the same solution.

This new updated Project Guide will attempt to explain all these technologies and provide a starting point for evaluating the likelihood of this technology being a fit for your application.

1   WHAT IS PASSIVE VS ACTIVE?

Passive RFID uses tags without an internal power source. The power for the tag comes from the RFID reader, not the tag. These types of tags are inexpensive and rugged (think $.20 to $5.00 each.) But range is limited, and require additional consideration when applied to metal or liquid products. This is especially true when metals or liquids are densely stored. The weaker RF signal of Passive UHF simply cannot get through or around these materials very well.

Alternately, active RFID tags have a power source built into them, usually in the form of a battery. They have a much longer read range than passive tags and are much more tolerant to being applied to metal products. The battery in the tag has a life of one to five years, and the tags are much more expensive (think $50.00 to $100.00 per tag.) Think of passive RFID tags as whispering, while active tags yell!

Typically, active tags can be used to determine the location of an item in real time and with a high degree of accuracy, while passive tags can be used to tell where the product was last located, but not exactly where it is in real time.

Cost also vary wildly between active and passive solutions. You can implement a small passive RFID system for under $25,000.00 if it is not too complex. For an active project, the costs will usually exceed $100,000.00 and multi-six figure in many cases.
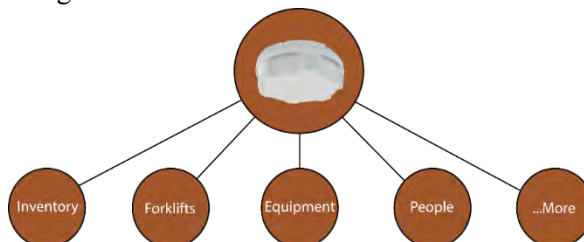
PASSIVE TAGS   ACTIVE TAGS

2   STIR IN SOME CONFUSION

The word "typically" was chosen carefully in the above section, because some new technologies are coming out that muddy the water. Zebra recently introduced an array reader called the ATR7000. This is a passive tag reader that is mounted 15 to 20 feet above the floor. From that height, it can locate passive tags in an area of approximately 1,500 square feet. The accuracy is roughly two feet, and this is done in real time. Many of these readers can be installed and networked together to cover a much larger area.

Another active technology is BTLE (Blue Tooth Low Energy). This uses Bluetooth beacons and bridges to locate products in real time. The cost of this solution is lower than a traditional, active tag project. The tags themselves are less expensive, and the batteries can be changed in the tag for better long-term cost. But the location of the asset is not as accurate as traditional active tags. You can basically tell what room the asset is in, and the refresh rate is every few minutes.

MB1000 ASSET BEACON   MB1000 BEACON   MB4000 BEACON

3   WHAT ARE THE REQUIRED COMPONENTS?

Let's start laying out all the pieces in this puzzle. Below is a partial list of what you will need for a passive, active or combination solution.

1. **Tags -** This is always where it starts. Determine the need for active or passive based on your need to know the exact location of an item or just where it was last and if you need to know the location real time.Survivability of the tags used for different technologies varies.

2. **Readers -** For a passive application, you can use fixed or mobile readers. There is also an option for a handheld reader that is connected to a PC like a traditional handheld barcode scanner. For active applications, fixed readers are your only option. The readers can cover a large area, depending on the exact technology chosen.

3. **Mobile Carts -** These can be used for a passive or BTLE application. Simply wheel the reader and a laptop around and locate tags as you go. Mobile readers can be used in a similar way for passive tags.

4. **Software -** The software needs are many. For a passive tag, you may need to print them in an RFID enabled label printer which will require printer software that is RFID capable. The tags may be unprinted and merely need to be programmed by a reader when they are first affixed to the item, but that reader will also need software. At minimum, fixed readers will need configured, and they may need to be programmed: when to read, what reads to accept or block, and where to send the data.

5. **Middleware -** This is the great chasm that exist in many of these projects. There is business software such as an ERP, MES, or WMS that needs to know where items are located. But most of these software packages have no way to accept the data generated by an RFID system. Also, most business software has no way to act on the data, or even display it to the users. So, the options are "build" or "buy." There are many RFID middleware packages in the marketplace, including some provided by Zebra. But building a custom interface may be the most cost-effective solution, depending on the complexity of the application.

6. **Engineering -** For both passive and active systems, there is some heavy lifting required to get the system designed and implemented. Few companies have the expertise or bandwidth to do this work themselves. An outside expert is typically needed to do most or all of the design and implementation work. An active system is almost on the scale of implementing new business software into a company.

7. **Cost -** Yep, we are going to talk about what this all costs. It is one of the things that sets the EMP Tech Group apart from the others: we want you to know what the costs are as soon as possible. We also want you to look internally and determine what the costs are for not doing the project so that you can make an informed decision. We are not working in the best interest of the customer or ourselves by trying to hold back the approximate cost of any system.

- Passive tags are $.20 to $5.00. A simple label with a passive inlay is on the lower end of that cost. A $5.00 tag is going to be made to mount on metal and will be encased in plastic.
- Active tags are in the $50.00 to $100.00 range.
- RFID enabled label printers are $1,000.00 to $2,000.00.
- Handheld RFID readers that plug directly into a PC via USB cost $500.00 to $1,000.00.
- Fixed mount, all in one, passive readers cost around $1,000.00.
- A full passive portal with a complex reader, multiple antenna's, and possibly a PC with user interface will cost $5,000.00 to $10,000.00.
- Mobile computers with RFID readers attached cost $3,000.00 to $5,000.00.
- Active reader systems are going to cost between and $250,000.00+.
- Middleware can be custom programming, or a canned software package can cost $20,000.00 to over $100,000.00.
- Engineering and implementation costs would be between and $100,000.00+ depending on the complexity of the system.

4   CONCLUSION

As you can see, this is not for the faint of heart. The simplest of passive systems will cost $25,000.00 or more, and a full active tag system will almost definitely be over $100,000.00. But what are the costs of lost assets and mis-shipments? These systems can also be used to streamline operations. The payback can be millions of dollars and the ROI time can be weeks or a few months.

One thing is for sure, you need an honest and experienced partner when contemplating these highly technical solutions. You want the EMP Tech Group on your team!