



**Active RFID Systems, Inc.**  
PO Box 3069, Evergreen, CO 80437

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*A proposal for an Enterprise wide Low Cost Indoor Tracking System*

**Background:**

*A significant obstacle to the adoption of most indoor tracking systems is the need for installed infrastructure and the set-up, maintenance, and change process which is complex and costly.*

*Active RFID Systems, Inc. has developed a family of inexpensive and exceptionally easy to install and setup system. The low cost is achieved by the following:*

- System is operable by "plugging" trigger assemblies directly into existing 110/220 VAC power outlets. It requires no added permanent building infrastructure. Location is determined by the physical identification of the trigger locations, i.e. "room 203".*
- System utilizes an adaptation of ARS's low cost, dual mode infra-red/RF RFID tags.*
- All communications and data forwarding are wireless, with no loss of data and no network set-up costs.*
- System does not require new wiring or expensive location mapping. Location mapping is consistent with building walls and power outlets.*
- Our proprietary system of infra-red triggers results in years of battery life on the tags as opposed to months with competitive systems.*

**System Description:**

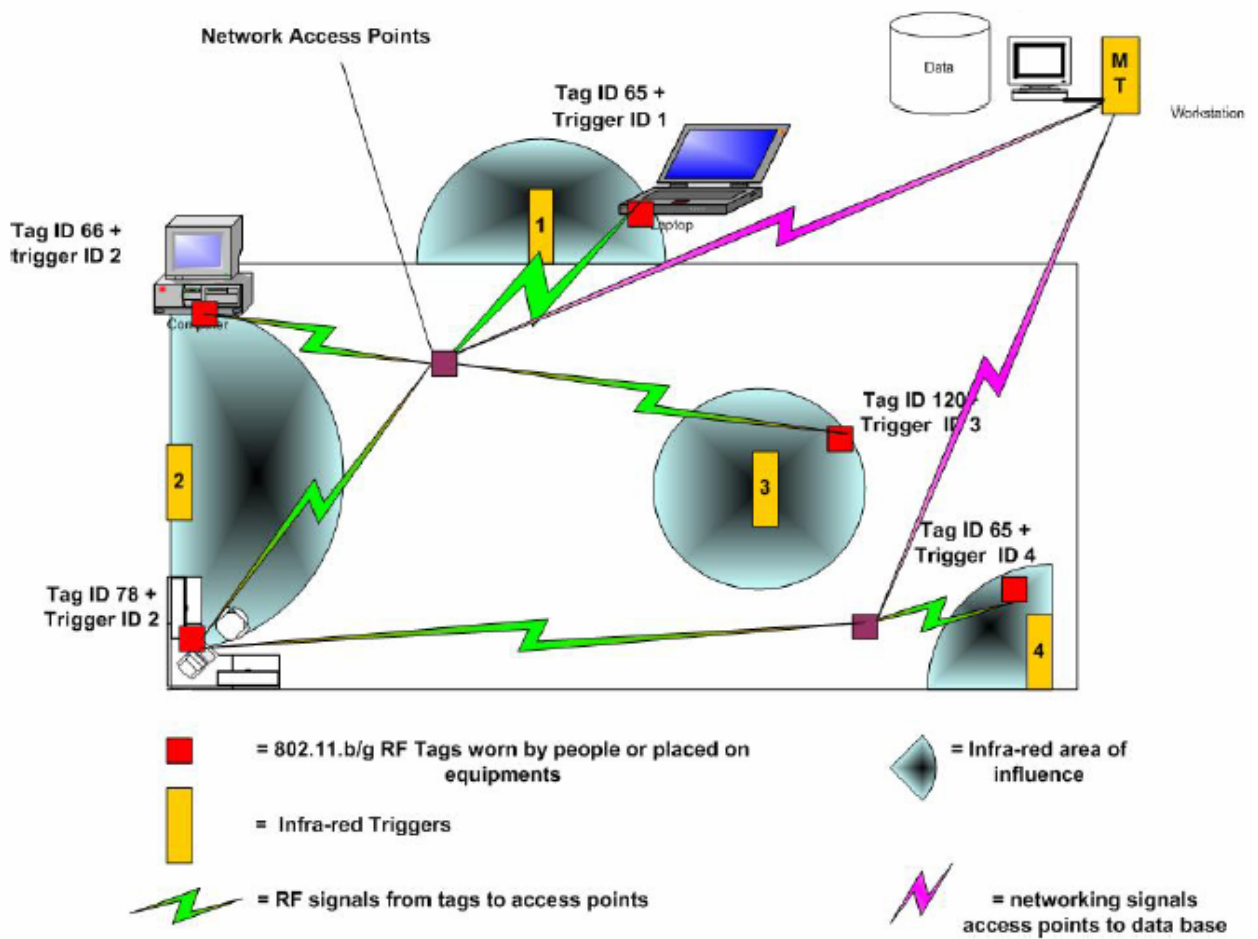
*The baseline system employs two basic components:*

- 1. Dual mode infra-red/RF tags- these tags incorporate an infra-red sensor that responds to an incoming coded signal such that the tag will transmit an RF output signal when it is in the vicinity (range) of an infrastructure mounted device. The output consists of the tag identification (ID) value and the identification of the infra-red transmitting unit. Thus the RF output serves to identify both the item (or person) and the location with a single transmission.*
- 2. Wall mounted trigger assemblies - these devices are designed to be powered from wall transformers that are "plugged into" the common wall outlets for 110/220 VAC power sources, thus obviating the need for hard wiring. These devices incorporate a number of infra-red signal transmitters and are continuously emitting the coded infra-red signals that the tags respond to. The power of these infra-red emitters is controllable with handheld devices such as PDAs, laptops or Active RFID Systems, Inc. supplied controllers. The power of these emitters determines the range of the system and can be adjusted from several inches to tens of feet. In this manner a near spherical volume of "engagement zone" is created. Within this "engagement zone" any tag will be triggered and the reception of this signal received by the 802.11.b/g network.*

*The infra-red signals are pervasive and do not require line of sight to actuate tags.*

*When a tag is in the vicinity of an infra-red device, the tag transmits the 802.11.b/g 2.45 GHz "payload" of data to the existing network.*

The figure below is incorporated as an illustration of the basic operating principles of this system.





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*In our system, the wall mounted triggers are shown (marked as IDs 1 through 4) fixed to wall outlets in the vicinity of the items to be monitored. These readers emit a continuous encoded infra-red signal that is transmitted hemi-spherically (shown in blue gradient and defined above as the "engagement zone") from each trigger device. These signals can be adjusted for approximate range; however, it is likely that signals will occasionally "spillover" into another reader's range. The system hardware enables manual adjustments of these infra-red signals.*

*When the tags (shown in red) receive an infra-red signal they transmit an 802.11.b/g signal (illustrated in green) to the access points. Note: Active RFID Systems, Inc. can supply both access points or relays for areas that do not have 802.11.b coverage. This signal may be received by a multitude of access points. However, since this signal packet contains both trigger signal ID as well as tag ID, the data base algorithm recognizes the tag as being in a particular trigger's sphere of influence. Again, there will occasionally be overlap due to infra-red signal spillover, in which case the location will be noted as within multiples of the trigger's range. Continuous receipt of a trigger signal will cause the tag to remain RF silent except for periodic updates.*

*The triggers can also be set up to form a "wall" at portals enabling the tracking of items that are entering or exiting through such a portal opening.*