

Electronic Product Code (EPC)-Compliant Passive Radio Frequency (RF) Technology
By Fred Naigle

The commercial industry led by Wal*Mart® and supported by DoD are moving together toward adoption of passive radio frequency technology and Electronic Product Codes (EPCs) as an eventual replacement to the bar code. On 20 February 2004, the Deputy Under Secretary of Defense (Logistics, Materiel, and Readiness) signed an update to the Draft OSD Radio Frequency Identification (RFID) Policy. The OSD policy establishes the DoD milestones to begin implementing EPC-compliant passive RF beginning in January 2005. Major DoD suppliers have been notified of the required date to begin installing passive RF tags on DoD shipments. The Draft OSD RFID Policy will be updated again in April 2004, before being finalized in July 2004.

Passive RF technology has been around for several decades, but until the two big supply chain conglomerates announced their intent to use the technology, passive RF has enjoyed limited use and very specific applications (toll collection, access control, railcar tracking, wildlife tracking, etc.). Today, EPC-compliant passive RF is gaining momentum because it offers significant advantage over bar codes. Bar codes have limited data and require individual item scanning at close range. Passive RF can enable hundreds of items to be read simultaneously at a distance of a couple of meters. The use of EPC on the passive tag provides an address pointer to reach-back into a database to retrieve product information. EPC-compliant passive RF promises to reduce reliance on human intervention, speed processes, and reduce errors in actionable logistics tasks.

Currently, there are four levels of EPC- compliant passive RF tags envisioned under development:

- Level 0 – item
- Level 1 – package
- Level 2 – case or transport unit
- Level 3 – unit load or pallet.

As of this article, Levels 0 and 1 are in pilot project testing and Levels 2 and 3 are in concept or engineering development. The OSD RFID Policy requires the use of level 1, 2, and 3 tags beginning in January 2005.

Unlike the current battery-powered active RF tag that emits a continuous signal (unless commanded to sleep), passive RF tags do not have a power source or emit a continuous signal. The tag requires a strong RF signal from a reader/interrogator. The RF tags reflect energy from the reader/interrogator or receive and temporarily store a small amount of energy from the reader/interrogator signal to generate a tag response. The return signal is constrained to very low levels by the limited energy available in the tag that equates to a shorter read range (3-12 feet) than active tags (300 feet or more). Battery-assisted or semi-passive tags possess a small internal battery. The added power in semi-passive tags allows the tag to include environmental sensors (temperature, shock, and pressure) or extend the

tag signal range. The battery assist may also allow a semi-passive tag to incorporate reusable read-write capabilities.

The enthusiasm over passive RF is not without caution. There is a great deal of engineering work to do to bring the EPC-compliant passive RF technology to fruition. Wal*Mart® and DoD are doing as much to manage expectations as they are to press forward achievements in the technology. Army expectations are tempered in cost and schedule realities to implement the OSD RFID Policy. Implementing the EPC-compliant passive RF envisioned by the policy will require significant infrastructure to accommodate the short read range and changes to current and future information management systems. To provide the reach-back support of EPC, assured communications will be required and a significant amount of hardware will have to be purchased.

Passive RF has the long-term potential to change the way the world does business. The two mega supply chain giants (Wal*Mart® and DoD) are locked in agreement on direction and timetable and have issued direction to their top suppliers. The ability to reconcile cost and schedule requirements outlined in the Draft OSD RFID Policy will determine our ability to stay the course over the long haul and bring passive RF technology to fruition in the global supply chain.