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RFID Class Warfare

The Battle for an Internationally-Accepted Passive Tag Standard

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The summer of 2005. That is the earliest date that an internationally-accepted UHF Passive Tag Standard can be expected to be ratified. Or, depending on the actions taken by EPCglobal later this month, it may not be achieved until as late as 2009.

That these dates clearly contradict the widespread expectation of the creation of a passive tag standard early in October 2004 when ratification of EPCglobal's Generation 2 Standard is expected merely underscores an honest, but unrealistic, attempt to speed along the time when there is a *true* passive tag standard.

Under-played is the fact that there is a big difference between obtaining an USA Consortium-crafted ratification of an EPCglobal "purpose-specific" drafted over-the-air (Air Interface) protocol standard, and the acceptance of an "all-purpose" standard by worldwide users and suppliers.

Thus, in order for any ratified standard created by EPCglobal to gain worldwide acceptance, it must be rendered truly all-purpose, and be recognized and issued by an international standards body known for producing technically sound and operationally viable standards. Standards that are comprehensive enough to assure ubiquity among the products of all the suppliers that claim to be compliant with the standard.

Ubiquity is especially important in the case of RFID tags. In order for RFID to fulfill its promise of cross-enterprise productivity improvements, the tags employed by each enterprise must be as ubiquitous as commercial radio broadcasts. Specifically, the radio Reader that an enterprise uses to pick up the broadcast of any transmitting tag must be capable of receiving the broadcast free and clear, with the only proviso being that the radio Reader be tuned to the right frequency.

This is true whether the purpose for which the tag is used is cross-enterprise supply chain tracking, in-enterprise inventory and manufacturing management, or managing assets – including people.

A Defining Moment for EPCglobal

This month, from among two proposed Air Interface protocol methodologies, EPCglobal is scheduled to select the method that will be put to a ratification vote in October as EPCglobal's Generation 2 Air Interface protocol.

If the selected methodology is the proposed method that is based on an evolutionary enhanced version of the existing International Standard Organization (ISO) 18000-6 Standard, it is within the realm of possibility, and high probability, that EPCglobal's Generation 2 Standard can be adopted as the ISO 18000-6c Standard as early as the summer of 2005.

(Already in existence are ISO 18000-6a and 18000-6b Standards for a UHF Passive Tag Air Interface between the Tag and the Tag Reader. In what is the normal evolution of an Air Interface Standard, the 6a and 6b Standards are analogous to those that became the original 802.11 Standard. Namely, two different, non-compatible Air Interface Standards as precursors to arriving at a single standard. For 802.11, the original 802.11FH and 802.11DS Standards were the necessary precursors to arriving at the single Air Interface Standard that is now 802.11b. Likewise, in the case of 18000-6, the 6a and 6b Standards currently in effect are the precursors to a single standard that will become 6c. It should be noted that, if the consortium that resulted in the creation of EPCglobal didn't exist, what the ISO proponents are proposing to become EPCglobal Generation 2 would become 18000-6c anyway. And, assuredly well before the summer of 2005.)

Adoption by EPCglobal of the ISO-based Air Interface methodology would come with the guarantee of acceptance of the EPCglobal Standard by ISO, and thereby would guarantee worldwide acceptance. Thus, the ISO ratification date would mark the date when there would be an unquestioned ubiquitous UHF Passive Tag Air Interface Standard that would be universally supported. A standard status that assures all enterprise-users that their investment in an infrastructure built upon this Generation 2/ISO-compliant protocol will be protected from incompatibilities, technical deficiencies, and obsolescence. Also, a protocol specification with a built-in means of maintaining backwards compatibility as the protocol is enhanced by future technological developments. We can say this because these are characteristics inherent in any protocol that carries the ISO label. Thus, any deficiencies relative to these characteristics that may inadvert-

ently exist in EPCglobal's creation of Generation 2 will be corrected before it becomes an ISO standard.

A Standard for the Next Wave of Global Prosperity

With such assurance of ISO-certified investment protection, the world's enterprises will be able to make the business case to move, and move rapidly, to implement the kind of RFID systems that will usher in an era of enormous gains in enterprise productivity – way beyond the substantial productivity gains that automatic data capture and wireless LAN-based interactive transaction processing systems have delivered to date. The result can be expected to generate a new higher level of prosperity for the global economy.

Stated another way, the primary pacing prerequisite for achieving this happy balance sheet status across the full spectrum of enterprises requires RFID ubiquity that can be attained only when there is a single internationally-accepted, all-purpose standardized RFID infrastructure that can read, write, and process tag communiqués from tags produced by a plethora of suppliers.

Thus, if the EPCglobal Working Committee adopts the ISO-based recommended protocol – or one mildly modified in order to arrive at consensus – then we have a situation that will enable the Generation 2 Standard not only to achieve ratification in the USA by year-end 2004, but also by the international community within a reasonable time thereafter.

The Alternative Scenario

If, on the other hand, EPCglobal adopts a protocol method substantively different from what ISO is planning to embrace, then the RFID world has a problem. The goal of having a single worldwide passive tag UHF standard will have been delayed for a period that can be measured in years. Such a delay will be enormously costly in every respect for both suppliers and users.

We will shortly make the case why ISO will prevail if there is a battle between a non-ISO compliant Generation 2 and an ISO Standard. **A result that potentially could render the EPCglobal Generation 2 Standard irrelevant.** But, no matter which methodology prevails, a contest of two conflicting standards will simply delay the date when there is worldwide Passive Tag ubiquity, and thus the date when any enterprise can make a valid business case for building the kind of RFID infrastructure that can be used to produce acceptable ROIs.

In the meantime, in the absence of an adequate business case for procuring and installing a Passive Tag infrastructure that will result in balance sheet benefits, pressure from end-of-the-supply chain retailers such as Wal-Mart may require that their suppliers slap a Generation 2-compliant tag for goods shipped to such retailers. RFID used solely for compliance-centric procedures will add cost to the retail suppliers cost-of-operations that will far exceed any possible expectation of savings.

Such a situation will be such a sufficiently unstable situation that it cannot prevail. In the end, even the Wal-Mart-like retailers of the world will realize that the absence of ubiquity is contrary to their business objectives, and may look for ways of moving from any non-ISO-compliant standard to an ISO-compliant standard.

Unfortunately, this could consume as much as five years, and in the process deny all enterprises the full beneficial potential of RFID. During that half decade period, RFID infrastructure suppliers most likely would be obliged to support both the Generation 2 and the ISO 18000-6c protocols. But the chip suppliers will not be able to afford or justify the luxury of dual chip support. Thus, chip suppliers will be divided into suppliers of one or the other mutually non-compatible standards. Since the well-funded, well-heeled mega chip suppliers are committed to ISO Standards – some already are die casting based on their assumptions of what technically has to be in the specifications of a ratified 18000-6c standard — their sheer muscle will assure that ISO will prevail. Additionally, their customers are not the end-of-the-supply chain retailers. Thus, the retailers don't have the leverage to pressure the chip suppliers to comply with any arbitrary EPCglobal standard that conflicts with ISO.

But the retailers do have influence with their own goods suppliers. Thus, during the period when a non-ISO compliant Generation 2 and an ISO 18000 standard slug it out for global acceptance, the retailers' suppliers will be pressured to employ Generation 2 tags. But during this period, the retailers' suppliers will be hard pressed to make the business case to build an internal RFID infrastructure that has to support two contradictory standards. One method will have to give.

There is no getting around the business reality that a single over-the-air protocol used within the supply chain composed of global enterprises must be based on an internationally adopted and accepted standard. **No matter what twists and turns occur to get to that point, in the long run, only an ISO Standard will prevail -- if for no other reason than the fact that the plethora of international governmental treaties mandate this.** But, there are other supporting reasons.

Historical Precedence on ISO's Side

Historical precedence asserts that the standard built by a recognized international standards body will prevail over one built by a body that emanated out of a consortium – regardless of the pedigree of the consortium members. EPCglobal evolved from the Auto ID Center Consortium.

Consortia and standards bodies conflicts are not new. There are ample examples – including contentions such as conflicts between the Frequency Hopping Consortium and the IEEE Standards Committee, and between the Bluetooth Consortium and the IEEE Standards Committee.

These two examples mimic the situation we are now experiencing with EPCglobal.

Bluetooth was an idea conceived by Ericsson to provide a wireless connection between a data device and its cellphones – giving the data device access to the cellular network. At conception, it was a brilliant idea that sought to make up for the cellular network’s woeful lack of data support. And Bluetooth had a seemingly enormous advantage over the “then” version of wireless LANs – the Bluetooth concept used a minimum fraction of battery power compared to that consumed by wireless LAN systems, and it was less costly. Soon, a Bluetooth Consortium arose, with a lot of blue blooded suppliers in its ranks. The Consortium leaders were inexperienced in standards writing, and what they produced was far from what had to be in a standard if multi-sourced Bluetooth radios were to enjoy ubiquitous communications. It was only when IEEE, a blue blooded accredited standards making organization, took Bluetooth under its wing that a viable Bluetooth Standard came into being. Far from being a generous benefactor, IEEE’s motivation was to make sure that what evolved from Bluetooth did not wreak interference havoc with wireless LANs sharing the same unlicensed spectrum.

The lesson to be learned is that it was only when an accredited standards body came out with a Bluetooth Standard that suppliers, assured that Bluetooth was reasonably protected from third party sources of interference, were willing to bring Bluetooth products to market.

Another example is the wireless LAN itself. Wireless LANs went through a phase when nearly everyone favored using Frequency Hopping as the protocol for a single 802.11 Standard. Again, there were commanding arguments for its popularity. In the early stages of its popularity, suppliers favoring its use included such powerhouses as Intel and IBM. And again, even a Consortium was formed to rush a standard upon the world.

Interestingly, the Consortium ignored the fact that IEEE was already working on a Standard. (A situation not unlike that of the AutoID Center Consortium — from which EPCglobal emerged — ignoring the RFID standards-making activities of ISO.) However, soon thereafter, responsible suppliers involved in the IEEE 802.11 Working Committee recognized that the downsides of Frequency Hopping outweighed its advantages. Perhaps the most notable downside was limited traffic handling capacity, compared to the alternative Direct Sequence approach. Thus, within the IEEE Standards body, Frequency Hopping just didn’t make the cut. The result is that the world was given the 802.11b (Wi-Fi) Standard, and the benefits to the world are history. But this happy ending was not without a struggle from Consortia that went so far as attempting to obtain two sets of governmental regulatory changes. One set would provide Frequency Hopping with near (but not even par) traffic handling capacity of Direct Sequence. The other set attempted to regulate Direct Sequence out of existence.

It is important to note that what became 802.11b was given to the world five years earlier than expected. To put it into context, if two powerfully pivotal

members of the IEEE 802.11 Working Committee had not acted with decisive business maturity, and a “let’s do the right thing functionality-wise” attitude, according to another member of the Committee, Wi-Fi supporting product would not have been available until 2003 – rather than five years earlier.

Today, the Frequency Hopping Consortium is no more. The more powerful members had withdrawn their support and joined the Direct Sequence generation. Those few that remained steadfast are either out of the wireless LAN market, or possess a tiny fraction of the business by supporting their installed base of Frequency Hopping wireless LANs. Meanwhile, their users who installed Frequency Hopping infrastructures based on the adamant recommendations of their supplier face the daunting task of sooner or later chucking the millions of dollars invested in portables provisioned with hardwired Frequency Hopping radios. These same users are not about to invest in any RFID infrastructure until ubiquity is assured.

No Standard Means the Classes Are Out

UHF Passive Tag standardization is at a comparable cross-roads. Currently, the tags offered as Class 0 or Class 1 tags enjoy a perception of being standardized tags. Yet, by any definition, they are not. Each sports a unique and proprietary protocol developed by one of two different suppliers that have placed their respective protocols into the public domain. Yet, neither approach has been reduced to a standards specification, let alone been ratified by any accredited standards body. And it is a given fact that neither of the two protocols will ever become an EPCglobal standard. This became factual when EPCglobal halted all effort towards that end. Additionally, one major retailer has declared that it will cease to accept pallets and cases with either class of tag one year after Generation 2 tags become available. This translates into the hard fact that Class 0 and Class 1 tags will be rendered obsolete by the end of 2005.

In actuality, one could submit that Class 0 and Class 1 tags already are obsolete. That is because what their own creators defined as Class 0 and Class 1 tags are no longer being shipped, except in support of their installed base. In fact, one is hard pressed to be definitive about just what is being shipped currently under the highly misleading claim of a "Class" standard. This is an undisciplined, chaotic situation that can only be corrected by the emergence of a single ISO Standard.

In Search of a Business Case

All external factors aside, this clearly states that it would be a foolhardy business decision, going forward, for anyone who has yet to procure any RFID components to even consider procuring Class 0 or Class 1 tags (and Readers). At a minimum, any new purchase arrangements should be for Generation 2 tags. And even that should be conditioned on assurances that the Generation 2 tags will be concurrently compatible with the ISO 18000-6c specifications. In our opinion, it would be business malfeasance to procure anything other than RFID components that are based on an international standard.

We don't even buy the idea at this time of piloting with Class 0 or Class 1 tags. The analogy would be to pilot a distributed data processing system using Apple PCs and Windows Servers – with the idea of replacing the Apple PCs with Windows PCs just before going live. If one needed to roll the dice, it would be more prudent to pilot with current ISO 18000-6 tags with the idea that they would be more like whatever becomes the ISO 18000-6c Standard than the Class 0 and Class 1 protocols.

We suspect that part of the perception that the “Classes” Tags are standard tags is not about perceiving them as Air Interface standards, but about the standardization of the ID format of the tag. That, in our view, is the true claim to fame (along with the Networked Tag concept) of the Auto ID Consortium and what it attempted to achieve.

But whatever ID format is employed is totally tangential to what Air Interface protocol is employed. Stripped to its essence, the EPC ID format is a standardized data record format with its payload data field composed of fields that describe the identity of the enterprise that attached the tag to a given object, the object's bulk ID, and the object's unique serial number within its bulk ID. The EPC ID format has reason to gain international acceptance because a formal mechanism has been set up to codify, assign, and register numerical values for identifying each participating enterprise, and assign categorical values to the enterprise's bulk object identifier.

But again, were the Class 0 and Class 1 tags, across the board, to support the EPC ID format, their Air Interfaces would still remain proprietary. Ironically, some of these very tags being used currently do not have sufficient storage capacity to support the standardized EPC ID format. Others do not support writing to the tag. Thus, even to say tags are Class 0 or Class 1 conforming does not define the *ID standard* they conform to.

There Is No Free Lunch

A side issue that is complicating matters is that EPCglobal appears to be seeking to specify a radio Air Interface methodology as its Generation 2 Standard that is not covered by patents. With all due respect, this is naïveté. It is inconceivable that any technically worthy methodology, in whole or in part, is not already covered by innumerable patents. Suppliers do not invest in development without the expectation of reaping a return. The best that can be hoped for is to ascertain that any claims to the technology are made available to all comers on a non-discriminatory and reasonable license fee basis. And, in many cases, cross-licensing arrangements will result in no or little money changing hands. This is very much the case with wireless LANs.

However, more to the point, it is our understanding that both proposed methodologies under review by EPCglobal include processes that are covered by patents. And in the case of one of the proposals, where its proponents claim that its proposed method is free of patent infringement, the contention is being challenged in the courts. We'll submit that the EPCglobal Working Committee, amply staffed by engineers, can readily determine the veracity, or lack thereof, of any claims to a patent-free methodology. And, if it is determined that the patent holders' claims, not those of the proposed methodology proponents, have an iota of veracity, then the supposed patent-free proposal should be summarily disqualified. The stakes for productivity improvements are too high to engage in silly attempts to skirt the normal business practice of having to have license agreements among those who productize a well-accepted technology standard.

Thus....

The bottom line is that EPCglobal, by its own actions, eliminated the Class 0 and Class 1 protocols even from being considered as the basis for the Generation 2 Standard. By their so doing, the class warfare has now transitioned to a situation where **EPCglobal either joins in an alliance with the free-world's only super standards-making power, or chooses to wage war against it. We will soon know.**

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