RosettaNet's PIP2™A9:

Making Sense for Design Chain Partners

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Today's electronics manufacturers—component suppliers and OEMs alike—operate in a hectic environment characterized by rapid change to both internal and external business processes. The explosive growth of e-business initiatives has led many to adopt process-control and data management standards to make it easier to manage their extensive networks of e-commerce partnerships with suppliers and customers and to collaborate with design partners.

RosettaNet, a self-funded, non-profit consortium of major Electronic Component (EC), Semiconductor Manufacturing (SM), and Information Technology (IT) companies, is a case in point. These companies have partnered to create and implement industry-wide, open e-business process standards in XML (Extensible Markup Language). RosettaNet and its members develop partner interface processes (or PIP™s) that each deal with a single aspect of partner-to-partner collaboration. Collectively these PIPs cover the entire spectrum of supply, manufacture, and distribution. A few PIPs focus directly on the design process. In particular, PIP 2A9 titled, "Query Technical Product Information," is beginning to see its first widespread adoption.

This PIP was developed primarily based on input from such industry heavyweights as Agilent, Hitachi, IBM, Intel, Lucent, Mentor Graphics, Motorola, NIST, Philips, Si2 (Silicon Industry Initiative), ST Microelectronics, and Texas Instruments. Originally, this PIP began life as the QuickData standard which RosettaNet adopted and enhanced as the basis of its first query and response process. The PIP squarely targets the process of moving technical information from component suppliers to electronic product designers. These early adopters have recently been joined by at least a dozen companies worldwide—including Mitsubishi, Altera, Xilinx, Cypress Semiconductor, NEC, Oki, Bourns, Toshiba, Fujitsu—all of whom have answered the question: "When is the right time to adopt an e-business standard for electronic design companies?"

So, how can you know when the standard is right for you, and when you should begin using it? Has this PIP reached the point where it provides real business benefit? (For a detailed description of the background of RosettaNet PIP2A9, see sidebar.)

And what benefits can you expect to see? RosettaNet designs its PIPs to provide:

- Faster infrastructure implementation (compared to EDI)
- Better customer "self-service," using Internet-based e-commerce
- Lower-cost implementations (versus costly Supply Chain "integration" solutions)
- Improved time-to-market (for both component suppliers and OEM product teams)

- Tool interoperability between vendors (supporting multiple PIPs and commerce partners)

What follows is a series of questions, answers, and guidelines to help you determine if PIP 2A9 is right for you, right now.

Implementing PIP 2A9

How does a company evaluate when to implement PIP 2A9? Here's a useful checklist for any electronic industry company:

- Is it *easy* to create the component information needed by query/response software?
- Does the standard provide *useful* data to internal information management systems?
- Is an initial vendor implementation *cost-effective?*
- Do supporting software providers offer tool *interoperability?*
- Is the standardized industry dictionary *ready?*

Ease of Implementation

Implementing a PIP2A9 compliant product information database is *reasonably easy,* especially if the electronic component vendor already has a product information database. If so, much of the necessary information is already available for the vendor's web site and requires only simple conversion and formatting steps.

In those cases where the data is not readily available, the component vendor can bring a PIP software supplier into the process to gather and implement the data. This involves both data "conversion" (to XML) and data "mapping" (assigning dictionary "codes" to vendor data, ensuring the data is consistent with the definitions in a standardized dictionary). This straightforward process acquires and incorporates the data into a PIP-compatible data store to support query and response software.

As a rule of thumb, PIP 2A9 implementations require between 30 and 180 days, depending upon the breadth of a manufacturer's catalog and the depth of information coverage desired.

How Useful is the PIP?

RosettaNet suppliers and OEM partners have long experience with the problem of supplying useful technical information in standard formats. Many of these partners previously supported such projects as Japan's ECALS (Electronic Continuous Acquisition and Lifecycle Support) and Si2's ECIX (Electronic Component Information Exchange) program, or its predecessor The Pinnacles Initiative. PIP 2A9 essentially mirrors the goals of these earlier programs.

Moreover, OEMs were the primary drivers in establishing the query/response nature of all these projects. The active participation of OEMs ensures that the PIP is asking and answering "the right questions." Simply put, a designer wants to know where and how to: Find, Try, Buy and "Design and Build" with electronic components for a particular project. To the extent that a given process yields these results, suppliers and OEMs report that the value of improving time-to-market for an electronic product lies between $2 million and $50 million per week. Yes, it's *useful.*

Cost-Effectiveness

A typical PIP2A9 production implementation for a Supplier is at least a six-figure proposition, possibly ranging up to seven figures. These costs depend on the size of a particular component vendor's catalog, the urgency for the vendor to implement the PIP, and the extent to which the component vendor wants to support specific *product information objects*—PIOs—such as CAD models.

A Supplier with fewer than 100 products in only a few product classes, a limited amount of PIO support, and six months or more to get into production can project costs at approximately $1,000 per product, even if there is no existing "database" of product information. This estimate obviously depends on which PIP software vendor the component supplier selects.

By contrast, a typical broad-spectrum supplier will offer dozens of product classes and thousands of products. Rapid implementation in 30 to 90 days to satisfy the PIP service requirements of one or more key OEMs could run implementation costs into the hundreds of thousands of dollars or more. Fortunately, suppliers with large product lines likely have existing product information databases. This helps lower their per-product cost of implementation to well under the $1,000 per part faced by suppliers with a smaller product catalog.

OEMs implementing PIP standards also have ramp-up costs of between $10 and $50 per product. RosettaNet Solution Partners can provide full-scale OEM implementation in less than one year. By contrast, non-participating OEMs face the high and ongoing costs of re-keying massive amounts of information about their vendors' products from Supplier datasheets into CAD systems. Additionally, the rework due to data entry errors can cost a non-participating OEM product design project millions of dollars.

By comparison, a non-PIP compliant component information management system implementation at a large-scale OEM typically costs between $1 million and $4 million. Worse, it can require as many as three years (sometimes longer) to reach full production. Simply put, PIP-compliant OEM systems virtually eliminate rekeying data into CAD systems and minimize rework due to data entry errors. The PIP-compliant system can be implemented much more quickly. More importantly, when used with supporting Design Chain Management™ software, it can dramatically reduce a design project's time-to-market

RosettaNet's implementation-cost guideline reduces costs by *five times* compared to EDI (with its six-figure annual costs and $1,000 per transaction-type per partner implementation costs). Thus, the only conclusion is that PIP2A9 is *cost-effective*.

Interoperability

While it isn't reasonable to expect software vendors to collaborate on product development, RosettaNet's development methodology is *highly* collaborative. The result is that most of the Solution Partners participate at important points in the process development of each PIP.

OEM partners strongly prefer that component vendors retain operational independence of their PIP support. Lucent Technologies, for example, has stated publicly—on many occasions—that it intends for its suppliers to support the PIP in the same way, regardless of which Solution Partner's PIP query or response software they choose. That leaves Lucent free to build its own PIP tools, to choose from among several existing tool providers, and to change tools over time without risk to its long-term plan. Other major OEMs agree with this strategy and it perfectly matches RosettaNet's tool interoperability goal.

Lucent and IBM recently spurred Suppliers and Solution Partners to support the PIP 2A9 Validation Plan. This plan tests the basic functionality of each software maker's capabilities to support queries and responses. It also tests the extent to which the OEMs could use one maker's query engine to hit another maker's response engine. (See sidebar.)

The first validation period, the last week in August and first week in September, 2001, pointed out some problems in the specification and some misunderstandings among the Solution Partners. It also pointed out some very bright spots in both the standard and the software that passed the tests. It provides a documented path toward greater interoperability for those Solution Partners who choose to follow it. So, while there is room for improvement, there are *important parts* of the PIP that are *demonstrably* interoperable.

The Dictionary

The dictionary makes the PIP functional, by:

- Enabling partners to unambiguously understand one another—Both a query and a response are strictly interpreted.
- Easing maintenance—PIPs are modeled in UML and auto-converted to Document Type Definitions (DTDs). The dictionary is used for operational changes, to avoid the need to change every copy of every DTD at every supporting partner when definitions or value types are revised.
- Encouraging flexibility and expansion—The dictionary structure for partner-specific dictionaries is standardized and made available via the PIP. New "entries" can be used immediately between partners who understand the PIP

semantics. Meanwhile, the dictionary maintenance teams work continuously to "normalize" the new content.

RNTD—RosettaNet Technical Dictionary—includes the domain-specific terminology (such as product classes and electrical properties). Other dictionaries contain the Business Entities (both terms and their value types) that are shared across PIPs. RNTD has two parts:

- *Structure*: The ECTD (Electronic Component Technical Dictionary), promulgated by Si2.
- *Content*: RosettaNet's dictionary team imported the ECALS definitions into the ECTD structure.

The structural part of the dictionary is mature and stable.

The content, however, must continually evolve to keep pace with the change inherent in the electronics industry. Dictionary teams have removed much of the ambiguities and inconsistencies of the original material via a series of "maintenance releases". Yet much work remains to be done. When subject matter experts submit requests for changes, these requests are prioritized, analyzed, and answered. Often the answers require a month's work to refine and normalize new and better definitions. Furthermore, the electronic component industry generates new terms and properties (even whole new types of products) at a prodigious rate.

The most recent release (v1.4, late November 2001) is a big step forward and has encouraged several new Suppliers to join the ranks of PIP 2A9 supporters.

Conclusion

PIP2A9 works really well for many classes of components, not so well for others, and not at all for a few. A broad-spectrum supplier, as well as most OEMs, must contend with all these variations. Fortunately, all PIP participants—Suppliers, OEMs, and Solution Partners alike—repeatedly have stated their objective to refine the RNTD and PIP to solve this problem.

RosettaNet has more than 400 member companies in a trillion-dollar market. Most members are major corporations committing hundreds of thousands of dollars in annual support. At least 20 of the largest members support PIP 2A9 and more than half of those also supported the ECALS and ECIX (Electronic Component Information Exchange) programs. They intend to see this PIP succeed so their long-term investments pay off. They also have committed to a much faster timeline to reach full implementation than was possible with prior EDI programs.

Even in today's uneven financial climate, companies that are vitally interested in its success are making major investments in RosettaNet—and in this PIP in particular. In conclusion, the time is right for companies to implement PIP 2A9. Design teams using

this PIP already see faster, better, and cheaper implementations leading to dramatically improved time-to-market for new electronic products.

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[Sidebar]

PIP 2A9: Background

In the middle of 1999, RosettaNet formed the EC (Electronic Component) Board of Directors to meet the needs of semiconductor component suppliers and their customers. This new board parallels its earlier IT (Information Technology) Board, composed largely of manufacturers and distributors of personal computer or workstation products and peripherals. The EC board establishes Internet-based, supply-chain information interchanges using RosettaNet's first technical information PIP (Partner Interface Process): PIP™2A9 titled, "Query Technical Product Information."

From the top down, the RosettaNet standards are organized by Cluster, then Segment, and finally by individual PIPs. RosettaNet defines Cluster 2, titled "Product Information," as follows: "Enables distribution and periodic update of product and detailed design information, including product change notices and product technical specifications." The first of the Cluster 2 Segments, 2A, is titled, "Preparation for Distribution," and is described as: "Enables distribution of product resources, including sales catalog and basic technical information, and obtainment of extended product information." PIP 2A9, titled, "Query Technical Product Information," has garnered significant attention recently in semiconductor design-chain circles. PIP 2A9 is described as: "Specifies the process for querying EC, IT and SM supply chain partners for technical information, including component technical specifications that can be used for business activities such as hosting online electronic catalogs and sales configuration systems."

In April of 2000, the EC board released PIP 2A9. They were able to do so quickly because they adopted a similar standard from Si2 (The Silicon Integration Initiative) called QuickData. This query/response standard was developed by many of the same companies that formed the RosettaNet EC Board (indeed, many of the same individuals worked on both projects). As an example of the industry's urgent need for a standard, Lucent Technologies called for its top suppliers to deliver plans to support this PIP by the third quarter of 2000.

By October 10, 2000, more than a dozen companies were expected to demonstrate response databases and server software. These infrastructure tools support standardized queries for electronic components such as integrated circuits and other discrete semiconductor devices. Three software vendors—ChipData, PTC (Parametric Technology Corporation), and Saqqara—went considerably further. They demonstrated working versions of the PIP. The demonstrations included 14 component suppliers and three OEMs. These vendors demonstrated hundreds of components supported in viable

product information databases by this early date. However, the standard still had not demonstrated its potential for interoperability among vendors.

In April (in the US) and again in May (in Europe) of 2001, RosettaNet sponsored Partner Conferences with PIP 2A9 as a showcase application. A special meeting in Japan at about this same time also focused exclusively on this PIP.

By this time, alliances were forming among some of the larger supply-chain software vendors and smaller ones who supported primarily this one PIP (Tibco and ChipData, for example). And more suppliers were supporting the PIP with larger parts databases and additional information. These included the PIOs (product information objects) used in design files by their customers' CAD systems. ChipData's booth alone featured eight supplier servers and three OEM servers with more than 40,000 components supported with real, production-ready catalog and design data.

Still, vendor-to-vendor interoperability had not been demonstrated and major OEM supporters of RosettaNet (notably Lucent Technologies) wanted to demonstrate interoperability. In practical terms, they wanted any query software to "hit" any component vendor's response database (assuming security allowed the access) and return reasonable results. For this demonstration, they wanted to evaluate the results for a single query spread across multiple suppliers' catalogs.

Meanwhile, the PIP and its supporting dictionary continued to evolve. Throughout this period, the dictionary "content", which was incorporated from the ECALS effort, was merged into the structural model (ECTD, adopted from Si2's ECIX program). After several fits and starts, an official dictionary review team developed a dictionary maintenance methodology and adopted supporting software.

In late August and early September, 2001, several Supplier/OEM partners using different PIP-support software vendors, tested the PIP and dictionary interactively. This test successfully "validated" the first maintenance release of PIP 2A9 and the new release of the dictionary.

This test stipulated 12 different ways to judge whether queries, responses, and support software were "valid" according to the standard and its supporting specifications. The results of the test—all vendors "passed" some of the tests and one vendor (ChipData) passed them all—allowed RosettaNet to revise, reword, and expand the specifications. The PIP project teams will shortly deliver improvements developed during the validation tests. These improvements will allow design-chain solution vendors to deliver more detailed component information and transparent interoperability among software suppliers.

RosettaNet released a subsequent enhancement to the RNTD in the last week of November 2001. The organization has also scheduled a second validation test for December, 2001. These milestones are expected to bring the number of companies actively supporting this PIP to about 20 by year's end. Nine of these companies have

pledged to be “in production” (they have stated they will be doing business using the PIP) with PIP 2A9 by January, 2002. At least three additional companies are expected to join them in February and March, 2002.