



BRIDGE

Newsletter - July/August 2008

BUILDING RADIO FREQUENCY
IDENTIFICATION SOLUTIONS
FOR THE GLOBAL ENVIRONMENT

Welcome to the BRIDGE Project Newsletter !

This newsletter is published every two months to keep you updated on the happenings within the BRIDGE project. Each edition contains topical information arising from the various Work Packages within BRIDGE as well as other BRIDGE related information.

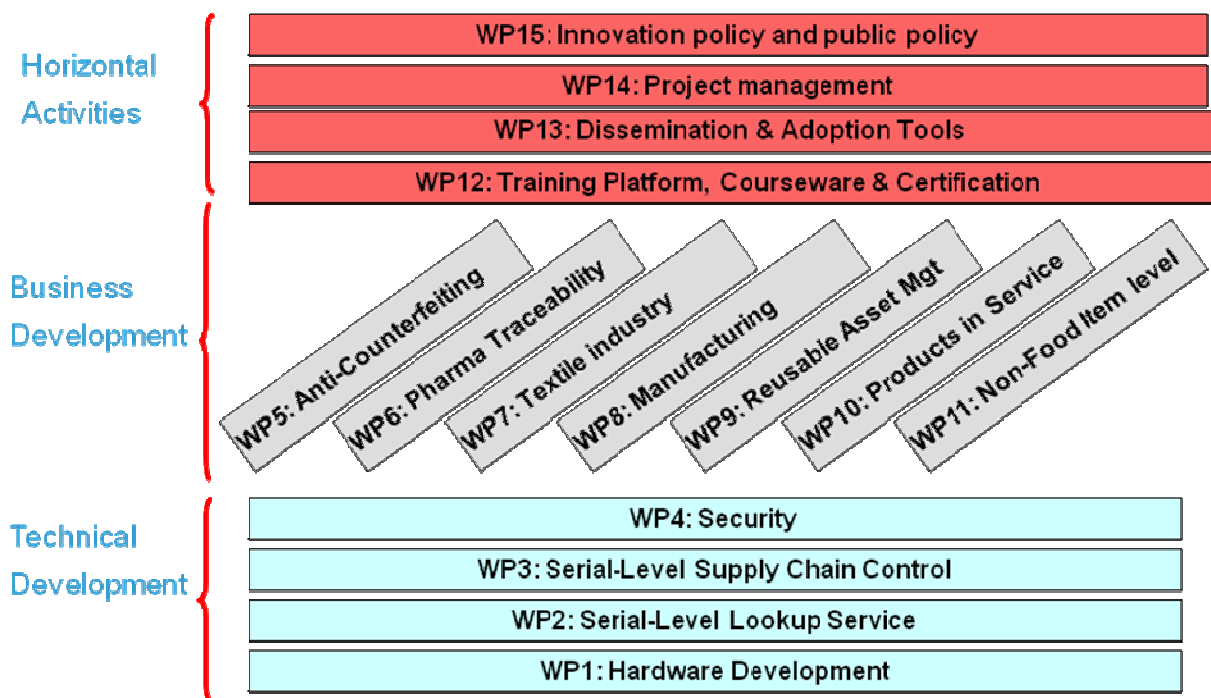
For this edition, as we are celebrating two years into the project, we will give you an overview of what has been achieved so far.

Any feedback or questions contact emilie.danel@gs1.org





BRIDGE is a European Union funded Integrated Project addressing ways to resolve the barriers to the implementation of RFID and EPCglobal technologies in Europe. The project started in July 2006 and it will be completed in June 2009. The project includes an important research and development programme in various aspects of RFID hardware, software, network and security. Seven Business work packages have been set up to identify the opportunities, establish the business cases and perform trials and implementations in various sectors including anti-counterfeiting, pharmaceuticals, textile, manufacturing, re-usable assets, products in service and retail non-food items. A series of horizontal activities provide training and dissemination services, enabling the adoption of the technology on a large scale in Europe for the sectors addressed by BRIDGE and beyond.





Thirty organisations are members of the BRIDGE Project, representing a good balance between standard bodies, academic and private research centres, end users and solution providers. The members are GS1 Global Office (Coordinator), GS1 member organisations from China, France, Germany, Poland, Spain and UK; University of Cambridge, ETH Zurich, Fudan University (Shanghai), TUG Graz (Austria), UPC Barcelona; Benedicta, Carrefour, gardeur, Kaufhof, Nestlé UK, Northland, Sony Logistics Europe; AIDA Centre, AT4 wireless, British Telecom, CAEN, Confidex, Domino, JJ Associates, Melior, SAP, UPM Raflatac and Verisign.

Over the last two years, the BRIDGE project participants had the opportunity to provide numerous presentations at conferences in Europe and around the world. Many articles and scientific papers have been published, in addition to the formal deliverables that are largely available on the BRIDGE public web site. It is quite challenging to monitor the progress of a project bringing together a large number of organisations and representing a cumulated total of more than 100 years of manpower commitment in research and development. It is at the same time very gratifying to see the remarkable quality of what has been produced so far and to enjoy sharing this knowledge and expertise with interested parties. If you haven't done so yet, I invite you to consult our web site at www.bridge-project.eu, to download papers of interest and to participate in webinars that we will continue organising on a regular basis. We also welcome questions and comments that you may have.

We are now entering the last year of the project. With a number of tasks getting ready to reach their conclusions, a large number of reports, prototypes, software models and demonstrations will be produced. I'm convinced that this will trigger creative and innovative initiatives aiming to deploy the RFID and EPCglobal technologies in Europe and beyond.

Henri Barthel
BRIDGE Project Coordinator

<http://www.bridge-project.eu>
If you have questions regarding the BRIDGE project contact:
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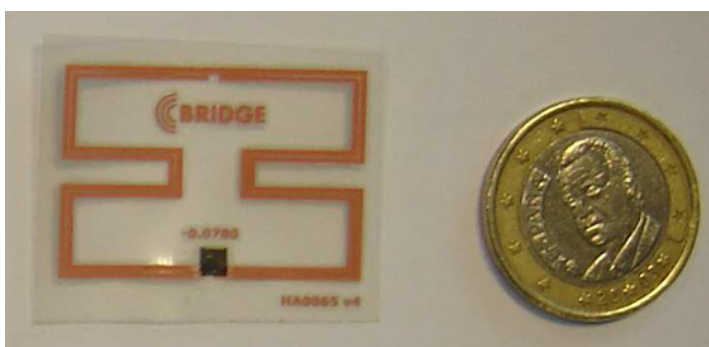
The first group of work packages within the BRIDGE project is focusing on technical aspects of the RFID technology, including hardware development but also serial level services and security components. During the second year of the project, the technical work packages have progressed considerably, developing important elements to improve and facilitate the use and implementation of the technology.

Hardware development

The first work package of the BRIDGE project focuses on hardware development to complement the existing RFID technology making it more affordable and usable. This year, the team has progressed in the following areas:

Miniaturized UHF tags based on metamaterials geometries:

This research introduces a new radiating structure inspired by the Split-Ring Resonator (SRR) used in some metamaterials structures. It has the advantage of being easily miniaturized and fabricated in planar substrates. This work presents a novel antenna design which can be manufactured in planar substrates and small sizes.



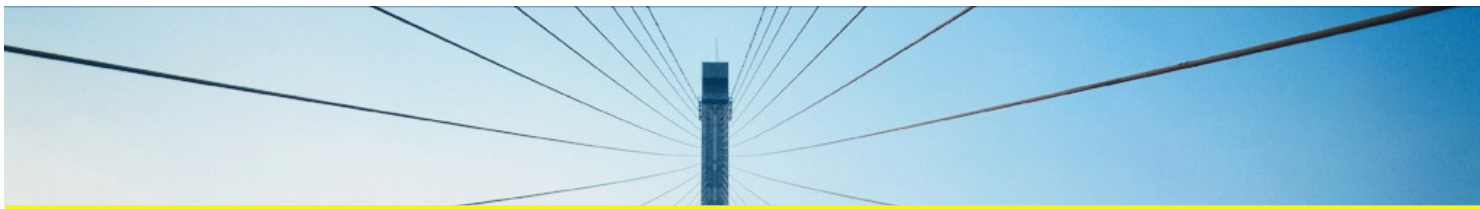
Miniature tag developed by WP1 - Coin is 1 Euro

Near-field UHF tags based on metamaterials concepts

This work introduces a new concept for the implementation of near field UHF RFID tags. Near field UHF tags are of more interest than HF tags, because they can be implemented without 'via holes' and thus reduce the fabrication cost.

Metamaterial concepts are introduced in order to increase the sensitivity of a near field UHF tag to a magnetic field. An RFID system is composed basically of two parts: an interrogator, usually known as a reader, and a transponder, known as a tag. The tag is composed of two parts: an RFID chip and a small antenna.

Depending on the antenna structure, it can be optimized to radiate power into the far field, or it can be optimized to produce a strong near field surrounding the antenna (electric or magnetic). In the latter case, the structure actually is not a good antenna in the sense of antenna radiation efficiency; however it has other interesting properties. One of which is that by using magnetic near fields, the system becomes more robust to the environment. Dielectric and lossy materials such as water in between the reader and tag antennas may produce strong detuning of the tag and attenuation to radiated waves. These dielectric materials do not disturb magnetic near fields so much. Therefore a single coil or loop can be used as an antenna for coupling the magnetic field in the UHF band.



Discovery Services - a step forward for standardisation

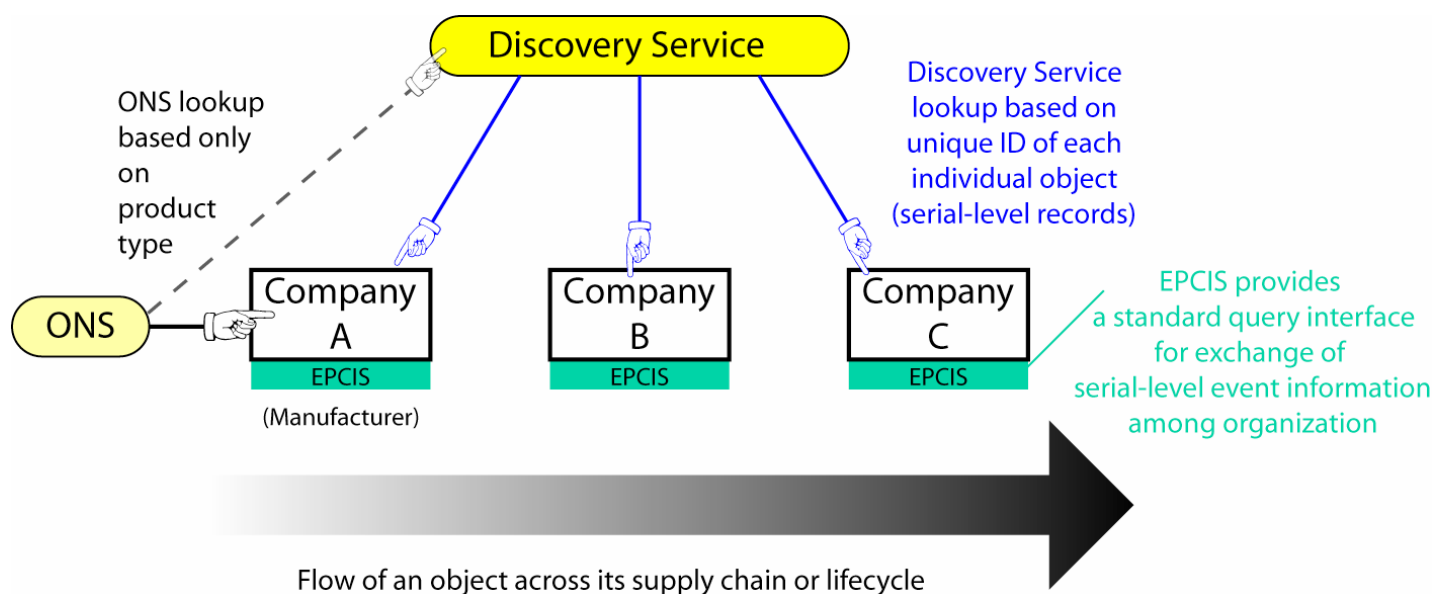
There are considerable efficiencies to be gained within a supply chain resulting from exchange of more accurate and timely information about flows of goods between trusted trading partners.

This year, the BRIDGE group working on serial level lookup service developed a major and comprehensive requirements document for various industries.

Sharing of data is of course commercially sensitive, especially information about volumes and flows of good and relationships between trading partners, which could be used advantageously by competitor organizations if the necessary security mechanisms and access controls were absent or compromised. As a result of such concerns, one of the fundamental design principles for the EPC Network is that each company should be able to retain control over the data that they collect or generate within their own organization, i.e. information is decentralized across multiple organizations.

The figure shows the proposed structure of Discovery Services.

During the second year of the project, this working group has been actively sharing its results with other working groups in the field and addressed its results to standardisation bodies including EPCglobal, IETF (the Internet Engineering Task Force) and ETSI (European Telecommunications Standards Institute). Their work represents a major contribution to the standardisation of these services.





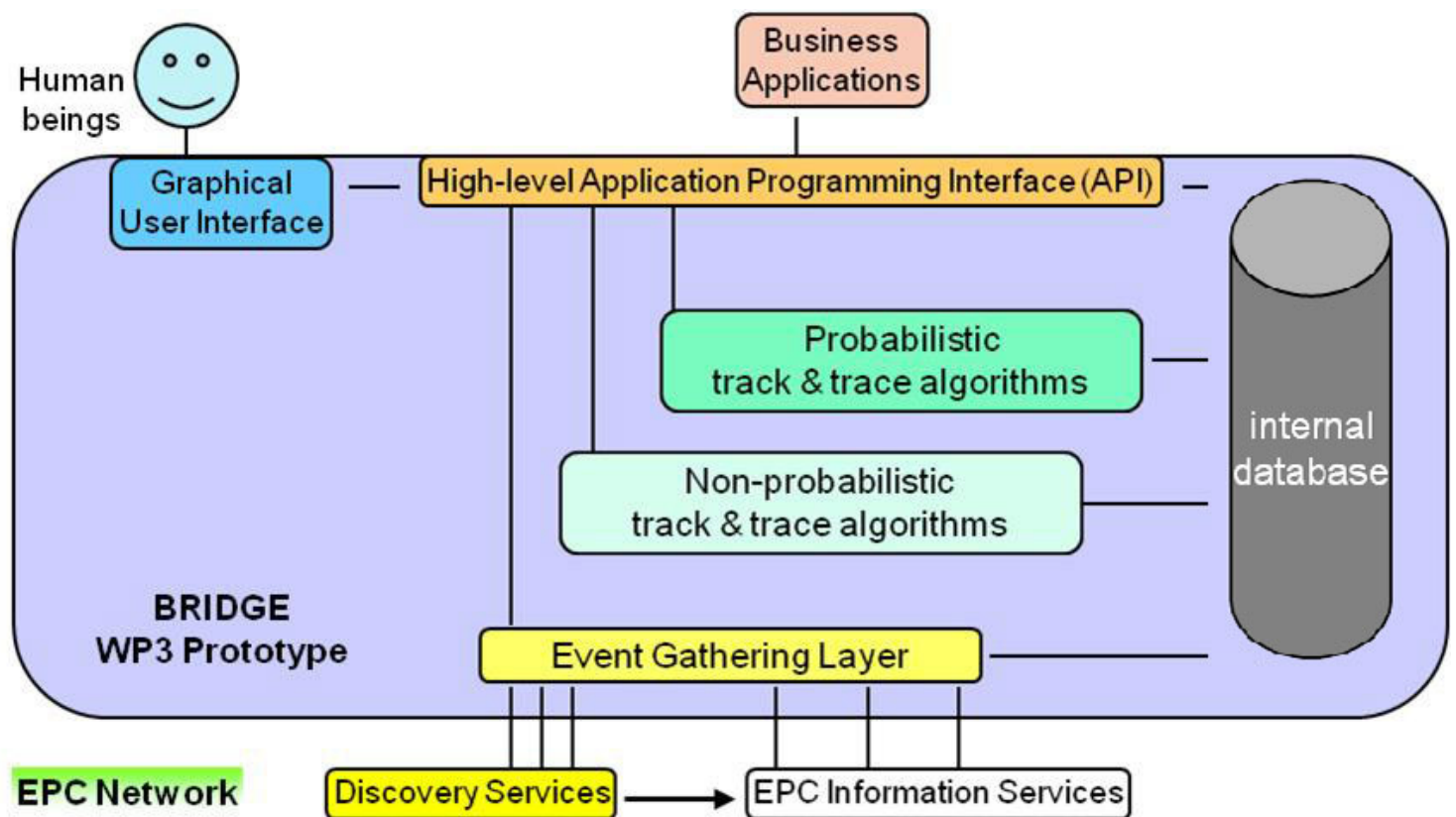
Serial Level Supply Chain Control

Tracking and tracing of objects across the supply chain and high quality information about the past, present and potentially the future state of an object is the cornerstone for effective decision making in business applications such as inventory control, distribution planning, manufacturing control and maintenance operations.

This working group is developing a track and trace information layer which sits between the EPC network and the business applications, providing enriched tracking and tracing information to the latter based on serial-level product information retrieved from the former. The novelty of the proposed model stems not only from the fact that it is based on serial-level information, but also from the use of probabilistic tracking and tracing algorithms which

provide high quality object state information, enabling intelligence that was not feasible with the traditional track and trace applications. The design of the model was based on requirements regarding track and trace applications captured from companies (most of which were members of the BRIDGE consortium).

This working group is currently developing an extensible software prototype to support various pilot and trial activities in various industry sectors across the BRIDGE project (see picture below)





Security

There are three main aspects in this work package:

- Security and privacy: analysis, requirement and dissemination
- RFID system security and integrity
- Network infrastructure security

This year, a report has been produced to present the possible security solutions to an extended EPCglobal network. The goal of this report was to analyze the state-of-the-art and elaborate security requirements for BRIDGE. BRIDGE goes beyond the specification of the traditional EPC network architecture by enhancing the network access and connectivity layer and by adding an application layer. This intended infrastructure is referred to as Extended EPC Network architecture.

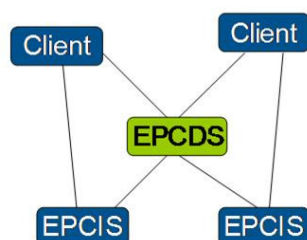
A security assessment of the state-of-the-art shows that the local EPC network components such as tags and readers can be deployed securely within constrained environments involving a limited number of trusted parties. Proprietary software developments combined with measures of traditional Internet security help to seal off the network, systems and data from those outside the limited group. The intention of BRIDGE is to also allow the deployment of RFID to enable dynamic cross party applications

where the participants may not be known at the time of deployment, and where there are conflicting interests between such parties. For such global deployments, a strong requirement for standards and standardized interfaces emerges. The security analysis indicates that a higher level of security is needed for existing EPC Network components such as tags and readers to operate in such open environments. In addition the network to share information securely between organisations is not yet developed.

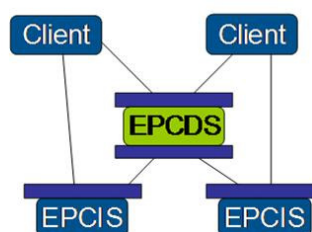
The key conclusion so far is that security is a multilayered problem and the strength of any solution is dependent on the security of the weakest link.

The goal of this work package is to remove the security barriers to new RFID applications across dynamic and collaborative supply chains. Such applications will only provide value if business intelligence can be protected and secure processes can be operated over data received from external parties. The work package team has analysed the security requirements to support these applications and suggested a programme of technical work to provide the required tools to the developers of both RFID systems and international standards.


Establish Trust Relations



Define and Enforce Access Control



Two elements of the Security Framework developed within BRIDGE



The business application work packages

Launch of the pilots



The second year of the project has been crucial for the business work packages as most of them have reached the stage of the business case and launched their pilots. This final stage is already showing very interesting and positive results for some of the pilots.



“BRIDGE will document the business cases achieved in these pilots as examples to other companies so that they can gain from the initial [lessons] and roll out the technology”
 Henri Barthel, GS1, BRIDGE coordinator

WP5 - Anticounterfeiting

In this business application, the objective is to increase the protection against illicit trading.

The business case has been finalised to support affected manufacturers in their decision on the application of EPC/RFID technology in the fight against illicit trade.

In this business case, various product authentication technologies have been evaluated in various industry sectors, showing that RFID and track-and-trace based product authentication methods meet the requirements of the considered industries, though in some cases (particularly the consumer goods and IT industries) other methods are also appropriate.

As part of this work package, a prototype has been designed to detect counterfeits and cloned tags at different levels of granularity. The team has developed an initial version of visual decision-support system for product authentication.



Anti-counterfeiting prototype developed by the work package



WP6 - Pharma traceability business application

This pilot focusing on pharma traceability has moved forward considerably during the second year of the project and started to show very interesting results.

In total, 19 product ranges have been tagged and traced from the manufacturer to the hospital pharmacy.

Here are some of the early lessons learnt from this pilot:

- Inline production equipment installation is a complex, precise and resource intensive operation
- Packaging must accommodate space for codes at

time of design

- Packaging colours must offer contrast for good reading
- Shape and form of packaging can create poor quality printing/verification
- Line configuration/equipment installation must allow firm base for encoding e.g. 'product wobble'
- Unplanned pallet consolidation (for cost reduction)
- Damage to Case Labels (e.g. by fork lift)

Videos of the pilot will soon be available for dissemination purposes.

WP7 - Supply Chain Management in European Textile Industry

This working group is preparing the adoption of the RFID/EPC technology in the European Textile Industry.

After providing a problem and requirement analysis in preparation of the business application, the group developed a business case which presented positive results; The European textile industry is one of the most promising industries for item level tagging and can provide a positive business case. The preliminary research demonstrates that across different business models a return on investment can be achieved – for SMEs as well as big companies.

The results of this report show that the technology opens many possibilities to the textile sector, which can be economically justified and certainly will increase the profitability in future. But not only textile companies benefit from EPC/RFID. Customers will profit from the increased service. Different new RFID applications in the store will make shopping an "adventure".

The two BRIDGE pilots illustrate these possibilities, testing the RFID technology both in a public store (Kaufhof) and a showroom (Norhtland) environment. Within the Kaufhof pilot, a customer survey will shortly reveal the consumer's feedback on this implementation.



Magic Mirror

Example of a consumer application within the Kaufhof pilot: the Magic Mirror, which delivers information about the product directly to the consumer



WP8 - Manufacturing processes

The WP8 'Business Application Manufacturing Process' work package is examining ways in which the role of RFID can provide accurate and complete batch level information in a timely manner to enhance the management of production processes within the walls of a factory from raw materials to finished product. The fundamental capability of the networked RFID-based automated product identification systems enabled by the EPCglobal Network is the ability to connect products tagged with RFID to a network.

Expected benefits in the IBC (Intermediate Bulk Container) management process are a better inventory tracking; the reduction of human error in item tracking; the elimination of errors in the product quality; with alarms raised and improved visibility of IBCs.

The business case has quantified the estimated benefits in terms of waste (reduced scrapping due to wrong quality states and un-traceability) and labour time reduction (reduction in the time spent on data correction, and time to find un-traced IBCs and correct IBCs).

WP9 - Reusable asset management

The objective of WP9 is to use radio-frequency technologies (RFID), to bring a better visibility and traceability to reusable transport items (RTIs such as pallets) as well as to their contents.

The contribution of the use of RFID has been studied for two different actors in the supply chain:

- RTI Pool Providers wishing to identify individual RTIs for a more efficient asset management of their whole collection of RTIs
- Manufacturer, LSPs and Retailers wishing to track the flow of goods on or in an RTI for better supply chain visibility and for more efficient processes in RTI handling.

Following on from the development of the business case two pilots are now being performed. The pilots, one upstream and one downstream, will make use of the EPCIS (Electronic Product Code Information Service) implemented by GS1 France to evaluate the business case for RFID use.



Pallets from the pilot



WP10 - Products in services

WP10 the 'Products-in-Service' work package is examining ways in which item-level information acquired during a product's lifecycle could enhance its in-service use. The "in-service use" applications can range from warranty or maintenance management to enhancing customer's experience when using the product.

Having presented the supply chain operation in detail in a first deliverable, five problem areas that have the potential to provide a positive impact to existing processes have been identified.

During the pilot, the RFID infrastructure is being tested from a technical point of view to assess the

reading rate and the stability of the connection. Once the technical stability of the system is proved, an assessment of the qualitative benefits of the infrastructure will be pursued through the development of two applications:

- The first application links the products that arrived with the list of customer orders already open and waiting for a particular product.
- The second application links the sales data with the data stored to improve the warranty management process.

WP11 - Non-Food Item level tracking

This work package is looking at item level tagging for non-food items (such as CD's DVD's - as shown in the picture - and retail software products) and is examining many aspects of retail operations, including improving customer value, company efficiency, and practical issues involved in changing business practices.

Early stages in the in-store pilots showed significant improvement in speed and accuracy in receiving goods, in store inventory and picking items for return to manufacturers leading to increased turnover. A second pilot is now looking at the business case in another retail area for non-food items - the textile product line.



Education and dissemination tools

Two work packages within BRIDGE involve development of new training and dissemination products to present the results of the BRIDGE project and to explain the business opportunities to potential users, especially SMEs across Europe.

Concept Animations

Last year, a series of concept animations was developed to illustrate possible applications of RFID in the supply chain in different industry sectors, such as textile industry, reusable asset management, etc. These animations are currently available in English and are in the process of being developed in other languages.

Discover RFID website

BRIDGE also supported the development and promotion of a website targeted at the general public to explain how the technology works in an understandable way and present the benefits that RFID can have in every day life situations.

The website <http://discoverrfid.org> also contains the concept animations developed under BRIDGE.

The screenshot shows the Discover RFID website interface. At the top left is the logo 'discoverrfid supplying you a better life'. Below it is a 'Timezone Selector' with a world map. To the right is a video player showing a man speaking, with the text 'rfid around the clock' and 'Monday | 10:00am | Pacific Ocean'. Below the video are three buttons: 'what is possible', 'how it works', and 'your questions'. At the bottom right is a newsletter sign-up form with a 'Subscribe' button and a 'Newsletter archive' link. The footer includes logos for 'rfideas', 'Discover', and 'GS1 EPCglobal'.

Portable Demo

The Portable Demo is a software tool showing how the EPC/RFID network works in real supply chain conditions. The software can be installed on one or several computers. One computer simulates the server (and possibly a client) while the others simulate the clients such as the manufacturer, the distributor and the final client e.g. retailer.

The screenshot shows the 'MMG Co. - Manufacturer - Portable Demo' software interface. At the top is a 3D virtual delivery area with a truck and a 'Delivery area' sign. Below this is a data table with columns for 'Order properties' and 'Data'. The table lists order details like 'Order number: 94228/ALLIM/07', 'Order date: 20 grudnia 2007', 'DESADV number: 109144', and 'DESADV date: 20 grudnia 2007'. Below the table is a 'Physical stock check' section with a tree view of EPC identifiers and their status (e.g., 'Dock').

E- Learning

A complete range of E-Learning material has been developed this year as part of the Education work package, which include 3 EPC/RFID courses:

- Basics of EPC/RFID
- Advanced Technical Aspects of EPC/RFID
- Advanced Business Aspects fo EPC/RFID

The training material for each course is available in classroom format consisting of a PowerPoint deck and a student syllabus and in web-based format consisting of text, illustrations/animations and voice over (sound files)



WP15 - Innovation & Public Policy

Innovation and public policy follow up

To integrate the BRIDGE results in the wider scope of the European Commission's efforts to promote the Internet of Things in Europe, BRIDGE produces a yearly report to present the most innovative aspects of the work packages. This report is available on the BRIDGE website.

To make the link between research and the framework of the European Union, the team follows up the public policy progress on the technology and analyses the potential impact of these progress.

This has allowed the BRIDGE project to contribute positively to the Commission's public consultation on the use of RFID and its impact on security, data protection and privacy. This is particularly important because a number of the BRIDGE applications involve the use of RFID throughout the supply chain to the retail outlet and the interaction with the consumer.



A closer look on data protection issues

Since the development of this new technology, the European Commission has been concerned with the necessity of paying particular attention to data protection issues.

During the second year of the project, the BRIDGE team decided to undertake a large analysis of the project with regards to data protection issues. The organisation involved in the business application work packages have been interviewed to give more details about their strategy to insure that data protection principles are respected within their pilots.

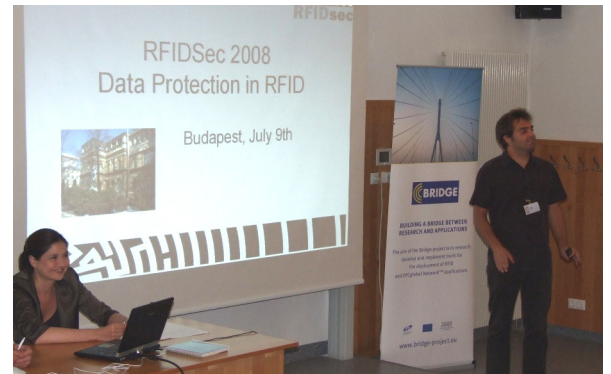
The analysis showed that potential data protection issues were well handled within the current pilots and that necessary actions were taken to inform the consumers about their alternatives when purchasing a product that is tagged (see pictures below showing information inside the stores)

Staff involved in the pilots have also been trained in an appropriate manner.



This year's edition of RFIDSec took place on 9-11 July in Budapest. The workshop was organized by the team of IAIK, Graz University of Technology. BRIDGE and NXP Semiconductors sponsored the workshop. The University of Eötvös were happy to host the meeting in its newly renovated conference centre called Gólyavár. About fifty experts from academia and industry were attending the workshop.

To emphasize the importance of data-protection issues and to provide a basis for cross-discipline communication between the data protection community (with legal background and education) and the IT-security community (background in technology and mathematics), a special session on data protection was held. After presentations by Marisa Jimenez (GS1) and David Marsh (Dickinson Dees), a discussion on privacy issues in RFID technology and applications started between the workshop participants and the invited legal experts.



The following two days of the workshop were dedicated to new research results towards security solutions for RFID technology. During review, the programme committee selected 12 out of 26 submitted articles for presentation and discussion. Three talks by invited experts rounded off the workshop.

The program was split into four sessions:

- 1) Implementations: Dealt with implementation of cryptographic functionality on RFID tags
- 2) Authentication: New proposals for authentication protocols and analysis of known protocols
- 3) Attacks: Results of successful implementation attacks on crypto primitives and RFID systems.
- 4) Key Management: Issues of secure key management and secure transfer of ownership of tags.

The following conclusion can be drawn from the workshop.

- It is accepted by the research community that proper cryptographic protection is technically possible also on low cost RFID tags.
- Asymmetric cryptographic primitives are useful in many RFID applications and, if they are properly implemented their implementation is possible on modern RFID tags.
- Security functionality on tags can provide much more than "just" privacy protection, but they will generate additional services for RFID applications (data integrity, anti-cloning etc.)
- The "one" final solution to protect every possible RFID application is not in reach, and due to the diversity of RFID applications not meaningful. A set of protection measures needs to be developed, that allows application designers to choose proper protection measures for their application.

In 2009 RFIDSec will be organized in Leuven, Belgium. For more information on the workshop, please refer to <http://www.rfid-sec.org>



Calendar of events



CARDIS 2008 Conference

8-11 September 2008, Egham, UK
<http://www.scc.rhul.ac.uk/CARDIS/index.html>

Conference Towards a European Policy on RFID

19 September 2008 - Brussels, Belgium
<http://www.rfid-in-action.eu/conference>

RFID Lighthouse project Symposium

22-23 September 2008 - Washington, USA
http://ec.europa.eu/information_society/policy/rfid/events/index_en.htm#EUUSlighthouse

Internet of Things, Internet of the Future

6-7 October 2008 - Nice, France
<http://www.internet2008.fr/spip.php?article9>
A BRIDGE booth will be displayed at the exhibition



EPCglobal Joint Action Group Meeting (JAG)

6-10 October 2008 - Bonn, Germany
<http://www.epcglobalinc.org/about/events/JAG/>
There will be a special BRIDGE session at this event



RFID Journal LIVE! Europe 2008

4th Annual Conference & Exhibition
3-5 November 2008 - Prague, CZ
<http://www.rfidjournalevents.com/liveeurope/>
BRIDGE will be presented at the exhibition



ICT 2008

25-27 November 2008 - Lyon, France
http://ec.europa.eu/information_society/events/ict/2008/index_en.htm
BRIDGE will have a booth at this major event

