EPC Creating An Internet of Things

Right
Value 最確切的價值
Partner 最佳的夥伴
Now 就在此刻
# Table of Contents 目錄

1. A Background to EPC  
   產品電子代碼背景資料  ......................................................................................................................... 2

2. Components of EPC Technology  
   產品電子代碼技術各元件  
   2.1 Electronic Product Code™ (EPC)  產品電子代碼  .......................................................................................... 3  
   2.2 Radio Frequency Identification (RFID) Tag  無線射頻識別標籤  ............................................................................. 4  
   2.3 Readers  閱讀器  ........................................................................................................................................... 4  
   2.4 EPC Middleware  EPC中介軟件  .................................................................................................................. 5  
   2.5 Object Name Service (ONS) 物件名解析服務(ONS)  .................................................................................. 6  
   2.6 EPC Information Services (EPCIS)  EPC訊息服務(EPCIS)  ............................................................................... 6

3. The EPCglobal Network™  
   EPCglobal網絡  
   3.1 Fact about the EPCglobal Network™ EPCglobal網絡真面目  ....................................................................... 7  
   3.2 How the EPCglobal Network Works? EPCglobal網絡如何運作？ ........................................................................ 8

4. Potential Applications of EPC  
   產品電子代碼的應用潛能  
   4.1 Logistics Track - and - Trace 物流追蹤與追溯  ....................................................................................... 10  
   4.2 Production Control  生產監控  .................................................................................................................. 10  
   4.3 Warehouse Management  倉庫管理  ........................................................................................................... 10  
   4.4 Asset Management  資產管理  .................................................................................................................... 11  
   4.5 Anti-counterfeiting  防僞  .......................................................................................................................... 11

5. About EPCglobal  
   關於EPCglobal  
   5.1 A Background to EPCglobal EPCglobal背景  .......................................................................................... 12  
   5.2 Organization Structure of EPCglobal Inc. EPCglobal Inc組織結構  ...................................................................... 13  
   5.3 EPCglobal & ISO EPCglobal與國際標準化組織  ...................................................................................... 15  
   5.4 EPCglobal Public Policy Steering Committee  EPCglobal公共政策指導委員會  ............................................. 16

6. EPC / RFID Enabling Services of GS1 Hong Kong  
   香港貨品編碼協會產品電子代碼/無線射頻識別服務  
   6.1 EPCglobal Membership Services  EPCglobal會籍服務  ............................................................................... 17  
   6.2 EPC Knowledge Transfer Services  產品電子代碼知識轉移服務  ................................................................ 18  
   6.3 Industry Adoption Facilitation  促進業界跟上產品電子代碼步伐  ............................................................... 18  
   6.4 EPC Professional and Consultancy Services  產品電子代碼專業及諮詢服務  .................................................. 19  
   6.5 Certification and Accreditation Program  認證和檢定計劃  ........................................................................... 20
1. A Background to EPC

The advent of Electronic Product Code™ (EPC), which combines Radio Frequency Identification (RFID) with the internet backbone, is predicted by many as the next big hit that will revolutionize the modern supply chain.

Major Stakeholders are Joining The Team

The number of companies preparing to leverage the promising technologies and standard is inflating. Among them are the biggest retailers of the world such as Wal-Mart, Tesco and Metro, as well as the US Department of Defense who have announced concrete plans to adopt EPC as the standard to integrate RFID into their supply chain.

What actually does EPC do to revitalize a 50-year technology in RFID?

Business Driver Behind EPC

RFID operation starts with a tag consisting of an integrated circuit attached to an antenna. Data on the tag can thus be read and sent over in radio waves by a reader, and decoded by a processor on the receiving end. It has been in use as early as the second World War for detection of friendly aircrafts in the air.

RFID tags can be read through packaging, shipping containers, and most materials without direct physical contact, and therefore do not need to be placed on the outside of the unit item. In addition, multiple RFID tags can be read simultaneously. The combination of the mobility offered by wireless interface and the bulk-reading capability represents strong potential in improving productivity and efficiencies of the supply chain by a large extent. Real-time visibility of inventories enabled by RFID also contribute to combat shop thefts, and speed up costly product recalls.

To apply the technology on our supply chain where different parties interact, however, a common global standard is a must. EPC has been proposed by EPCGlobal Inc and is being accepted by the industries as such standard. It is a unique number that represents a unique item. By reading the number and referring to the corresponding database over the EPCGlobal Network, details of the item can be retrieved and updated on-line immediately and accessed practically anywhere in the world with internet connection.

主要貢獻夥伴陸續加入團隊

準備建立具潛力的技術和標準的公司數量正迅速增加，它們包括全球最大零售商－沃爾瑪(Wal-Mart)、Tesco、麥德龍(Metro)以及美國國防部。其中美國國防部已提出具體計劃，逐步採納產品電子代碼(EPC)為標準，將無線射頻識別(RFID)技術併入其供應鏈。

產品電子代碼如何令具有50年歷史的無線射頻識別(RFID)技術復興起來呢？

無線射頻識別的應用是由一個連接天線的集成電路的標籤開始。標籤上的數據能被閱讀器讀取出來，並且通過電波傳送，再由接收端的處理器解讀，早於二次大戰時期，無線射頻識別已被應用於戰場空中的盟友飛機。

無線射頻識別標籤須經直接接觸，使可以通過包裝、付運的貨櫃和大部分物品被閱讀出來，故無需將標籤放置在物件外層。此外，多個無線射頻識別標籤能同時被閱讀，而其結合了無線介面的流動性和龐大的閱讀能力，表示已具備了提升供應鏈生產力和效益的潛能，無線射頻識別賦予的庫存實時透明度，既可打擊店鋪盜竊，更可加快昂貴的產品回收過程。

應用這技術於供應戶的供應鏈時，必須有一個全球公認的標準。產品電子代碼由EPCglobal提出，業界亦已接受了它作為標準。產品電子代碼是一個獨一無二的編碼，用以代表獨一無二的物件，透過閱讀編碼及參考其在EPCglobal網絡上相應的數據庫，各物件的詳細資料便能被檢索出來，在網上即時更新，並透過互聯網於世界任何一個角落被存取。

"Do you know? 你知道嗎？

- RFID is still used in civil & military aviation.
  無線射頻識別仍用於民專及軍事航空交通上。
- RFID was first used to identify friendly aircraft.
  無線射頻識別最初用以識別盟友飛機。"
2. Components of EPC Technology

2.1 Electronic Product Code™

The Electronic Product Code (EPC) is a unique number that is used to identify a specific item in the supply chain. The EPC is stored on a radio frequency identification (RFID) tag, which combines a silicon chip and an antenna. Once the EPC is retrieved from the tag, it can be associated with dynamic data held in a secured database such as where an item originated or the date of its production. Much like a Global Trade Item Number (GTIN) or Vehicle Identification Number (VIN), the EPC is the key that unlocks the power of the information systems that are part of the EPCglobal Network™.

產品電子代碼

產品電子代碼是一種用來識別於供應鏈上某一物件的惟一數字編碼。每一組產品電子代碼均植於一枚結合晶片和天線的無線射頻識別標籤內。當產品電子代碼由標籤中被讀取出來時，它可以結合存在於數據庫內的動態數據，例如物件的來源地或其生產日期。如國際貿易代碼（GTIN）或車輛識別編碼（VIN）一樣，產品電子代碼是啟動EPCglobal網絡內各信息系統力量之鎖匙。

An EPC number is made up of a header and three sets of data.

The header identifies an EPC’s format, which facilitates different volumes of EPC data to follow - this allows for different lengths or types.

The second part of the number identifies the EPC manager – most likely the manufacturer of the product the EPC is attached to – for example “The Coca-Cola Company”.

The third, which is termed as “object class”, refers to the exact type of product, most often the Stock Keeping Unit (SKU) – for example “Diet Coke 330 ml can”.

The fourth is the serial number, unique to the item; this specifically informs which 330 ml can of Diet Coke is being referred to, which makes it possible, for example, to quickly find products that might be nearing their expiration date.

The EPC Manager Number (96 bits)

35.0203D2A.916E8B.0719BAE03C

<table>
<thead>
<tr>
<th>8 bits (first)</th>
<th>28 bits (EPC Manager Number)</th>
<th>24 bits (Object Class)</th>
<th>36 bits (Unique Serial Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>前置編號</td>
<td>EPC 管理單位編號 (CompanyPrefix)</td>
<td>物品類別 (ProductType)</td>
<td>獨一無二的序號</td>
</tr>
</tbody>
</table>

產品電子代碼由一組前置編號和三組數據組合而成。

前位編號識別產品電子代碼的格式，賦予不同容量的作電子代碼數據隨後。它容許不同長度及類別的數據。

第二部分，稱為物種類別。參考產品的正確識別。

第三部分，稱為物品類別。參考產品的正確識別。大部分情況下是供應單位，例如“健怡可樂330毫升盒裝”。

第四部分是單元編號，每個項目的單元編號均是獨一無二，這可以正確無誤地提示我們，究竟談及的是那一罐330毫升的健怡可樂，單元編號令例如盡快找出已屆到期的產品變得輕而易舉。
2.2 Radio Frequency Identification (RFID) Tag

An RFID tag is made up of a microchip attached to an antenna. There are different kinds of tags for different applications. Active tags have a battery, which is used to run the microchip's circuitry and to broadcast a signal to a reader (the way a cell phone transmits signals to a base station). Passive tags have no battery. Instead, they draw power from the reader, which sends out electromagnetic waves that induce a current in the tag's antenna. In general, active tags have a longer reading distance than passive tags.

2.3 Readers

RFID readers use a variety of methods to communicate with tags. The most common method for reading passive tags at close range is called inductive coupling. The coiled antenna of the reader creates a magnetic field with the coiled antenna of the tag. The tag draws energy from this field and uses it to send back waves to the reader, which are turned into digital information - the tag's Electronic Product Code.

The reading range of readers depends on its power and frequency range. In general, readers with higher frequency have longer reading distance but the power required is also higher.

無線射頻識別標籤

一個無線射頻識別標籤是由內藏天線和晶片組成，不同的無線射頻識別標籤可配合各種應用需要。主動式標籤內含電池，用以駕動微晶片的電路系統，從而向讀寫器發放信號。(方式如手持電話傳送信號到發射台)；被動式標籤則沒有電池。相反，它從讀寫器獲取電源，令標籤天線產生電流，藉此傳送電磁波。一般而言，主動式標籤比被動式標籤具有更長的閱讀距離。

閱讀器

無線射頻識別閱讀器以多種方法來與標籤溝通。最普遍的方法是近距離閱讀被動式標籤，稱為「電感耦合」。閱讀器的環形天線產生磁場，標籤的環形天線則由磁場獲取能量，利用它來向閱讀器回送電波，電波逆轉成數碼訊息－標籤的產品電子代碼。

閱讀器的閱讀距離由其電源和頻率範圍決定。普通情況下，較高頻率的閱讀器具有較遠的閱讀距離，但同時需要的電源也較高。

Do you know? 你知道嗎？

- EPCglobal Generation 2 compliant tags can be read from as far away as 10 metres. EPCglobal第二代電子標籤讀取距離達10公尺。
- Tag data can be rewritten or modified.
- 電子標籤內含訊息能夠寫入或修改。
- EPCglobal Generation 2 Air Protocol uses a series of “tags” to manage which tag talks to which reader.
  EPCglobal第二代空中協定使用一系列「標籤」來管理不同電子標籤，讓它們相互間獲得直接「對話」。
- A reader can scan hundreds of tags per second and can scan the same tag many times in doing so.
  閱讀器每秒可掃描數百個電子標籤，並能掃描多次相同標籤。
2.4 EPC Middleware

In a world where every object has an RFID tag, readers will be picking up a continual stream of EPCs. Managing and moving all this data is a difficult problem and one that must be overcome for any global RFID network to be of value. Software technology called EPC Middleware has been designed to act as the nervous system of the network.

EPC Middleware is different from most enterprise software in that it is not one overarching application. Instead, it uses a distributed architecture and is organized in a hierarchy that manages the flow of data. EPC Middlewares at each level will gather, store and act on information and interact with other EPC Middlewares.

EPC中介軟件

若世界上每件物件均貼上無線射頻識別標籤，讀書器便要不斷接收一束延續不絕的產品電子代碼。然而管理和移動所有這些訊息便非常困難，要成為具有價值的全球無線射頻識別網絡，就必須克服這問題。為此，便設計了EPC中介軟件，並在網絡裏擔當神經系統的角色。

EPC中介軟件與大部分企業軟件的分別在於它並非支配一切的應用程式，相反，它利用分散式結構，並以等級和組織來管理數據的流向。各層的EPC中介軟件會收集、儲存和執行訊息，並與其他EPC中介軟件互聯互聯。

Distribution centre example:
配送中心範例:

Do you know? 你知道嗎?

- EPC tells you where something is, when it got there and even detect how long it stayed there.
  產品電子代碼告訴你物件在那裏，何時到達那裏，甚至檢測到它停留了多久。
- EPC enables you to have accurate detailed and timely data.
  產品電子代碼令你掌握準確、詳細和實時的數據。
- EPC tells you how long everything took in a particular process, gives you average performance.
  產品電子代碼告訴你某個程序需多久完成，並提供平均表現。
2.5 Object Name Service (ONS)

The EPC vision of an open, global network for tracking goods requires some special network architecture. Since only the EPC is stored on the tag, computers need some way of matching the EPC to information about the associated item. That is the role of the Object Name Service (ONS), an automated networking service similar to the Domain Name System (DNS) that points domain names to websites on the internet.

When a system with RFID reader reads an RFID tag, the EPC is passed on to an ONS in a local network or the Internet to find where information of the product is stored. ONS points the system to a EPCIS server (see below) where information about that product is stored. The information about the product can then be retrieved by the system, and be forwarded to a company's inventory or supply chain applications.

2.6 EPC Information Services (EPCIS)

EPCIS is a component of the EPCglobal Network, which enables users to exchange EPC-related data with trading partners through the Network. It gathers EPC-related data from the EPC Middleware and integrates with enterprise applications. It also provides standard interface for EPC-related data exchanges within the enterprise and with its trading partners. The exchange of EPC data allows EPCglobal Network participants to gain a shared view of the status of the physical goods in a relevant business context. With different parties in the supply chain sharing EPC information, end-to-end supply chain visibility could be realized.
3.1 Facts about the EPCglobal Network™

**What is the EPCglobal Network™?**

The EPCglobal Network is a set of technologies that enable immediate, automatic identification of items in the supply chain; the network allows trading partners to exchange such information about the goods they ship amongst themselves. In this way, the EPCglobal Network makes organizations more effective by uncovering inefficiencies and reducing eternal issues such as counterfeiting, internal theft, and other drains on productivity and profitability.

**What are the components of the EPCglobal Network?**

The EPCglobal Network consists of several components that are designed to work together to give maximum visibility to a supply chain. The components are made up of Electronic Product Code (EPC), tags, readers, and software that helps all of the pieces communicate in a common "language".

The EPC sits on a tag which is physically attached to an item, a case or a pallet of items. The tag "communicates" its unique number to a reader through radio frequency. The reader then passes the number to a computer that accesses the Object Name Service (ONS). The ONS directs the computer systems where to locate information on the secure network about the object carrying an EPC, which includes, for example, when the item was produced and where.

EPC Information Services (EPCIS) provide a common set of data elements, a common language for communication, and a set of defined messages for trading partners to use when storing, accessing and communicating data on objects moving in the supply chain. The key to these information services is the EPC held in the RFID tag on each object.

**How does the EPCglobal Network deliver value?**

The technology helps businesses reduce on costs that are commonly encountered with internal operations, such as internal theft, out of stocks, counterfeiting, and various other similar plagues. This in turn drives down the cost of doing business, which helps business succeed while applying downward pressure on consumer prices.

**EPCglobal network 面目**

**甚麼是EPCglobal網絡？**

EPCglobal網絡是一套能在供應鏈上即時自動識別各物件的技術，同時，網絡容許貿易夥伴間就其供應貨品交換訊息；這樣，EPCglobal網絡能揭露供應程序上的漏洞，有助提升企業組織的效率，並減少冒牌貨、內部失竊和生產力下降、盈利流失等持續問題。

**EPCglobal網絡包含哪些元件？**

EPCglobal網絡由多個元件組成，它們合作無間，務求令供應鏈盡至最高透明度。這些元件由產品電子代碼、電子標籤、閱讀器和軟件系統組成，務求令各部份能使用共同「語言」溝通。

產品電子代碼藏於電子標籤內，並可貼在物件、裝箱或卡板上。它利用無線射頻，以其獨一無二的編碼與閱讀器溝通。閱讀器將編碼傳送到電腦，並登入物件名解析服務(ONS)，物件名解析服務便會導引電腦系統由安全可靠的網絡上辨識證實帶有產品電子代碼的物件資訊，包括例如物件在任何何地生產的資料。

EPC訊息服務提供一套共同的數據元，一種共同的溝通語言，以及一套已定義的資訊，供貿易夥伴於供應鏈上對某一物件進行存取、讀取和溝通數據時使用；而通往這些訊息服務的閘門，就是貼在各物件上無線射頻識別標籤裏的產品電子代碼。

**EPCglobal網絡如何助您增值？**

這技術幫助商業機構解決內部營運普遍遇到的問題，從而達致降低成本，例如內部失竊、缺貨、冒牌貨及其他類似的煩惱。這樣，即使消費價格出現下降壓力，機構也可以藉此降低經營成本來取得成功。
3.2 How the EPCglobal Network Works?
EPCglobal 網絡如何運作？

With the new EPCglobal Network™, computers will be able to "see" physical objects, allowing manufacturers to track and trace items automatically throughout the supply chain. This technology will revolutionize the way we manufacture, distribute, sell and buy products. Here’s how it works:

1. Each item contains a tiny microchip which includes a radio antenna and a unique identifier, called an Electronic Product Code™ (EPC).

每件物品含有精細微晶片，裏頭有一個無線天線和一個獨一無二的識別時，就是產品電子代碼。

2. The item can now be automatically and cost-effectively identified, counted and tracked. Cases and pallets can also carry their own unique tags.

物件現在可以被識別、點算和追蹤出來，這過程是全自動化和具成本效益；即使裝箱和卡板也可以附有獨一無二的標籤。

3. As pallets leave the manufacturer, an RFID reader positioned above the loading dock door beams a radio wave that "wakes up" the tags.

當卡板離開生產商時，放置在閘門上的無線射頻 識別閱讀器便會發送無線電波來「喚醒」那些標籤。

4a. The tags broadcast their individual EPCs to the reader, which rapidly switches them on and off in sequence, until all are read.

各個無線閱讀器傳送屬於其本身的 產品電子代碼，訊號會以高速串流行 階順傳播，直至閱讀器接收所有標籤訊息。

4b. The reader sends the EPCs to a system with RFID readers. It sends the EPC over the internet to an Object Name Service (ONS) database, which produces an address. The ONS matches the EPC to EPCIS server, which has comprehensive information about the product.

閱讀器向配備了無線射頻識別系統發送產品電子代碼。接著再透過互聯網把產品電子代碼發送到物件名解析服務 (ONS) 數據庫，並製作一個地址。物件名解析服 務將會將產品電子代碼相對應到擁有該產品完整資訊的EPC訊息服務伺服器去。

4c. The EPCIS server stores data about manufacturer’s products. Because it knows the location of the reader sending the query, it knows where the product was made. If an incident involving a defect or tampering arises, the source of the problem can be tracked and the products can be recalled.

EPC訊息服務伺服器儲存了生產商各項產品的資料，由於它知道發送查詢的閱讀器的位置，因此也知道產 品在甚麼地方生產。假若發生事故，包括產品出現 缺陷或調包，問題根源便能夠追蹤出來，而相關 產品也可以召回。
5. If the unloading area contains an RFID reader, there's no need to open packages and examine their contents. EPCglobal Network provides a cargo list, and the pallet is quickly routed to the appropriate truck.

6. SpeedyMart tracks the shipment through its own EPCglobal Network connection. As soon as it arrives, retail systems are updated to include every item. In this way, stores can locate their entire inventory automatically, accurately and at low cost.

7. Reader-enabled "smart shelves" can automatically order more products from the back room or the manufacturer. With such a system, the need to maintain costly "safety volumes" in remote warehouses is eliminated.
4. Potential Applications of EPC

4.1 Logistics Track–and–Trace

The growing consumer-driven demand has put the modern supply chain under immense pressure to shorten turnaround time for product-to-market. Riding on a common global standard and the internet as communications channel, EPC is capable of taking supply chain efficiency to the next level.

By leveraging adoption of EPC on the supply chain, manufacturers, logistics service providers and retailers, disregarding their geographic locations, could all take advantage of the web-based EPC Information Services network to get a better picture of where logistics units are on a real-time basis.

4.2 Production Control

In an increasingly globalised supply chain, it has become critical for manufacturers to shorten their production cycle time in order to respond more quickly to market demand. By adopting EPC internally, manufacturers could gain the valuable edge on enhanced visibility over their whole production line.

The production process becomes a lot more visible with the flow of raw materials and components tracked automatically by RFID tags and the information shared either within the internal EPCglobal Network or internet-based EPCglobal Network.

4.3 Warehouse Management

In a warehouse environment, different sorts of goods come in and out frequently. The adoption of EPC could provide organizations with an accurate account of the inventory on-hand on a real-time basis. While internal resources could be planned more efficiently, enhanced visibility enables better monitoring of internal resources. Consequently, problems associated with shrinkage and theft could be diminished as well.

物流追蹤與追溯

顧客主導需求的狀況日益增長，令現代供應鍊在縮短貨品到市場的週轉時間上面對嚴重壓力。憑藉一個全球共同標準和利用互聯網為溝通渠道，產品電子代碼極具實用力將供應鍊的效能提升到新階段。

將產品電子代碼應用於供應鍊上，無論地理位置如何，生產商、物流服務供應商和零售商等，也可以透過以互聯網為本的EPC訊息服務網絡，看清楚物流單位在實時下的狀況。

生產監控

在日益蓬勃的全球供應鍊內，對生產商最關鍵的是如何縮短生產周期，藉以回應市場愈加迫切的需求。把產品電子代碼應用於企業內部，生產商便能從提高整個生產線的透明度中獲取相當優勢。

因為原料和元件的流向都能透過無線射頻識別標籤被自動追蹤出來，生產過程變得更透明。同時，訊息可以在內部EPCglobal網絡或互聯網版的EPCglobal網絡上分享使用。

倉庫管理

在倉庫裏，不同種類貨品經常進出，於倉庫使用產品電子代碼能令企業在實時狀況下即場獲得準確的庫存描述。此應用除了幫助企業更有效地規劃內部資源外，亦提高了透明度，容許企業更好地管理資源，最終減少貨品耗損和失竊等問題。
4.4 Asset Management

Asset management is becoming a key issue for organizations that aim at getting better hold of their own resources, especially for those that are spread out geographically. By applying EPC to track individual items automatically, organizations would have better management of their resources. Efficiency of processes such as warranty, replenishment and audit could be improved as a result.

4.5 Anti-counterfeiting

While product counterfeiting is on the rise, it becomes increasingly important for genuine brand owners to come up with measures to protect their products circulating in the market. With unique serialization of products enabled by EPC, there is an added domain to identify items individually. The internet-based EPC back-end infrastructure, which allows for real-time traceability, is a new potential platform for anti-counterfeiting applications development.

EPC's Impact on the Supply Chain

### Supply Chain 供應鏈

**Benefits** 好處
- Reduce Out of Stock 減少缺貨情況
- Reduce inventory 減少庫存
- Detect shrinkage 侦查貨物耗損情況
- Detect counterfeit 侦查仿假
- Labor efficiency/accuracy 提升勞動生產效率/準確性

### In-Store 店舖內

**Benefits For Consumers 顧客獲得好處**
- Product available on shelf 購買當日即可取得
- Perishability monitoring 監控易腐產品
- No-scan check out 毋須掃描的結帳方式
- Interactive shopping 互動購物

### At Home 家居

**Benefits For Consumers 顧客獲得好處**
- Smart appliances 智能装置
- Recall communication 回收產品溝通
- Simplified recycling 簡化回收

### Near-Term 6-8 Months 短期6至18個月

### Medium-Term 2-3 Years 中期2至3年

### Long-Term 5-10 Years 長期5至10年以上

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**Do you know? 你知道嗎?**

- RFID enabled baggage handling system at Hong Kong International Airport handles all outgoing baggage. The electronic toll collection service AutoToll equips with RFID technology. Octopus, a RFID enabled electronic payment system offers an easy and hassle-free travel dine and buy around the city of Hong Kong.

無線射頻識別設備行李處理系統。電子收費系統AutoToll已安裝RFID技術。一咭通，這項無線射頻識別電子支付系統方便市民於香港奔跑購物。

- Skies and theme park visitors benefit from less queuing, thanks to RFID.

航空及主題公園的旅客不用大排長龍，多虧無線射頻識別。

- Sheep, cows and goats (secretly) are tracked using RFID.

無線射頻識別甚至可追蹤綿羊、牛和駝駝。
5. About EPCglobal

5.1 A Background to EPCglobal

This group chose to fund research, initially by the Massachusetts Institute of Technology (MIT) and subsequently by six other universities – two in Europe (Cambridge and St Gallen), one in Australia (Adelaide) and three in Asia (Fudan, China, Keio, Japan, ICU, Korea) – collectively known as the Auto-ID Labs (formerly known as Auto-ID Centre). The challenge for these universities was to develop globally applicable and economically viable standards for RFID usage in the supply chain.

By 2003, the research carried out by the Auto-ID Lab had resulted in a set of solutions based on a uniquely numbered low-cost tag and a network similar to the internet holding relevant supply chain data. This included detailed specifications for:

1. The EPC™ numbering scheme
2. Proposals for the Network components
3. Passive tags and readers

As a result of the work done by the Auto-ID Lab, EPCglobal Inc. was formed in 2003 as a not-for-profit joint venture between the standard organizations GS1 and GS1 US. These bodies were given the task of building on the work undertaken by the Auto-ID Lab and driving global adoption of EPC technology by establishing open, voluntary standards for the EPCglobal Network™.

The importance of open, non-proprietary standards are key elements to ensuring its successful development across borders worldwide. Additionally, an important aspect of the structure of EPCglobal is the royalty-free nature of the standards development process to ensure low-cost accessibility to the technology, which will leverage the GS1 global user base of over one million member companies to drive adoption of EPC technology through the development of universally supported standards.

Since its inception, EPCglobal has ratified standards for Generation 2 tags and for software interface components. The Generation 2 standard has been designed and developed specifically to take into account global telecommunications’ requirements. EPCglobal also works with international bodies, including the International Organization for Standardisation (ISO).

EPCglobal 背景

這群有心人決定資助學術機構進行研究，首先由麻省理工學院開始，接下去六所大學也加入此行列，兩所在歐洲(英國劍橋大學Cambridge, 瑞士St Gallen), 一所澳洲(University of Adelaide)和三所在亞洲(中國復旦大學, 日本Keio University, 南韓Information and Communication University)，共同創建Auto-ID實驗室(簡稱為Auto-ID中心)。各大學面對的挑戰是如何發展全球適用及經濟可行的標準，讓無線射頻識別可以應用在供應鍊上。

2003年，由Auto-ID實驗室領導的研究提交了一系列解決方案，其中主要由總無一，已編碼的廉價標籤和類似互聯網、貯存相關供應鍊數據的網絡組成的解決方案，這詳細規格包括：

1. EPC編碼計劃
2. 網絡元件建議書
3. 被動式電子標籤和閱讀器

Auto-ID實驗室所做的工作成果，促成EPCglobal Inc.正式在2003年成立，它是由GS1標準組織和GS1 US組成的非牟利合營企業，EPCglobal Inc.繼承了AutoID實驗室已開發的工作，同時透過建立開放、自發的EPCglobal網絡標準，推動EPC技術在全球使用。

開放、非私有的標準非常重要，它是確保產品電子代碼能不受地域限制，成功發展的關鍵元素。同時，發展EPCglobal標準結構中最重要的過程必須不含版稅，確保能以低成本應用此技術，開發環球支援的標準，從而鼓勵GS1全球超過100萬的公司會員採納產品電子代碼標準。

開始至今，EPCglobal已確認第二代電子標籤和軟件介面元件的標準。在設計和發展第二代電子標籤標準時，EPCglobal已特別顧及全球電訊規定。EPCglobal也會與國際組織合作，包括國際標準化組織ISO)。
5.2 Organization Structure of EPCglobal Inc.

**EPCglobal Board of Governors**
Representatives from GS1 US, GS1 Member Organizations, the Auto-ID Labs and end users from the public and private sectors.

**EPCglobal President**
Responsible to the EPCglobal Board of Governors and CEO of GS1.

**EPCglobal Staff**
Work collaboratively with multi-industry representatives to facilitate the development and recommendations of technical standards, to manage public policy, marketing and communications and administration.

**Architecture Review Committee (ARC)**
The ARC is a standing committee that reports to the EPCglobal President. It helps to evaluate and prioritize requirements affecting the overall EPCglobal Reference Architecture, and can be utilised by the EPCglobal Board of Governors as a technical resource.

**EPCglobal Inc.組織結構**

**EPCglobal董事局**
各代表分別來自GS1 US、GS1會員組織、Auto-ID實驗室和公私營部門的終端用戶。

**EPCglobal主席**
向EPCglobal董事局和GS1行政總裁負責。

**EPCglobal職員**
與不同行業代表緊密合作，協助技術標準的發展和提供建議，處理公共政策、市場推廣、溝通和行政管理。

**Architecture Review Committee (ARC)**
Architecture Review Committee是向EPCglobal主席彙報的常設委員會，它主要評估及優先處理影響整個EPCglobal相關結構的要求，此委員會亦為EPCglobal董事局用作為產品電子代碼技術資源。
Industry Action Groups (IAG)

The Industry Action Groups determines high level industry business process opportunities where RFID can be leveraged as a solution and ensures they are represented on the appropriate Joint Requirement Action Groups to aid in defining more specific business or user requirements that feed functional requirements (specification) development of a Technical Action Group.

Joint Requirement Action Groups (JRG)

JRG means cross industry or cross action. The Joint Requirement Action Groups consolidate industry requirements developed by IAGs and co-develop more unified and refined business and user requirements that feed the functional requirement development described in a specification by a Technical Action Group.

The JRGs are also responsible for the development of specific use cases will result in a very specific set of requirements that a specification will need to be considered.

Cross Industry Adoption and Implementation Groups

These groups aimed to drive industry as well as regional adoption and implementation. Regional issues and concerns in EPC / RFID adoption or implementation will also be discussed.

Technical Action Groups (TAG)

The Hardware Action Groups (HAG) and Software Action Groups (SAG) are members of TAG. The ARC and Technical Steering Committee will assist in mapping the JRGs to SAG or HAG working groups’ through the development of the appropriate charters. These working groups will only develop specifications that meet the requirements coming from the JRGs and will reconcile the specification to the requirements in conjunction with the JRGs.

業界工作組 (IAG)

業界工作組(IAG) 確定哪些高層次的商業程序能利用無線射頻識別技術作為解決方案，同時確保向聯合要求工作組 (JAG) 適當陳述更具體的商業和用戶要求，讓這些要求能作為技術工作組(TAG)發展應用要求(規格)之源。

聯合要求工作組 (JRG)

「聯合」指跨業界或跨行動。聯合要求工作組(JRG)進一步鞏固從業界工作組(IAG)發展出來的業界要求，並合作發展出更一致和精確的商業和用戶應用要求，藉此協助技術工作組(TAG)發展相關的技術規格。

聯合要求工作組也負責發展個別應用個案，並由此衍生出一套需要納入考慮規格之個別要求。

跨業界採納與執行工作組

這些工作組目標旨在推動業界和地區採納與執行產品電子代碼/無線射頻識別；同時，也會討論關於產品電子代碼/無線射頻識別於地區內採納或執行的相關課題與關注事項。

技術工作組 (TAG)

硬件工作組(Hardware Action Groups) 和軟件工作組(Software Action Groups) 均是技術工作組的成員。ARC和技術指導委員會(Technical Steering Committee)藉著成立合適支部協助將聯合要求工作組的要求併入軟件工作組(SAG)或硬件工作組(HAG)的工作範圍內。這些工作小組只會發展符合聯合要求工作組 (RGS) 要求的規格，並與聯合要求工作組合作調節規格，從而達致相關要求。

Do you know? 你知道嗎?

- EPCglobal compliant tags contain only data relating to an item or location. 符合EPCglobal標準的電子標籤只包含特定物件或位置相關的訊息。
- No EPCglobal compliant tag contains data about a person. 沒有任何一個EPCglobal的電子標籤包含個人資料。
5.3 EPCglobal & ISO

EPCglobal Inc., is forecasted to develop global technical standards for the Electronic Product Code and the EPCglobal Network. EPCglobal works with other standard organizations, such as the ISO, to promote its standards to the broader international community. While the standards development processes of EPCglobal and ISO differ, there are essential similarities in their respective formal directives and procedures that assure due process and valid, defensible consensus. ISO and EPCglobal complement one another with their shared goal to develop global standards and methodologies.

The Class-1 Generation 2 UHF RFID Protocol for communications at 860 MHz – 960 MHz was ratified by the EPCglobal Board of Governors in December 2004 and was successfully accepted into ISO/IEC 18000-6 Amendment 1 standard as Type C in July 2006. This is a significant milestone because it provides recognition of the work that the EPCglobal community is doing to build user-driven technical standards to advance the adoption of EPC/RFD technologies in supply chains throughout the world.

EPCglobal與國際標準化組織

EPCglobal Inc. 被預期會成為產品電子代碼和EPCglobal網絡發展全球技術標準。EPCglobal與其他訂立標準的組織合作，例如國際標準化組織(ISO)，藉此把標準推廣至更廣的國際社群。儘管EPCglobal和ISO的標準發展程序各異，它們各自的正式指令和執行步驟卻有相同之處，彼此都是以確保一套有效的標準制定過程與可行模式為目標。EPCglobal與ISO均有着共同的環境常態相互補足的標準與程式。

EPCglobal董事局於2004年12月確認由860 MHz 到960 MHz頻率的第二代的Class-1超高頻無線射頻識別空中通訊協定，並於2006年7月成功納入ISO/IEC 18000-6 Amendment 1 標準的C類別，這是一個重要的里程碑，亦證明EPCglobal社群透過建立用戶主導的技術標準和促進全球供應鏈採納產品電子代碼/無線射頻識別技術等工作已獲得認同。

Do you know? 你知道嗎？

- Consumers should be able to choose to remove or retain RFID tags on their items. 消費者有權選擇除去或保留物件上的無線射頻識別標籤。
- EPCglobal continues to work with governments on consumer privacy. EPCglobal與各政府緊密合作，致力保障消費者權益。
- Legislation should protect this choice, not remove it. 法律上應保障此選擇權，而不應扼去該電子標籤。
5.4 EPCglobal Public Policy Steering Committee

EPCglobal Inc. and representatives of various industry sectors that are implementing RFID and EPC technology have formed the EPCglobal Public Policy Steering Committee (PPSC) to foster open dialogue with key audiences around public policy and other important areas relative to EPC technology and the EPCglobal Network.

The members of EPCglobal recommended guidelines for use by all companies engaged in the large-scale deployment of EPC. Since EPC is an emerging technology, usage guidelines supplementing or modifying those already available will evolve as applications are developed and implemented. For example, with developments in EPC technology or its use for providing consumers with added flexibility when controlling EPC tags or record personal consumer information beyond that provided by conventional bar code technology; changes to notices required by consumers or to the guidelines themselves may be appropriate.

EPCglobal and PPSC will administer these guidelines. The PPSC will monitor the proper use of these guidelines and be responsible for updating them as further developments occur in technology, new applications and enhanced benefits. These developments will provide even more choices to both consumers and companies when using EPC tags.

EPCglobal 公共政策指導委員會

EPCglobal Inc. 與應用無線射頻識別和產品電子代碼的不同業界代表，組成公共政策指導委員會 (PPSC)，藉此推動主要受眾公共政策和其他與產品電子代碼及EPCglobal網絡相關範疇公開交換意見。

EPCglobal會員向所有規模展開產品電子代碼技術的公司提供指引。由於產品電子代碼是一項新生技術，每當應用程式發展和執行後，使用指引需要在適當的時候作出補充或修訂。例如，透過產品電子代碼技術發展和應用，消費者可能有彈性地控制產品電子代碼標籤或是普通電腦條碼無法做到的個人資料。指引會因應消費者需求而作出適應的修訂。

EPCglobal和公共政策指導委員會共同管理這些指引。公共政策指導委員會PPSC會監管這些指引否適合使用，同時會因應技術發展、創新應用程式及新概念等隨時更新指引內容。這些發展將會賦予消費者和公司在使用產品電子標籤時更多選擇。

Do you know? 你知道嗎？

- MIT Auto-ID Labs team develops technology to support the EPCglobal Network.
- The Adelaide, Australia team focuses on antennas.
- 澳洲University of Adelaide小組集中研發天線。
6. EPC / RFID Enabling Services of GS1 Hong Kong

6.1 EPCglobal Membership Services

EPC is an emerging technology standard that transforms the modern supply chain to a new paradigm. Apart from administering the EPC Manager Numbering System and EPCglobal Standards, GS1 Hong Kong is also responsible for offering End User Membership and Solution Partners Membership schemes. Both membership types are granted with exclusive access to global EPC standard and technology development, cross-industry support and services.

Solution Partners Membership

This group of members is made up of organizations that facilitate the end-user community to implement the EPC network and its technologies. Members include hardware and software companies, consultants, system integrators, training companies and trade associations.

End User Membership

This group of members comprises of organizations that have objects in motion in the supply chain. Members include manufacturers, retailers, wholesalers, logistics service providers, public organizations and government bureaus.

EPCglobal会籍服務

產品電子代碼是項新興技術標準，它改變了現代供應鏈的面貌，並將之帶到新領域。香港貨品編碼協會除了管理產品電子代碼系統和EPCglobal的標準外，也負責提供終端用戶會籍及解決方案夥伴會籍計劃。兩種會籍均享通り全球產品電子代碼標準和技術發展，跨業界支援和服務之專利。

解決方案夥伴會籍

這組會員是由一些促進終端用戶社群實行產品電子代碼網絡和相關技術的機構組成。會員包括硬件和軟件公司、顧問、系統整合供應商、培訓公司和業界組織。

終端用戶會籍

這組會員包括供應鏈上不同環節運作的貿易夥伴。會員包括生產商、零售商、批發商、物流服務供應商、公共機構和政府機關。

Do you know? 你知道嗎？

- Barcodes need a visible line of sight, RFID doesn’t. 傳碼需要一見即眼見之光線，無線射頻識別則不必。
- Barcodes can be visually read by people. 傳碼可讓人們能眼閱。
- Barcodes suffer from high humidity. 傳碼容易受潮濕氣候影響。
6.2 EPC Knowledge Transfer Services

EPC / RFID deployment begins with awareness and in-depth understanding of the technologies, costs and benefits involved. GS1 Hong Kong, with its extensive and first-hand knowledge of the EPC standard and technologies, is committed to organizing regular seminars, training workshops, certification programs and various industry events to infuse the essential knowledge, skills and methodologies to potential EPC users, solution providers and other interested parties. Participants will obtain valuable insight and key learning from EPC adopters to develop a practical and optimal EPC implementation roadmap.

The online knowledge bank disseminates the latest and hottest EPC / RFID related industry information to the EPC community. Go to www.epcglobal.org.hk to stay updated with the latest EPC / RFID developments.

6.3 Industry Adoption Facilitation

Technology development is a long term yet fast changing process that requires special attention. Building on its strong and long-established relationships with various industry bodies and the government, GS1 Hong Kong strives to keep the EPC community abreast of the global EPC developments. It also secures support, resources and business opportunities for both end users and solution providers with the aim of exploring and realizing business cases that justify its EPC initiatives.

6.2 產品電子代碼知識轉移服務

產品電子代碼/無線射頻識別的應用始於對技術、成本和利益的覺醒和深入認識。香港貨品編碼協會憑藉多方面和第一手的EPCglobal標準與技術知識，定期舉辦研討會、培訓工作坊、驗證計劃和各種業界活動，向準產品電子代碼用戶、解決方案供應商和任何有興趣人士灌輸相關知識、技能和方法。參與者將能從產品電子代碼先導者身上取得寶貴意見和重要經驗，從而發展出可行和最佳的產品電子代碼施行路線圖。

網上知識庫向產品電子代碼社群傳遞關於產品電子代碼/無線射頻識別的最新、最熱訊息，只要登入www.epcglobal.org.hk，用戶便可以知道產品電子代碼/無線射頻識別的最新發展情況。

6.2 促進業界趕上產品電子代碼步伐

技術發展過程是持久和急速變化的，故需要特別關注。香港貨品編碼協會憑藉與各行業和政府的長期良好的關係，努力使產品電子代碼社群跟上全球產品電子代碼的發展步伐。與此同時，香港貨品編碼協會保障向終端用戶和解決方案供應商提供支援、資源及商機，希望共同探索和實現具效益的產品電子代碼商業實例。
6.4 EPC Professional and Consultancy Services

With its profound knowledge of modern supply chain management (SCM), different global standards and enabling technologies, GS1 Hong Kong’s consulting team offers a wide range of professional consultancy services in collaboration with strategic partners to facilitate enterprises to become EPC compliant. It lets organisations define approaches that can maximize business values out of their EPC/RFID initiatives and opens the door for EPC deployment at different stages.

The consulting team comprises of experienced consultants who have broad exposure and expertise which can support companies’ EPC/RFID supply chain initiatives:

- EPCglobal Network™ Integration
- EPCglobal 網絡整合
- Compliance Audit and EPC Certification
  規範審核及產品電子代碼認證
- Knowledge Transfer
  知識轉移
- System Analysis and Technology Sourcing
  系統分析與技術採購
- Implementation Management
  執行管理
- Process Improvement Consultation
  流程改善諮詢
- EPC/RFID Enabled SCM Best Practices
  產品電子代碼及無線射頻識別供應鏈管理及最佳實務守則
- We support your EPC/RFID initiatives with our People, Methodologies and Technologies to make your Vision come true.
  我們的人才、方法與技術均支援你採納產品電子代碼及無線射頻識別技術，令你的商業願景變成事實。

Do you know? 你知道嗎？
- RFID can be made to work through water at short ranges.
  無線射頻辨識可在水中近距離操作。
- RFID systems can suffer from interference.
  無線射頻辨識會受電磁干擾。
- There are handhelds that combined RFID and bar code scanner.
  很多手持裝置結合了無線射頻識別和條碼掃描器之功能。

產品電子代碼專業及諮詢服務

香港貨品編碼協會顧問團隊於現代供應鏈管理、全球不同標準和技術使用等各方面均有深厚知識，並與策略夥伴合作，提供一系列專業顧問服務，協助業界執行產品電子代碼規範。給使用產品電子代碼及無線射頻識別的企業確立提升商業價值至極的方法，讓企業在不同階段都可以打開使用產品電子代碼之門。

我們的顧問團隊由具備豐富經驗及專業技能的顧問組成，支援你在供應鏈上應用產品電子代碼及無線射頻識別技術：
6.5 Certification and Accreditation Program

To ensure the smooth adoption of EPC / RFID compliant standards by EPC users, GS1 Hong Kong works closely with EPCglobal Inc. on various EPC / RFID certification programs, to establish a neutral source to provide global certification testing and information about EPC-compliant vendors and products. GS1 Hong Kong will also be accrediting Performance Testing Centres, where users can have tagged products, cases, and pallets tested for readability in conditions similar to those that will be experienced within their own supply chains.

For End Users: This program will enable them to quickly and more easily identify solution providers offering products and services that comply with EPCglobal Standards.

For Solution Providers: This program offers a single, authoritative source for neutral certification and performance testing. Certified vendors receive a direct link to the EPCglobal community and end-user subscribers who are looking for specific products and services to help them implement EPCglobal Standards and EPC technology.

認證和檢定計劃

為確保終端用戶能順利執行產品電子代碼/無線射頻識別的規範標準，香港貨品編碼協會與EPCglobal Inc多方面緊密合作，建立一個中介機構，為符合產品電子代碼規範的供應商和產品提供全球檢定測試服務。香港貨品編碼協會亦會檢定Performance Testing測試中心，讓用戶可以在類似他們供應鏈的狀況下測試裝箱和卡板上已貼上產品電子代碼的產品是否可讀。

對終端用戶的幫助：此計劃令他們更快捷和容易識別出那些解決方案供應商提供的產品與服務的是符合EPCglobal標準。

對解決方案供應商的幫助：此計劃提供一、具權威的中肯認證和表現測試。已被認證的供應商將能直接連繫尋求個別產品和服務的EPCglobal終端用戶社羣，協助他們執行EPCglobal標準和產品電子代碼技術。