Hong Kong Internet of Things
Centre of Excellence
香港物聯網科技應用中心

The Fundamentals of
Internet of Things
認識物聯網基礎

Making Smarter Business · Better Life
成就智能商貿·智慧生活

Powered by 策動

GS1
Hong Kong

About Hong Kong Internet of Things Centre of Excellence

The Internet of Things Centre of Excellence (IoT Centre) has been well renowned as the ONLY showroom in Hong Kong to provide live demo of IoT technologies. The IoT Centre is supported by the Innovation and Technology Commission of the HKSAR Government as well as the industries, technology partners and organizations which championed IoT.

關於香港物聯網科技應用中心

香港物聯網科技應用中心是全港唯一的以生活化形式展示物聯網科技的展覽廳。中心獲香港特區政府創新科技署、物聯網業界、技術合作夥伴及支持物聯網機構和單位支持。

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Table of Contents 目錄

Preface 前言

The Internet of Things is no longer a "fiction" in a paper book, it is HAPPENING now.

The Internet of Things refer to any smart interconnected devices (e.g. RFID, sensors, etc.) that enterprises or organization adopted to obtain more visibility in to the identification, location, and condition of products, assets, transactions, or even people with the ultimate goals to be able to trace their pedigree and to drive more effective, timely business decisions or to improve customer interactions.

Imagine a world where everything is traceable, everything can be identified and everything is connected to the Internet together, these connections may change how we see the world, how the world see us, and how we work together with these smart object to make smarter business and better life.

For instance, business may no longer run out of stock or generate waste products, as involved parties would know which products are required and consumed. With the many business benefits promise and those to be unlocked, the adoption of Internet of Things will serve as the catalyst to bring about sustainability, growth and profitability to the enterprises and organizations.

Like something out of a sci-fi movie, the Internet of Things promises to transform our daily lives. Your plants will text you when they need to be watered. Your coffee maker will brew a stronger

物聯網已不再是一個「虛幻」的故事,它正在我們的生活中發生。

物聯網意指企業或機構採用任何智能互連設備(如無線射頻識別(RFID)、傳感器等),獲取更透明化的身份識別、位置、產品狀況、資產、交易,甚至人物等的相關資訊,達至追蹤個別物件的系譜,從而作出有效之及時的商業決定或達至改善客戶關係的最終目標。

試想像一下,在這個世界裡,所有物件都是可追溯、可識別,並且串聯至互聯網,這些串聯將會改變我們觀看世界的角度,也改變世界觀看我們的方式,以及如何與這些智能物件攜手合作創造出智能商貿和智慧生活。

例如,參與生產過程中的各方瞭解產品的需求和消費狀況後,就可以避免缺貨或浪費產品。面對許多現存或潛在應用物聯網技術的商業優勢,應用這些技術將會作為催化劑,為企業和機構帶來可持續的發展以及盈利增長。

物聯網有望改變我們的日常生活,如同科幻電影中的情節:你的植物會通過短信通知你它需要淋水;咖啡機收到來自你睡床傳遞的訊息,

cup when your bed transmits data that you didn't sleep well last night. Your child can make friends with children in another continent with an Internet connected toy. Your daily life in future will be well taken care by these smart objects, which sound great, right?

Let's get started to understand and embrace the advancing Internet of Things enabling technologies now.

知曉你昨晚睡得不好，然後自動幫你沖調一杯濃郁的咖啡；你的孩子可以通過接通了互聯網的玩具與來自世界另一個角落的孩子做朋友。試想像一下，未來你的生活將因為這些智能化的物件而變得不同，不是很有趣嗎？

讓我們現在開始了解並支持先進的物聯網技術吧！

A

AIDC

Automatic identification and data capture (AIDC) refers to the methods of automatically identifying objects, collecting data about them, and entering that data directly into computer systems (i.e. without human involvement). Technologies typically considered as part of AIDC include bar codes, Radio Frequency Identification (RFID), biometrics, magnetic stripes, Optical Character Recognition (OCR), smart cards, and voice recognition. AIDC is also commonly referred to as "Automatic Identification," "Auto-ID," and "Automatic Data Capture." (Wikipedia)

自動識別及數據擷取

自動識別及數據擷取（AIDC）指自動識別物件、收集關於它們的數據，並把數據直接輸入到電腦的方法（即全程不經人手）。一般被視為AIDC技術的包括：條碼、無線射頻識別、生物特徵、磁帶、光學字元識別、智能卡和話音識別。AIDC也可稱為「自動識別」和「自動數據擷取」。（《維基百科》英文版）
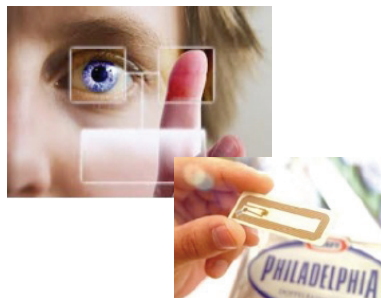
Active RFID Tag

Active RFID is a form of Auto ID (automatic identification) characterised by the use of ID tags which are self powered. They have their own battery, and typically emit a signal at a predefined rate, usually with an interval of about one second between transmissions.

主動式無線射頻識別電子標籤

主動式無線射頻識別電子標籤是自動識別及數據擷取的一種工具，其特色是帶電的識別標籤。它們本身具備電池，一般會以預設的頻率發放訊號，每次發送通常相隔約一秒。

B

Big Data

"Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization." (Gartner)

大數據

大數據是指數量大、速度高及/或種類繁多的數據資產,而需要講求新的處理方式,來改善決策,帶來新啟發並優化流程。(Gartner)

BLE

Bluetooth low energy or **Bluetooth LE**, marketed as **Bluetooth Smart**, is a wireless personal area network technology designed and marketed by the Bluetooth Special Interest Group aimed at novel applications in the healthcare, fitness, security, and home entertainment industries. Compared to Classic Bluetooth, Bluetooth Smart is intended to provide considerably reduced power consumption and cost while maintaining a similar communication range. Bluetooth Smart was originally introduced under the name Wibree by Nokia in 2006.]It was merged into the main Bluetooth standard in 2010 with the adoption of the Bluetooth Core Specification Version 4.0. (Wikipedia)

低功耗藍牙

低功耗藍牙,亦被稱為**智能藍牙**,是一種無線個人區域網絡科技,由Bluethooth Special Interest Group設計和推廣,旨在為多個領域帶來新穎的應用方式,包括醫療護理、健身、保安和家庭娛樂。相比傳統藍牙,智能藍牙能大幅減少耗電和成本,但同時能維持相若的傳輸距離。智能藍牙最初由Nokia於2006年以Wibree之名推出,後於2010年通過採用藍牙核心規範4.0版本,與主流藍牙標準結合。(《維基百科》英文版)

C

Cloud Computing

Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet). Clouds can be classified as public, private or hybrid. (Wikipedia)

雲端運算

雲端運算為一種運算服務而非產品。電腦及其他裝置可通過網絡（通常是互聯網），獲得雲端運算所提供的共享資源、軟件和資訊。那也是公用事業的一種（就像電網）。雲端模型可分為公用雲、私有雲和混合雲。（《維基百科》英文版）

Cold Chain Temperature Management Solution

冷凍鏈溫度管理方案

To monitor temperature changes and generate business critical alerts along the supply chain in a cost effective way with a RFID (Radio Frequency Identification) temperature sensor tag embedded in the logistics units.

此方案在物流單位嵌入無線射頻識別溫度感應標籤，以符合成本效益的方式監察供應鏈上的溫度轉變，並發出與業務相關的重要警報。

D

Data Quality Framework

The Data Quality Framework (DQF) provides an industry-developed best practices guide for the improvement of data quality and allows companies to better leverage their data quality programmes and to ensure a continuously-improving cycle for the generation of master data. It details the crucial processes and capabilities that help organisations improve their data quality and maintain a sustainable good quality data output. (GS1)

數據品質框架

數據品質框架（DQF）是一項業界研發的最佳實務指引，目標是改善數據品質，並提升公司的數據品質計劃成效，以及確保公司在產生主體數據方面尋求持續改進。框架詳述了改善機構數據品質和持續地輸出高質數據所需的重要程序和能力。（GS1）

Data Security

Data security refers to protective digital privacy measures that are applied to prevent unauthorized access to computers, databases and websites. Data security also protects data from corruption. Data security is the main priority for organizations of every size and genre. Data security is also known as information security (IS) or computer security.

數據保安

數據保安乃保障數據私隱的措施，用以預防未經批准進入電腦、數據庫和網站。數據保安也能預防數據損毀。不論機構的大小和類型，數據保安都是優先事項。數據保安也可稱為資訊保安或電腦保安。

D

Data Centre

A data center is a facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (e.g. air conditioning, fire suppression) and various security devices.

數據中心

數據中心是安置電腦系統和相關元件，如電訊和儲存系統的設施。它一般設有額外的或後備的電源、額外的數據通訊連接、環境管控（如空調、滅火）和各種保安設備。

E

Electronic Product Code™ (EPC)

Electronic Product Code™ (EPC) is a numbering system, which works with Radio Frequency Identification (RFID) technology and global communications networks, to track and trace goods as they move through the global supply chain. When an item carries an RFID tag embedded with an EPC number, its origins, date of production and other information can be discovered simply by scanning the RFID tag and accessing a secure remote computer database. EPC is the global RFID standard for numbering in the supply chain management space. As its adoption has spread, EPC is helping more and more businesses to control product quality, deliver goods on time and achieve optimal supply chain efficiency, which ultimately benefits the consumer. (GS1 Hong Kong)

產品電子代碼

產品電子代碼（EPC）是一套編碼系統，它配合無線射頻識別科技和全球通訊網絡，追蹤及追溯在全球供應鏈上流動的貨品。日後只須掃描貨品貼上已編上EPC編碼的無線射頻識別標籤，便可從安全的遠端電腦數據庫中獲取其原產地、生產日期和其他資訊。EPC是一項全球無線射頻識別標準，用於供應鏈管理內的編碼。隨著EPC應用範圍日廣，它協助了更多企業加強管控產品質量、準時送貨和優化供應鏈效率，最終使消費者受惠。（香港貨品編碼協會）

Electronic Article Surveillance (EAS)

Electronic article surveillance (EAS) is a technological method for preventing shoplifting from retail stores, pilferage of books from libraries or removal of properties from office buildings. Special tags are fixed to merchandise or books. These tags are removed or deactivated by the clerks when the item is properly bought or checked out. At the exits of the store, a detection system sounds an alarm or otherwise alerts the staff when it senses active tags.

電子商品防盜系統

電子商品防盜系統（EAS）是一套防盜科技方案，能協助零售店舖預防高買、圖書館預防偷書，以及辦公大樓預防財產被盜。特製標籤將貼於商品或書本裡，並由櫃枱職員在物品售賣或借出時移除或使其失效。在商舖出口設有探測系統，若偵測到仍然生效的標籤，便會發出響聲或向職員發出警報。

E

Electronic Point Of Sale (EPOS)

Electronic Point Of Sale (EPOS) is the place where a retail transaction is completed. It is the point at which a customer makes a payment to the merchant in exchange for goods or services. At the point of sale the retailer would calculate the amount owed by the customer and provide options for the customer to make payment. The merchant will also normally issue a receipt for the transaction.

電子銷售點

電子銷售點（EPOS）是完成零售交易的地方，正是在這一點上，顧客向商戶付款，換取商品或服務。零售商會在銷售點計算顧客所欠的金額，並為他們提供付款的選項。商戶亦通常會為是項交易發出收據。

E

G

Global Positioning System (GPS)

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver.

全球定位系統

全球定位系統（GPS）是設置於太空的衛星導航系統，只要與四顆或以上的GPS衛星之間的直視距離沒有任何阻擋，便能在任何天氣情況、於地球上或地球附近的任何地點獲取位置和時間資訊。此系統為全球的軍事、平民和商業用家提供了重要的功能。它由美國政府維護，任何人只要配備GPS接收器就能免費獲取資訊。

General packet radio service (GPRS)

General packet radio service (GPRS) is a packet orientedmobile data service on the 2G and 3Gcellular communication system's global system for mobile communications (GSM). GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies.

通用封包無線服務 (GPRS)

通用封包無線服務是2G和3G全球流動通訊系統中建基於封包的流動數據服務，它的標準最初由歐洲電訊標準協會（ETSI）制定，以配合早期的蜂窩數碼封包數據和i-mode封包交換手機科技。

G

Global Data Synchronization Network

The Global Data Synchronization Network (GDSN) is an internet-based, interconnected network of interoperable data pools and a global registry known as the GS1 Global Registry, that enables companies around the globe to exchange standardised and synchronisedsupply chain data with their trading partners using a standardised Global Product Classification.

GDSN assures that data exchanged between trading partners is accurate and compliant with universally supported standards. GDSN consists of supplier/retailer trading partner, data pools that hold and process trading partner data and the GS1 Global Registry, a directory that helps locate data sources and keep relationships between trading partners in sync.

Geographic Information System (GIS)

Geographic Information System (GIS) is a computer system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. The acronym GIS is sometimes used for geographical information science or geospatial information studies to refer to the academic discipline or career of working with geographic information systems and is a large domain within the broader academic discipline of Geoinformatics.

全球數據同步網絡

全球數據同步網絡（GDSN）是一個建基於互聯網、互相連結的網絡，網絡內包含互通的數據池和全球註冊庫，後者稱為GS1全球註冊資料庫。GDSN能讓世界各地的公司與貿易夥伴以標準化的全球產品分類系統，交換標準化和同步的供應鏈數據。

GDSN可確保貿易夥伴間交換的數據均屬準確並符合全球支援的標準。GDSN包括供應商/零售商等貿易夥伴、儲存和處理貿易夥伴數據的數據池，以及GS1全球註冊資料庫，後者是一個名錄，有助尋找數據來源及維繫正處於同步狀態的貿易夥伴之間的關係。

地理資訊系統

地理資訊系統（GIS）是一套用以擷取、儲存、處理、分析、管理和表述各種空間和地理數據的電腦系統。GIS這個縮寫有時是代表地理資訊科學或空間資訊學，與地理資訊系統有關的學科或職業，也是大地訊息學這門廣闊學科的其中一大知識領域。

H

High Resolution Management

High Resolution Management is a new approach to management that emerging hand-in-hand with new tools such as RFID, GPS and digital technologies.

高分辨率管理

高分辨率管理是與無線射頻識別、全球定位系統和數碼科技等工具同時興起的一種新的管理方法。

Health Informatics

Health informatics is a discipline at the intersection of information science, computer science, social science, behavioral science and health care. It deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine. Health informatics tools include computers, clinical guidelines, formal medical terminologies, and information and communication systems. It is applied to the areas of nursing, clinical care, dentistry, pharmacy, public health, occupational therapy, physical therapy and (bio)medical research, and alternative medicine too.

電子健康及醫療訊息

電子健康及醫療訊息是一門由資訊科學、電腦科學、社會科學、行為科學和醫療護理交匯而成的學科。它探究保健和生物醫學界優化資源擷取、儲存、檢索和使用等程序所需的資源、設備和方法。電子健康及醫療訊息工具包括電腦、臨床指引、醫療術語以及資訊和通訊系統。它可應用於護理、臨床護理、牙醫、藥劑、公共衛生、職業治療、物理治療和（生物）醫學以及另類醫療等領域。

Internet of Things (IoT)
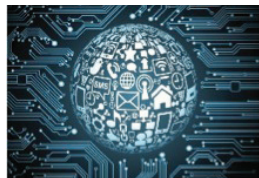
A global network infrastructure, linking physical and virtual objects through the exploitation of data capture and communication capabilities. This infrastructure includes existing and evolving Internet and network developments. It will offer specific object-identification, sensor and connection capability as the basis for the development of independent federated services and applications. These will be characterised by a high degree of autonomous data capture, event transfer, network connectivity and interoperability. (CASAGRAS, an EU Framework 7 project)

物聯網

物聯網是一個通過採用數據擷取和通訊等功能，來連結實體物件和虛擬物件的全球網絡基建。這項基建包括了現存和正在演變的互聯網和網絡發展。它提供了特定的物件識別、感應和連結功能，能作為開發獨立的聯盟服務和應用的基礎。它們的特色包括高度自主的數據擷取、事件傳送、網絡連結和互通性。（CASAGRAS，歐盟第7期框架的一個項目）

IoT for Business

Any smart interconnected devices (e.g. RFID, sensors, etc.) that enterprises or organization adopted to obtain more visibility into the identification, location, and condition of products, assets, transactions, or even people with the ultimate goals to be able to trace their pedigree and to drive more effective, timely business decisions or to improve customer interactions. (GS1 Hong Kong)

商用物聯網

這是企業或機構所採用的互相連結的智能裝置（例如無線射頻識別、感應器等），該等裝置能提高產品、資產、交易甚至人的身份、位置和狀況的透明度，最終目標是追蹤上述項目的電子系譜，以便作出更有效和及時的商業決策或改善與顧客的互動。（香港貨品編碼協會）

Internet Protocol Version 6 (IPv6)

Internet Protocol version 6 (IPv6) is the latest version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet. IPv6 was developed by the Internet Engineering Task Force (IETF) to deal with the long-anticipated problem of IPv4 address exhaustion. (Wikipedia)

互聯網通訊協定第6版 (IPv6)

互聯網通訊協定第6版（IPv6）是互聯網通訊協定（IP）的最新版本，IP是一項通訊協定，為網絡上的電腦提供一個識別和位址系統，以便在互聯網上傳遞訊息。IPv6由互聯網工程任務組研發，旨在解決早已預視到的IPv4位址枯竭問題。（《維基百科》英文版）

I

L

Logistics Management

Logistics Management is the part of supply chain management that plans, implements, and controls the efficient, effective, forward, and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer's requirements.

物流管理

物流管理是供應鏈管理的一部分，旨在計劃、執行和管控貨品、服務和相關資訊在原產地和消費地之間的正向和逆向流動和儲存，確保過程有效率和有效，以滿足顧客要求。

M

Machine to Machine (M2M)

Machine to Machine (M2M) refers to technologies that allow both wireless and wired systems to communicate with other devices of the same type (Wikipedia)

機器對機器（M2M）

機器對機器（M2M）意指為同類裝置提供無線和有線通訊系統的科技。（《維基百科》英文版）

Mobile Computing

Mobile Computing is human-computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

流動運算

流動運算是人類與電腦之間的互動，而該電腦能夠在移動期間仍然正常運作。流動運算包括流動通訊、流動硬件和流動軟件。通訊事宜包含臨時安排或基礎建設的網絡、通訊財產、協定、數據格式和具體的科技。硬件包含流動裝置或裝置的元件。流動軟件涉及流動應用程式所需的特質和要求。

M

Mobility for Business

Mobility is the trend toward a shift in work habits, with more employees working out of the office and using mobile devices and cloud services to perform business tasks.

The term refers not only to mobile workers and mobile devices, but also to the mobility of corporate data. An employee may upload a corporate presentation from his or her desktop PC to a cloud storage service, then access it from a personal tablet to show at a client site.

Mobility can improve employee productivity, but it also creates security risks. Mobility management products, such as data loss prevention technologies, are available to help IT departments address these risks. A strong acceptable use policy for employees can also contribute to a successful mobility strategy for enterprise.

商界的流動性

流動性是工作習慣的一種新趨勢，越來越多僱員在辦公室以外的地方工作，並使用流動裝置和雲端服務來完成商業任務。

流動性指的不僅是流動的僱員和裝置，還包括企業數據的流動。僱員可以把企業的簡報從他/她的桌面電腦上載到雲端儲存服務，再在抵達客戶地點時以個人平板電腦展示這份簡報。

流動性可促進員工的生產力，但同時造成保安風險。與流動性管理相關的產品，例如預防數據遺失的科技可協助資訊科技部門處理這些風險。為員工制定健全的適當使用政策也有助企業成功推行流動性策略。

N

Near Field Communication (NFC)

Near Field Communication (NFC) is a set of standards for smartphones and similar devices to establish radio communication with each other by touching them together or bringing them into proximity, usually no more than a few centimeters.

Network

A network is a group of two or more computer systems linked together. There are many types of computer networks, including:

- local-area networks (LANs): The computers are geographically close together (that is, in the same building).

- wide-area networks (WANs): The computers are farther apart and are connected by telephone lines or radio waves.

- campus-area networks (CANs): The computers are within a limited geographic area, such as a campus or military base.

- metropolitan-area networks MANs): A data network designed for a town or city.

- home-area networks (HANs): A network contained within a user's home that connects a person's digital devices.

近場通訊（NFC）

近場通訊（NFC）是一套標準，允許智能手機和類似裝置互相之間建立無線通訊，方法是把這些裝置互相觸碰又或縮短它們的距離至通常不多於數厘米。

網絡

網絡由兩個或以上的電腦系統連結而成。電腦網絡有不同種類，包括：

- 局部區域網絡（LANs）：這些電腦的地理位置非常接近（即是在同一座建築之內）。

- 寬廣區域網絡（WANs）：這些電腦的距離較遠，由電話線或無線電波連接。

- 校園區域網絡（CANs）：這些電腦的地理範圍有限，例如分佈於校園或軍事基地之內。

- 城市區域網絡（MANs）為市鎮或城市而設的數據網絡。

- 家庭區域網絡（HANs）限於用家家庭內的網絡，用以連結個人電子設備。

Q

QR Code (Quick Response Code)

QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte / binary, and kanji) to efficiently store data; extensions may also be used. (Wikipedia)

Originally designed for industrial uses, QR codes have become common in consumer advertising. Typically, a smartphone is used as a QR code scanner, displaying the code and converting it to some useful form (such as a standard URL for a website, thereby obviating the need for a user to type it into a web browser). The QR code has become a focus of advertising strategy, since it provides a way access to a brand's website more quickly than by manually entering a URL. (Wikipedia)

QR碼

QR碼是一種矩陣條碼（或二維條碼）的商標，最初是為日本的汽車業而設計。條碼是一種能夠被機器讀取的光學標籤，包含其所附貼的商品的資訊。QR碼使用四種標準化的編碼模式（數字、字母數字混合、字節/二進制和漢字），確保有效率地儲存數據；亦可能具備擴充套件。（《維基百科》英文版）

QR碼最初是為工業用途而設計，現常見於消費廣告之中。一般會以智能手機作為QR碼的掃描器，手機會顯示QR碼，並把它轉化為一些有用的形式（例如網站的標準URL位址，那樣用家就無須在瀏覽器內鍵入網址）。QR碼已成為廣告策略的焦點之一，因相比過往以人手輸入網址，用家使用QR碼能更快進入品牌的網站。（《維基百科》英文版）

R

Radio Frequency Identification (RFID)

Radio Frequency Identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by and read at short ranges (a few meters) via magnetic fields (electromagnetic induction). Others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHFradio waves (i.e., electromagnetic radiation at high frequencies). Battery powered tags may operate at hundreds of meters. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object. (Wikipedia)

無線射頻識別

無線射頻識別（Radio Frequency Identification，RFID）使用電磁場來無線傳輸數據，藉此自動識別和追蹤物件上附貼的標籤。標籤內含以電子形式儲存的資訊。有些標籤能在短距離（約幾米）內通過磁場（電磁感應）來獲取電力和讀取。其他標籤則配有自身的電源如電池，如果沒有電池，則可能從探測標籤的儀器所發出的電磁場中收集能量，然後作為一個被動的應答器，發出微波或特高頻無線電波（即高頻的電磁輻射）。以電池供電的標籤的操作距離可達數百米。與條碼不同，標籤不一定要在讀取器的直視距離之內，它亦可能內嵌於被追蹤的物件之中。（《維基百科》英文版）

R

Responsive web design (RWD)

Responsive web design (RWD) is a web design approach aimed at crafting sites to provide an optimal viewing experience—easy reading and navigation with a minimum of resizing, panning, and scrolling—across a wide range of devices (from mobile phones to desktop computer monitors).

回應式網站設計

回應式網站設計（Responsive Web Design）是一種網站設計方式，旨在提供最佳瀏覽體驗—不管使用哪類裝置瀏覽（如手提電話以至桌面電腦屏幕），均易於閱讀和導航，而且儘量不用改變大小、橫移或滾動。

R

Real Time Location System (RTLS)

Real Time locating systems (RTLS) are used to automatically identify and track the location of objects or people in real time, usually within a building or other contained area. Wireless RTLS tags are attached to objects or worn by people, and in most RTLS, fixed reference points receive wireless signals from tags to determine their location. Examples of real-time locating systems include tracking automobiles through an assembly line, locating pallets of merchandise in a warehouse, or finding medical equipment in a hospital.

The physical layer of RTLS technology is usually some form of radio frequency (RF) communication, but some systems use optical (usually infrared) or acoustic (usually ultrasound) technology instead of or in addition to RF. Tags and fixed reference points can be transmitters, receivers, or both, resulting in numerous possible technology combinations.

RTLS are a form of local positioning system, and do not usually refer to GPS, mobile phone tracking. Location information usually does not include speed, direction, or spatial orientation.

實時定位系統（RTLS）

實時定位系統（RTLS）用於自動識別和實時跟踪的物體或人的位置，通常的建築物或其他包含的區域內。無線實時定位標籤附著到物體或佩戴人，並且在大多數的RTLS，固定參考點接收來自標籤的無線信號來確定自己的位置。實時實施的定位系統包括通過一個裝配線跟踪汽車，定位托盤商品在倉庫，或發現醫療設備在醫院。

RTLS技術的物理層通常是某種形式的射頻（RF）通信，但是有些系統使用光學（通常為紅外線）或聲（通常超聲的或除了RF）技術來代替標記和固定參考點可以是發射器，接收器，或二者，從而導致大量可行的技術組合。

RTLS是一種形式的局部定位系統，並且通常不參考GPS，手機追踪。位置信息通常不包括速度、方向或空間取向。（《維基百科》英文版）

S

Sensor

A **sensor** (also called **detector**) is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an (today mostly electronic) instrument. For accuracy, most sensors are calibrated against known standards.

Type of Sensor

- Barcode
- RFID
- Light
- Motion
- Temperature
- Magnetic fields
- Gravity
- Humidity
- Moisture
- Vibration
- Pressure
- Electrical fields
- Sound
- GPS
- Other physical aspects of the external environment

感應器

感應器（也稱**偵測器**）是一個轉化器，能測量物理上的數值，並將之轉化為一種觀察員或儀器（今天通常是電子儀器）能讀取的訊號。為求準確，大部分感應器均會按公認的標準來校準。

感應器種類

- 條碼
- 無線射頻識別
- 光
- 動作
- 溫度
- 磁場
- 地心吸力
- 濕度
- 水分
- 振動
- 壓力
- 電場
- 聲音
- 全球定位系統
- 外界環境的其他物理範疇

S

S

Smart City

A smart city (also smarter city) is an emerging conceptual view of a city that promotes the use of information and communication technologies (ICTs) to engage with citizens to develop social capital and intellectual capital, to make better use of hard infrastructure (physical capital), reduce usage of environmental capital and support smart growth (sustainable economic development). The inclusion of social and environmental capital distinguishes smart cities from the more technology-laden terms of digital city and Intelligent city.

Smart cities create more effective urban systems capable of addressing contemporary challenges and urban problems. They create more innovative and competitive cities, based on knowledge clusters, people-led innovation, and global networking; offering higher capacity of monitoring and management of environmental issues; improved city transportation; more secure urban spaces. This greater effectiveness is based on solutions /platforms integrating human, collective and artificial intelligence (in other words urban activities, institutional capacity, and IT).

智慧城市

智慧城市是一種新興的城市概念，鼓勵使用資訊及通訊科技來聯繫市民，藉以建立社會和知識資本、善用硬基建（物質資本）、減少使用環境資本，並支援智慧增長（可持續經濟發展）。智慧城市包括了社會和環境資本，因而與數碼城市和智能城市等科技成分較重的術語有所區別。
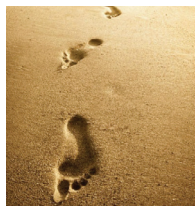
智慧城市務求建立更有效的都市系統，能處理當代的挑戰和都市問題，並帶來更具創意和更有競爭力的城市。它以知識群為基礎，強調以人帶動創新和全球網絡，提升監察和管理環境議題的能力，改善城市交通，並提供更安全的都市空間。這些卓越成效源自結合人類、集體和人工智慧的方案/平台，即是結合都市活動、體制能力和科技。

T

Traceability

Traceability is the ability to verify the history, location, or application of an item by means of documented recorded identification. (Wikipedia)

可追溯性

可追溯性是以有文件紀錄的證明，來核實一項物品的歷史、位置和應用的能力。（《維基百科》英文版）

U

Ubiquitous Computing

Ubiquitous computing (ubicomp) is a concept in software engineering and computer science where computing is made to appear everywhere and anywhere. In contrast to desktop computing, ubiquitous computing can occur using any device, in any location, and in any format. A user interacts with the computer, which can exist in many different forms, including laptop computers, tablets and terminals in everyday objects such as a fridge or a pair of glasses. The underlying technologies to support ubiquitous computing include Internet, advanced middleware, operating system, mobile code, sensors, microprocessors, new I/O and user interfaces, networks, mobile protocols, location and positioning and new materials. (Wikipedia)

普及運算

普及運算是軟件工程和電腦科學的一個概念，意指運算可出現在任何

地方，無所不在。與桌面運算相比，普適運算能以任何裝置，在任何地點以任何方式進行。用家可通過多種不同形式與電腦互動，包括手提電腦、平板電腦和終端機，以至冰箱或眼鏡等日常物品。支援普及運算的科技包括互聯網、高階中介軟件、作業系統、流動編碼、感應器、微處理器、新的輸入/輸出和用家介面、網絡、流動協定、位置和定位以及新物料。（《維基百科》英文版）

TU

V

Supply Chain Visibility

The practice of capturing and storing data, creating intelligence, and altering decisions based on the three cross-organizational flows in the supply chain (materials, capital, and information) along with their relevant environmental details" (www.supply-chain-visibility.com)

供應鏈透明度

供應鏈透明度能讓機構根據供應鏈的三類跨機構流動（物品、資本和資訊）以及相關的環境細節，來擷取和儲存數據、獲取情報和改變決定等。（www.supply-chain-visibility.com）

Virtualization

Virtualization, in computing, is a term that refers to the various techniques, methods or approaches of creating a virtual (rather than actual) version of something, such as a virtual hardware platform, operating system (OS), storage device, or network resources. This article lists and briefly explains these methods.

虛擬化

虛擬化是電腦運算的一個術語，指創造某些物件的虛擬（而非實體）版本的不同技巧、方法或步驟，例如虛擬硬件平台、作業系統、儲存裝置或網絡資源。本文列舉和簡述這些方法。

V

W

Web 2.0

Web 2.0 describes World Wide Web sites that use technology beyond the static pages of earlier Web sites. The term was coined in 1999 by Darcy DiNucci and was popularized by Tim O'Reilly at the O'Reilly Media Web 2.0 conference in late 2004. Although Web 2.0 suggests a new version of the World Wide Web, it does not refer to an update to any technical specification, but rather to cumulative changes in the way Web pages are made and used.

A Web 2.0 site may allow users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community, in contrast to Web sites where people are limited to the passive viewing of content. Examples of Web 2.0 include social networking sites, blogs, wikis, folksonomies, video sharing sites, hosted services, Web applications, and mashups.

Web 2.0的描述萬維網使用的技術超越了早期的網站靜態頁面的網站。這個由 Darcy DiNucci 於1999年創造，被 Tim O'Reilly 於2004年底 O'Reilly Media Web 2.0 會議中普及。雖然Web 2.0提出了一個新版本的萬維網，它不是指的最新的任何技術規範，而是在網頁被製成和使用的方式累積的變化。

一個Web 2.0網站可以讓用戶進行互動和互相協作的社交媒體對話的創造者用戶生成內容的虛擬社區，而相比網站，用家都限於被動觀看內容。Web 2.0的的例子包括社交網站、博客、維基百科、大眾分類、視頻共享網站、寄存服務、Web應用程序和混搭。

W

W

Wi-Fi

Wi-Fi, also spelled Wifi or WiFi, is a local area wireless technology that allows an electronic device to exchange data or connect to the internet using 2.4 GHz UHF and 5 GHz SHF radio waves. The name is a trademark name, and is a play on the audiophile term Hi-Fi. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards".[1] However, since most modern WLANs are based on these standards, the term "Wi-Fi" is used in general English as a synonym for "WLAN". Only Wi-Fi products that complete Wi-Fi Alliance interoperability certification testing successfully may use the "Wi-Fi CERTIFIED" trademark. (Wikipedia)

Many devices can use Wi-Fi, e.g., personal computers, video-game consoles, smartphones, some digital cameras, tablet computers and digital audio players. These can connect to a network resource such as the Internet via a wireless network access point. Such an access point (or hotspot) has a range of about 20 meters (66 feet) indoors and a greater range outdoors. Hotspot coverage can comprise an area as small as a single room with walls that block radio waves, or as large as many square kilometres achieved by using multiple overlapping access points. (Wikipedia)

Wi-Fi，也可寫成Wifi或WiFi，是一種局部區域無線技術，讓電子裝置使用2.4GHz特高頻和5GHz超高頻無線電波交換數據或連結互聯網。它是一個商標，是音響愛好者的一個術語Hi-Fi的諧音。Wi-Fi聯盟把Wi-Fi定義為任何「建基於國際電機電子工程學會（IEEE）802.11標準的無線局部區域網絡產品」。然而，由於大部分現代的無線局部區域網絡均建基於這些標準，故Wi-Fi基本上是無線局部區域網絡的同義詞。只有成功通過Wi-Fi聯盟認證測試的產品才能使用「Wi-Fi認證」的商標。（《維基百科》英文版）

很多裝置均有使用Wi-Fi，例如個人電腦、視像遊戲主機、智能手機、部分數碼相機、平板電腦以及數碼音樂播放器。這些裝置可通過無線網絡接駁點，連接網絡資源如互聯網。這類接駁點（或熱點）的有效距離約為室內20米（66呎），室外的範圍會更廣。熱點的範圍可以小至一個有牆壁阻隔無線電波的單一房間，又或廣至以平方公里計算，後者需要使用多個互相重疊的接駁點。（《維基百科》英文版）

X

XML

Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. It is defined in the XML 1.0 Specification produced by the W3C, and several other related specifications, all free open standards. The design goals of XML emphasize simplicity, generality, and usability over the Internet. It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, it is widely used for the representation of arbitrary data structures, for example in web services.Many application programming interfaces (APIs) have been developed to aid software developers with processing XML data, and several schema systems exist to aid in the definition of XML-based languages. (Wikipedia)

可擴展標記語言（XML）

可擴展標記語言（XML）是一種標記式語言，它定義了一套文件編碼的規則，其編碼格式是人類和機器都能夠讀取的。它的定義源自萬維網聯盟（W3C）制定的XML 1.0標準以及數項其他相關的規範，它們均屬免費、開放的標準。XML的設計目標是成為一種簡單、普遍和可用的互聯網語言。它的數據格式以文字為主，並通過統一碼來為不同的人類語言提供強大支援。雖然XML的設計以文件為主要對象，它亦被廣泛用於表達任意的數據結構，例如在網絡服務之中。為協助軟件開發員處理XML數據，坊間開發了很多應用程式介面（API），亦有數個模式系統協助定義XML為本的語言。（《維基百科》英文版）

X

Z

ZigBee

ZigBee is a specification for a suite of high-level communication protocols used to create personal area networks built from small, low-power digital radios. ZigBee is based on an IEEE 802.15 standard. Though its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics, ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking (ZigBee networks are secured by 128 bit symmetric encryption keys.) ZigBee has a defined rate of 250 kbit/s, best suited for intermittent data transmissions from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range low-rate wireless data transfer. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi. (Wikipedia)

紫蜂

紫蜂是一種高層次通訊協定規範,用以建立以小型、低耗無線電波為基礎的個人區域網絡。紫蜂是建基於IEEE 802.15標準的,雖然它的傳輸距離受低耗電所限,只有10-100米的直視距離(視乎功率輸出和環境因素),紫蜂裝置仍可通過網狀的中間裝置,長距離傳送數據到較遙遠的裝置。紫蜂一般用於低速、講求電力持久和網絡安全的應用(紫蜂網絡使用128比特對稱加密密匙來為網絡加密。) 紫蜂的標準傳輸速率為250kbit/s,最適合傳送感應器或輸入裝置的間歇數據。應用包括無線電燈開關、具備家居顯示屏的電錶、交通管理系統以及其他需要短距離低速無線數據傳輸功能的消費品和工業設備。這項科技由紫蜂規範所定義,目的是建立較藍牙或Wi-Fi簡單而便宜的無線個人區域網絡。(《維基百科》英文版)

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