NEC Hong Kong Limited
日本電氣香港有限公司

Brewing a Crystal-Clear Wine Supply Chain
釀造清澈透明的葡萄酒供應鏈

About the Company 公司簡介

Established in 1984, NEC Hong Kong Limited (NEC HK) has been rapidly expanding its activities to meet growing customer demands in Hong Kong, Macau and mainland China.

As a leading information and communications technology provider, NEC HK provides innovative solutions and infrastructure to promote safety, security and enhance the quality of life for individuals and the community.

成立於1984年，日本電氣香港有限公司迅速擴展公司業務以滿足香港、澳門和中國內地不斷增長的顧客需求。

作為業界領先的資訊及通訊科技供應商，NEC香港致力為個人及社區提供安全可靠、提升生活品質的創新解決方案和基礎架構。

Background 背景

The wine supply chain is one of the most complicated and disintegrated supply chains with distant grape-growers, suppliers, producers and demanding consumers. This complicated network poses challenges not only for efficient production and supply, but vulnerable to counterfeiting, adulteration, usage of hazardous and excessive chemicals.

These issues call forth a solution which can build trust among different stakeholders as well as in consumers by providing visibility into the supply chain at different stages and to verify the ingredients, composition and other factors such as vineyard location, weather conditions etc. from farm to bottle.

To do this, NEC Hong Kong and GS1 Hong Kong jointly developed the Wine Traceability Solution using NEC's Blockchain platform and GS1's Global Supply Chain Standards interfacing with GS1 Hong Kong's ezTRACK™ platform.

葡萄酒供應鏈的網絡複雜而分散，當中包括位處世界各地的葡萄種植者、供應商、生產商和高要求的消費者。這繁複的脈絡不僅影響業界的生產效率和供應，更衍生出彷冒、摻假、使用危險及過量化學品等的危機。

要解決上述問題，就必須取得不同持份者、包括消費者的信任，提升整個產業鏈中每個階段的運作透明度，並為每樽葡萄酒核實其「由莊園至酒樽」的整個過程，包括成份、比例，及其他要素如莊園位置、氣候條件等。

為此，NEC香港和香港貨品編碼協會(GS1 HK)携手，利用NEC的區塊鏈平台及GS1全球供應鏈標準，開發出葡萄酒溯源解決方案，並連接至GS1 HK的「蹤橫網™」平台。

"NEC's Blockchain focuses on resolving existing Byzantine fault-tolerant (BFT) limitations, we have taken a leap further in introducing a potentially-revolutionary consensus protocol - FastBFT. This novel consensus protocol not only ensures high availability and security, but also delivers high throughput."

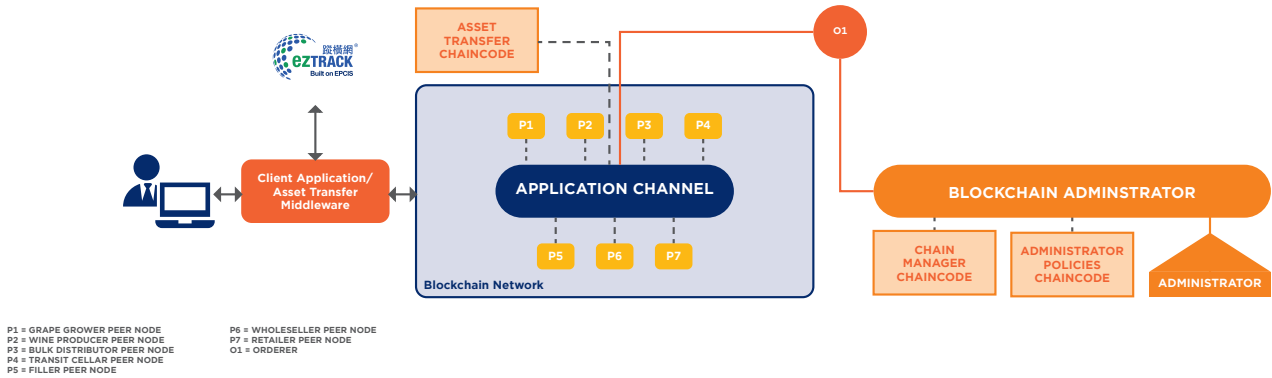「NEC的區塊鏈致力解決現時拜占庭容錯(BFT)的局限，遂引入顛覆性的共識協議『FastBFT』。這套革新的共識協議不僅確保高度可用性及安全性，更擁有高通量的儲存能力。」

Mr. Patrick leung,
Project Director
項目總監 楊本碩先生

GS1 standards used or solution (s) / service (s) applied
應用的GS1標準或方案/服務

- ezTRACK™

- 蹤橫網™

P1 = GRAPE GROWER PEER NODE
P2 = WINE PRODUCER PEER NODE
P3 = BULK DISTRIBUTOR PEER NODE
P4 = TRANSIT CELLAR PEER NODE
P5 = FILLER PEER NODE

P6 = WHOLESELLER PEER NODE
P7 = RETAILER PEER NODE
O1 = ORDERER

Solutions

The blockchain based traceability system aims to enhance the cross-border supply chain visibility and can solve the challenges of counterfeiting and integrity by recording every transaction as a block in a chain. Inherently these blocks are immutable and any tampering with a block shall break the chain due to lack of further consensus. With the appropriate permissions, relevant stakeholders of the system are able to query a secured distributed ledger and ultimately trace the origins and journey of a wine product.

NEC's Blockchain is based on a novel architecture that caters to meeting industry standards. The architecture comprises of satellite chains that privately run different consensus protocols in parallel, boosting the scalability of the system, and allows a blockchain administrator to oversee the entire network and enforce specific policies via smart contracts. Moreover, NEC's Blockchain combines hardware-based trusted execution environments with lightweight secret sharing.

The solution integrates with GS1 Hong Kong's ezTRACK™ platform and based on GS1 global standards. ezTRACK™, a platform that offers real-time information visibility across worldwide supply chains, can effectively track and trace the flow of goods and product information from point of manufacture to point of sale through a robust Electronic Product Code™ (EPC) standard-based platform.

As a cloud-based application compatible with various technologies including Radio Frequency Identification (RFID), barcode, Global Positioning System (GPS), sensors, ezTRACK™ runs various solutions that allow enterprises to instantly access business-critical product information related to work-in-progress status, product inventory data, delivery schedules, etc.

Benefits

The Wine Traceability Solution provides following benefits to the users:

1. Enhance the visibility of Wine Supply Chain Traceability and ensure provenance and authenticity for every bottle of wine

2. Ensure the data privacy and confidentiality with Private and Confidential Satellite Chains

3. Warrant high security against cyber attacks

解決方案

該溯源系統以區塊鏈為基礎，旨在加強跨境供應鏈的可視化程度，並可以藉著記錄每宗交易的每段軌跡，去應對造假及信譽等問題。這些區塊鏈數據是不可改變的，如果在缺乏雙方共識的情況下進行篡改，將會破壞整條區塊鏈。在取得合適的權限後，相關的系統持份者便能夠查閱受保護的分散式帳本，並追蹤葡萄酒產品的產地及運送旅程。

NEC的區塊鏈是建基於業界標準的嶄新架構創建而成。該架構能連接衛星網絡，可私密地同步運行不同的共識協議，提升系統的擴展性；同時，它亦允許區塊鏈管理員透過智能合約監察整個網絡及執行指定條款。除此以外，NEC的區塊鏈更結合受硬件保護的可信執行環境及輕量的密件共享。

解決方案同時融合了GS1全球標準及GS1 HK「蹤橫網™」平台。「蹤橫網™」能提供全球供應鏈中的實時資訊，提升供應鏈透明度；透過產品電子代碼™（EPC）標準，它能有效地追蹤及追溯從製造源頭至銷售點途中的貨物和產品動態資訊。

採用雲端技術的「蹤橫網™」能兼容多種科技，包括無線射頻識別技術（RFID）、條碼、全球定位系統（GPS）以及傳感器等，為企業提供多元化方案，以即時獲取重要的產品資訊，例如生產進度、庫存管理數據、付運日程等。

效益

葡萄酒溯源解決方案為用家提供以下效益：

1. 提升整個葡萄酒供應鏈溯源時的透明度，確保每瓶葡萄酒原產地質量及真確性

2. 透過加密隱藏的衛星鏈，保障客戶數據私隱和機密資料

3. 強調高安全性以防黑客網絡攻擊