(intel®)

Changing the Face of Retail with Blockchain

Collaboration between IntraEdge Technology and Intel can help retailers unlock the transformative potential of blockchain

This solution brief describes how to solve business challenges through investment in innovative technologies.

If you are responsible for...

- **Business strategy:**
  You will better understand how blockchain will enable you to successfully meet your business outcomes.

- **Technology decisions:**
  You will learn how blockchain works to deliver IT and business value.

Executive summary

It is an exciting time to be in retail. The industry is overflowing with opportunities for innovation as more intermediaries and multiple channels of engagement offer new ways to satisfy demands for better customer experience.

However, as business models become increasingly complex, there is much to be done to address the pain points experienced by retailers, associate partners and end customers. Emerging technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT) offer a solution to many of these business problems, enabling new ways to store, process and analyze data to produce immediately actionable insights that can streamline processes and drive innovation.

One new technology with especially transformative potential for the retail sphere is blockchain, promising the creation of a more transparent and accountable retail supply chain in which all parties have access to a single view of interactions. The new solution created by IntraEdge in collaboration with Intel harnesses this potential to address the lawful use and management of customer data without compromising business performance.

IntraEdge
TECHNOLOGY SERVICES & SOLUTIONS

Business challenge: driving data-driven accountability

Retail is undergoing one of the biggest transformations in history. Shopper habits have changed, and their expectations increased dramatically. The speed and convenience of online platforms makes researching and purchasing items far easier than ever before; and ever-savvier customers are demanding better accountability for ethical practices throughout the supply chain.

At the heart of all of these changes is data. To capitalize on this potential goldmine of insights, retailers are looking to new data capture, ingestion and analysis mechanisms to be able to better understand their customers and transform the shopping experience.

Dr. Farhaan Mohideen
UK Business Unit Lead,
Retail Solutions Division, Intel

However, with customer trust at an all-time low[1], it is vital that the retailers have the right data obtained from trusted sources available for the action requested by the consumer and then protected, shared and retained consistent with that purpose.

With the EU General Data Protection Regulation (GDPR) coming into effect in May 2018, the need for businesses to apply rigorous standards to the collection and processing of personal information is more important than ever before.

Not only does the GDPR require a careful re-examination of how organizations collect, process and share personal information, but the new regulation also empowers individuals with expanded rights to request that their information be changed, transferred or completely erased. Organizations found to be non-compliant may be subject to serious penalties and fines up to 20 million euros or 4 percent of annual revenue[2], whichever is greater.

Retailers require a way to lawfully use personal information to support their operations without compromising their ability to drive innovation and optimize customer experience.

The GDPR imperative

Organizations found to be non-compliant are subject to fines up to 20 million euros or 4 percent of annual revenue.[2]

Overcoming retail challenges with blockchain

Faced with a need to work with multiple third parties, a popular solution for retailers has been to create a single database accompanied by an application programming interface (API) management platform which distributes the data to all parties.

However, the problem with this solution is that not all data is created and stored in one location. The multiple parties involved end up with their own version of records, rather than a single point of truth that can be seen and updated by all participants in real-time.

Blockchain offers an alternative model. While most of blockchain's existing use cases apply to the financial services context, the technology's transformative potential extends far beyond financial transactions.

For its ability to securely record any sort of data and provide a single view of all interactions, blockchain provides a new dimension to current business problems – elevating data authenticity and device security, while simultaneously lowering costs.

Here are a few use cases for how blockchain could overcome key challenges in retail:

1. Device Security

The number of IoT devices that will be deployed across a retail estate is on the rise. Every device that is connected to the network, transmitting and receiving information is a prime target for hackers. There needs to be a way to identify which devices are pre-provisioned or authenticated to be used in a retailer's environment. Blockchain provides a mechanism for maintaining a list of devices that are authorized to be part of the network and adds additional security during a device's entire lifecycle.

2. Single View of Inventory

Inventory accuracy is of crucial importance in retail supply chain. Especially when there are multiple suppliers and manufacturers involved in providing stock to a retailer, it is important to have a single view of inventory down to which store has exactly which pieces at which point in time. Blockchain enables this single view of inventory which is updated in real-time by all parties involved – from the retailer itself to all independent suppliers.

3. Customer Data

The number of data breaches has been increasing[3] and consumers are worried about their data falling into the wrong hands. The concern over individuals being harmed due to unauthorized access and use of their personal information has fueled regulators efforts to expand individuals' rights and obligations on data processors and controllers. As privacy laws become stronger and more commonplace globally, retailers must be confident that their practices reflect good data stewardship. This means retailers must be clear about what data they capture, and how they use and secure it. Blockchain can support these efforts by making it easier to keep a secure record of all customer data and limit third party access to only the relevant elements. What's more, blockchain is a useful control to prevent ransomware due to its ability to create multiple copies of the exact same transaction.

4. Insurance Theft

In certain unfortunate circumstances, high-value goods are insured and the claimant may disingenuously claim a replacement via insurance, whilst trying to sell the original goods to make a profit. Blockchain can be used to prevent this from happening by providing each unit, such as a mobile phone, with an International Mobile Equipment Identity (IMEI) number that uniquely identifies it, which can then be flagged when it is being re-sold against an insurance claim.

5. Authenticity of Products

The number of fake products in the market is increasing[4] and the differences are so subtle that it is becoming ever more difficult to distinguish between genuine and fake merchandise. Retailers who track their supply chain through blockchain will find it easier to prove the high-quality provenance and ethical standards of their merchandise, thus building their reputation and creating stronger trust with customers.

6. Loyalty Schemes

Many retailers create programs to build long-term customer loyalty. These often take the form of 'coalition loyalty programs', which enable customers to earn and redeem their points across multiple retailers. Blockchain helps to streamline such programs by removing any intermediaries that would normally govern them. This would not only reduce overheads but also provide equal transparency to all coalition members in real-time.

7. Customer Reviews

In the digital age, online reviews have a powerful impact on customers' buying decisions[5]. However, it can be difficult to get customers to agree to leave the personal information required to prove reviews are genuine. Blockchain helps retailers to solve this problem by validating anonymous reviews. This can be done against an online purchase, or in store by simply getting customers to enter a receipt number. Only the pertinent information is then transferred over to the marketing and sales teams.

Growing privacy compliance with blockchain technology: An IntraEdge* Solution

At the heart of blockchain is its ability to create trust among collaborators without the need for a central authority or administrator.

The IntraEdge* solution offers a blockchain technology approach that companies can use as a tool to help meet the expectations of privacy legislation such as the GDPR.

Built by Intel and IntraEdge Technology, a technology and services company based in Arizona, the tool transfers and

"At IntraEdge, we realized that the power of the blockchain could be harnessed in new and exciting ways. We have applied that technology to the GDPR compliance needs that will radically shake the global retail landscape. The solution has been the result of that. By securely logging and linking consumer requests together, we can prove to auditors and others that retailers are taking the necessary measures to comply with even the strictest data privacy regulations. And this is just the beginning of how we see blockchain disrupting the retail marketplace."

Daniel Clarke
President IntraEdge, products and solutions

manages data collected during consumer interactions in a blockchain ledger using API workflows.

While no tool can guarantee legal compliance, this solution can help organizations meet some specific, hard to operationalize, requirements.

The solution is focused on the user interface needs for all parties and provides a way to manage the workflow of providing notice, obtaining consent, and fulfilling individuals' requests for correction and deletion in a transparent manner. It interacts with three distinct users — the consumer, the retailer and the auditor — and is composed of four essential parts:
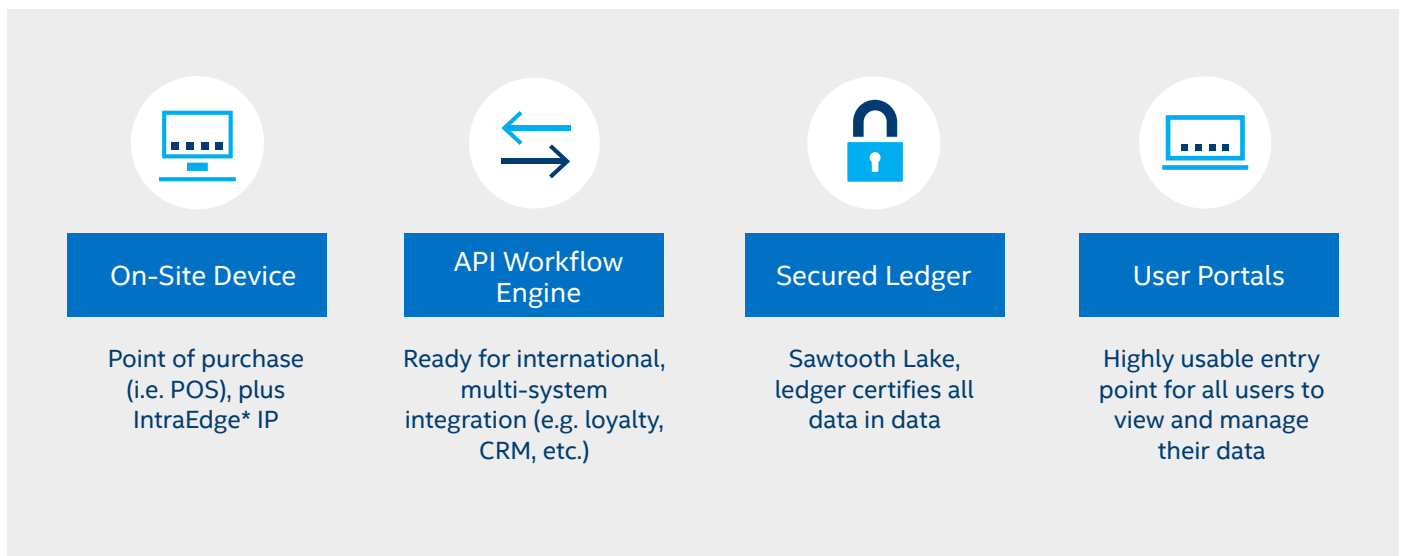

On-Site Device	API Workflow Engine	Secured Ledger	User Portals
Point of purchase (i.e. POS), plus IntraEdge* IP	Ready for international, multi-system integration (e.g. loyalty, CRM, etc.)	Sawtooth Lake, ledger certifies all data in data	Highly usable entry point for all users to view and manage their data

Figure 1. The four key elements of the IntraEdge* solution

Intel® Technology Stack

Intel has been working on the foundational elements of blockchain since 2014, and contributed its distributed ledger platform Sawtooth Lake, to The Linux Foundation Hyperledger* project in 2016. Hyperledger is an open source collaboarative effort to advance blockchain technologies.

IntraEdge* is one of many solutions that has been built on the resulting Hyperledger Sawtooth* platform, a modular platform for building, deploying and running distributed ledgers. The platform also contains its own consensus mechanism making use of Intel® Software Guard Extensions (Intel® SGX) and storage is supported via Intel® Optane™ technology.

The blockchain ledger certifies the data stored in a data lake, a repository holding vast amounts of raw data in its native format until needed, as unaltered. It does this using a ledger of the transactions. Each line in the ledger contains a timestamp, transaction type, specific IDs for the customer and retailer, the transaction ID from the data lake, and the hash value – an output that represents large amounts of data as a smaller numeric value – associated with the contents. Additional data may be stored depending on the type of transaction. This data is then securely managed throughout its lifecycle, with old ledger data being purged as soon as it becomes obsolete.

In the context of a retailer, the blockchain should be a permissioned blockchain which could be for a finite number of participants in a closed ecosystem, unlike the Bitcoin*

blockchain which is a public open to all blockchain. A key difference is that all participants will be identified, whereas in Bitcoin anonymity is a key feature.

Conclusion

As retailers expand their digital expertise, they have unprecedented opportunities to drive innovation from data insights, streamline their operations and provide ever better customer experiences. However, they must find a way to do this by using personal information responsibly and lawfully.

This new product built by IntraEdge with Intel offers an effective and simplified tool for consumers, retailers and auditors to help meet these objectives in a new, more privacy conscious era.

Find the solution that is right for your organization. Contact your Intel representative or visit **intel.com/retail**

Learn more

You may also find the following resources useful:
- **IntraEdge* Solution:** https://gdpredge.com
- **Intel® Software Guard Extensions:** software.intel.com/en-us/sgx
- **Intel® Optane™ technology:** www.intel.com/optane
- **Hyperledger Sawtooth*:** hyperledger.org/projects/sawtooth
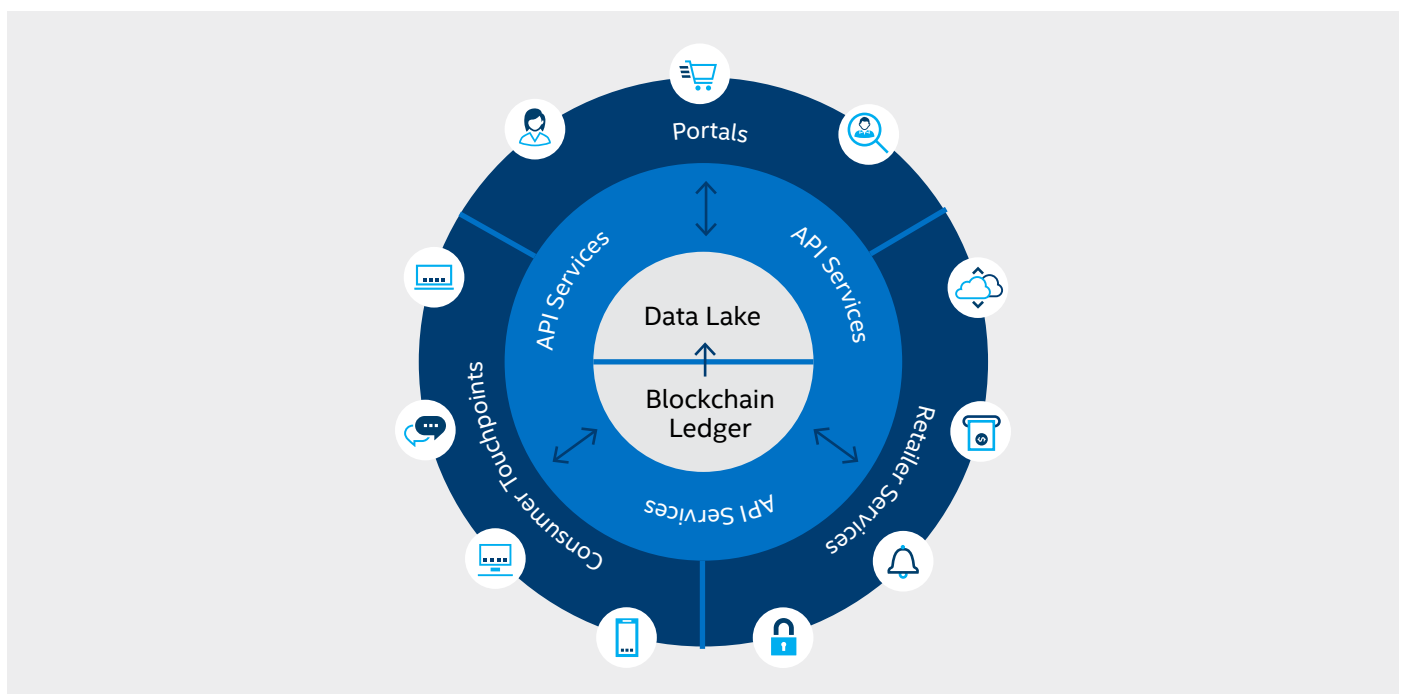- **IntraEdge Technology*:** https://intraedge.com

Figure 2. Overview of the IntraEdge* solution architecture

Solution provided by:

[1] Forrester, cited in Forbes, 'Consumer Trust At An All-Time Low' https://www.forbes.com/sites/blakemorgan/2017/11/14/consumer-trust-at-an-all-time-low-says-forrester-in-their-most-recent-report/#130bb56b1a19

[2] The GDPR Group https://www.gdpr.associates/what-is-gdpr/understanding-gdpr-fines/

[3] Ponemon Institute and Accenture, '2017 Cost of Cyber Crime Study' https://www.accenture.com/us-en.insights-cost-of-cybercrime-2017

[4] International Trademark Association https://www.inta.org/Press/Pages/Counterfeiting_Impact_Study_Press_Release.aspx

[5] Podium 2017 survey, cited in The Drum http://www.thedrum.com/news/2017/03/27/online-reviews-impact-purchasing-decisions-over-93-consumers-report-suggests