

New Levels of Intelligence Drive Down Shrinkage

Integrated AI and automation solutions from Intel and its large retail ecosystem help retailers improve loss-prevention strategies

intel.



Table of contents

Do you know what's really going on with your inventory? / 03

Designing a practical loss prevention strategy / 05

Plan for the future with integrated solutions and modern architecture / 08

A loss prevention use case sampler / 11

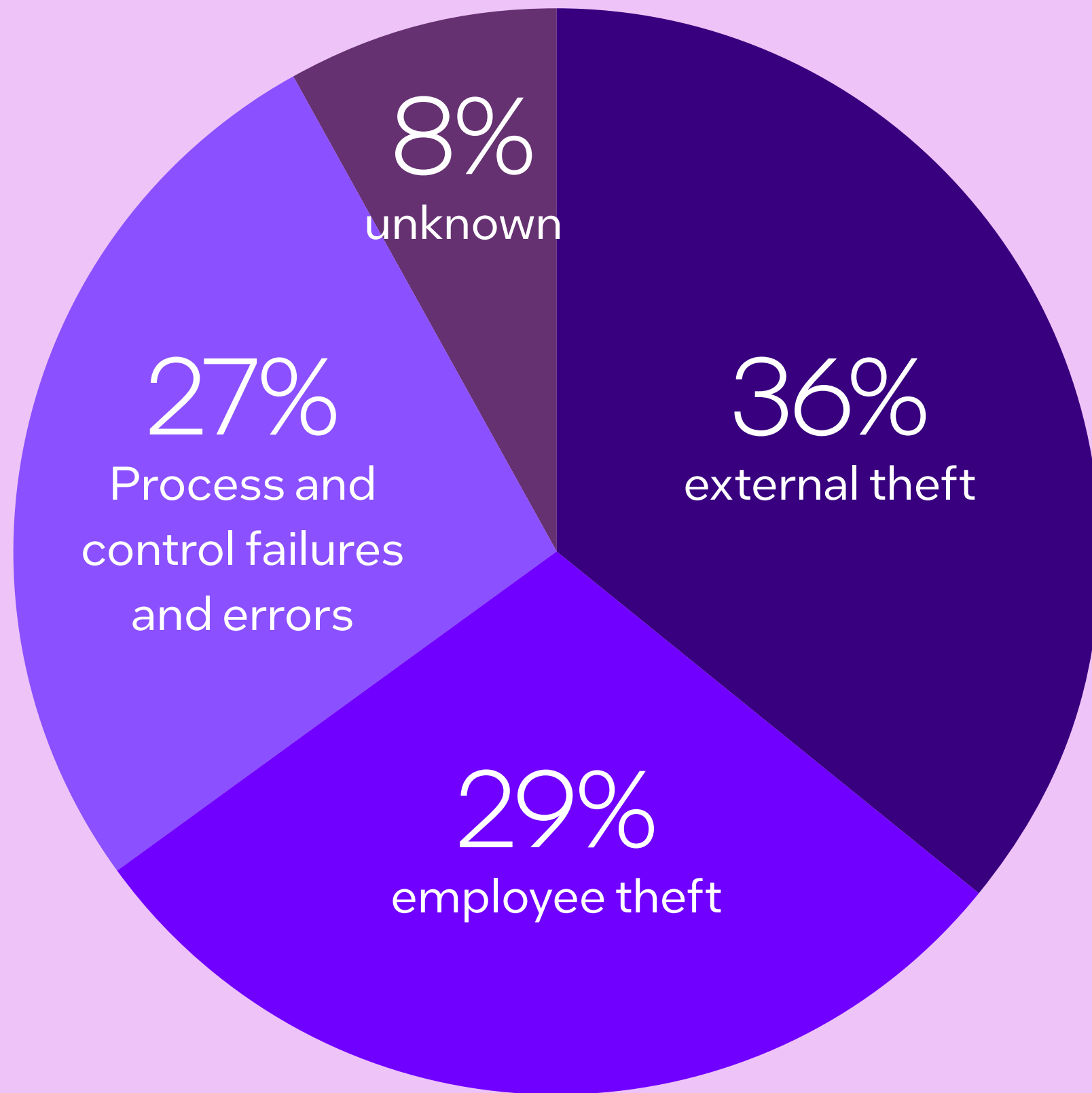
Conclusion / 14

Do you know what's really going on with your inventory?

Retail shrink is a serious problem worldwide. In 2022, as a percentage of total U.S. retail sales, shrink represented \$112.1 billion in losses, while in 2023, UK retailers lost £7.9 billion to stock theft. Shoplifting costs Australian retailers \$2.3 billion annually. Shrink drives up prices for consumers and lowers profitability for retailers, but curtailing it is a complex problem.

Much attention is given to obvious shrink causes, such as shoplifting, organized crime, accidental theft, and employee theft. But there's a hidden problem—most retailers don't really know what stock they have and have limited visibility into what goes on behind the scenes in the supply chain.





Source: The U.S.-based National Retail Foundation (NRF)

Supply chain fraud and damaged/expired goods, as well as faulty data about inventory through administrative error and inventory distortion, all contribute to the retail shrink problem. The U.S.-based National Retail Foundation (NRF) estimates that in 2022, external theft represented 36% of shrink, while 29% was attributed to employee theft. Process and control failures and errors accounted for another 27%, while the rest was due to other, unknown reasons.¹

Incorrect assumptions about consumer behavior often hinder finding the correct solution to a shrink problem. For example, one retailer was convinced that customers were removing RFID codes from low-value items and putting them on high-value items. However, analysis of video images proved that this was not the case. The retailer needed better data about what customers—and perhaps suppliers—were really doing to pinpoint where losses were occurring.

Designing a practical loss prevention strategy

A loss prevention strategy rests on two pillars:

- Retailers must connect the dots from supply chain origination to warehouse delivery to store shelves to final sale.
- Technology alone is not enough—a loss-prevention solution must also consider processes and people (both employees and customers).

For example, cameras, video analytics, and RFID tags combined with weight sensors and smart shelves can help track inventory. However, to take the best advantage of the data generated by these technologies, retailers must establish processes that ensure every retail item goes through the point of sale (POS) system, with no exceptions.





Employees should be trained to correctly interpret and react to the data, such as intervening if potentially suspicious behavior is detected by video analytics. Locked cabinets for high-value items can limit theft but also negatively affect the customer experience—retailers seek to balance loss prevention and customer relations.

Retailers can tailor solutions to meet their budget and reliability needs and modify solutions over time. For example:

- To limit expense, some retailers tag only high-value items.
- Retailers can focus technology investments in geographic regions where shrink is highest.
- Computer vision algorithms can be retrained to account for changing customer and employee behaviors.

Privacy by design

Privacy concerns are a potential drawback of loss prevention solutions based on computer vision and video analytics. For example, in 2021, a computer electronics retailer was fined €10.4 million for non-compliant video monitoring of its employees.²

Retailers need to adopt intelligent, AI-based camera systems that contain privacy-by-design safeguards. Many solutions address this concern by anonymizing the personally identifiable information (PII) in the video data so the data can be used without infringing on privacy regulations. One such solution is the [ENTERA offering](#).



Plan for the future with integrated solutions and modern architecture

Customer and employee patterns of stealing change over time, and inventory is in constant flux. This dynamic environment means that loss-prevention systems have a lifecycle. Retailers must manage and secure them and be able to update AI models. To enable these activities, three characteristics are key:

- **Integrated data.** Successful loss-prevention solutions are able to integrate data from legacy software such as existing POS or employee management systems, as well as from newer technology like Internet of Things (IoT) sensors and smart cameras.



- **Scalable edge.** [Intel® AI PCs](#) deliver the right balance of AI performance and power consumption to make AI possible at the edge. When combined with software orchestration and MLOps, AI workloads can be cost-effectively deployed at scale.
- **Connectivity.** Networking components must provide a highly secure edge-to-cloud connection and deliver sufficient bandwidth to handle the increased demand generated by AI solutions. Retailers need reliable, cost-effective, low-latency communication between devices that generate data (such as cameras and POS systems) and applications that process that data.

Intel's [Loss Prevention Reference Implementation](#) shows how to optimize loss-prevention-focused AI pipelines using Intel® hardware components. Intel also offers other reference implementations, such as automated self-checkout (see Figure 1).



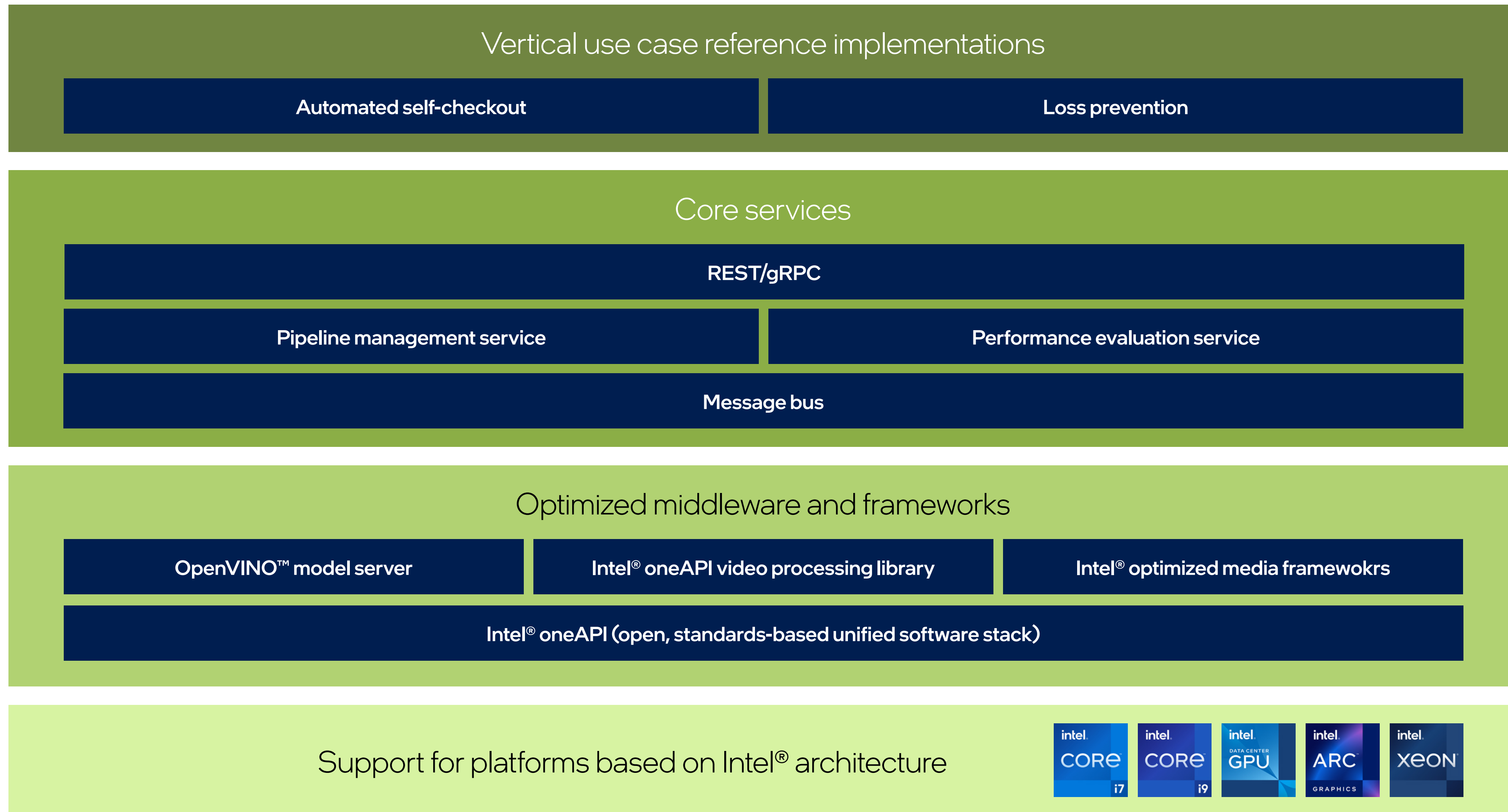


Figure 1. Reference implementations and core services help accelerate the development and deployment of AI-enabled computer vision solutions.

A loss prevention use case sampler

Here are a few examples of how Intel and the ecosystem of retail solution providers are working together to help retailers reduce shrink:

- **Computer vision for checkout.** Whether it's a self-checkout machine or a cashier-assisted checkout stand, opportunities abound for loss. Intentional or unintentional scanning errors, tag switching, and other forms of fraud are common.
 - The [ShopAssist solution](#), created by RadiusAI, uses advanced computer vision and Intel® architecture to address the challenges retailers face today with current self-and autonomous checkout systems. In particular, the solution helps control shrinkage by automatically building a basket for the customer and avoiding intentional or inadvertent scanning errors.
 - The Tata Consultancy Services (TCS) [Self-Checkout Loss Prevention Solution](#) is an AI-powered computer vision solution that can integrate with the retailer's existing video surveillance to identify self-checkout machine fraud and errors. In one deployment at a retail store in Manchester, England, the system showed that nearly 9% of the self-checkout transactions were anomalous, and the TCS solution successfully detected and prevented the thefts.³ The TCS solution could also be used for cashier-assisted checkout stands and be modified to deploy in warehouses.



- **Video analytics for customer journeys.** Although in-aisle loss prevention has historically been difficult and potentially expensive, insights into the entire customer journey, from store entrance to store exit, can provide many valuable customer insights. These include product preferences, socio-demographic drill-down, and whether a customer pays for an item that somehow slipped into a pocket. The [ENTERA offering](#) runs on Intel hardware either in the cloud or on-premises. It provides comprehensive, accurate, and 100% faceless shopper journey insights.⁴ The solution is GDPR-compliant and adheres to data minimization, security, and innovation principles, with data privacy compliance at the core of the product development philosophy.

- **Automation and data management for higher efficiency.**
As mentioned earlier, a lack of accurate, centralized data can contribute to retail shrink. Aurify Systems offers AI-based solutions that drive automation across diverse business needs, tasks, and processes while capturing advanced analytics. A chain of 600 stores in India deployed [Aurify's StoreScript solution](#) to harness the power of data and improve operational efficiency.⁵ While not specifically developed for loss prevention, StoreScript's automation and analytics capabilities could be extended to loss prevention use cases.

All these solutions run on Intel® architecture, such as Intel® Core™ processors, Intel Core Ultra processors, and Intel® Arc GPUs. In many cases, the solution vendor has used the Intel® Distribution of OpenVINO™ toolkit to optimize application performance for Intel architecture.



Conclusion

Getting a handle on shrink is crucial to retailers' bottom line. Intel understands the problems and has long-standing relationships with a broad selection of ecosystem players. With its deep retail expertise and holistic portfolio of solutions, Intel can help retailers deploy cost-effective, scalable loss-prevention solutions—the [Intel® marketplace](#) offers at least 15 loss-prevention solutions.

Working with Intel and its technology partners, retailers can modernize their architecture and optimize across people, processes, and technology to enhance their loss-prevention strategy, thereby benefiting from better technology utilization, faster innovation, and improved business agility.

Learn more

- [Intel® Retail Solutions](#)
- [Intel® Partner Showcase for loss prevention](#)
- [Intelligent Loss Prevention in Retail article](#)
- [Loss Prevention Retail Reference Implementation](#)
- [Retail Builders](#)



1. Retail Dive, September 2023, "[Retail shrink, theft changed little in 2022.](#)"
2. LinkedIn, October 2021, "[The importance of GDPR compliance in next-gen video monitoring technology.](#)"
3. Tata Consultancy Services, May 2022, "[Helping Retailers fight fraud from theft & unscanned items.](#)"
4. Source: <https://www.intel.com/content/www/us/en/partner/showcase/offering/a5b3b000000MNfLAAW/entera.html>
5. Aurify Systems, 2023, "[Revolutionizing Retail with StoreScript© Deployment Across 600 Stores.](#)"

Intel technologies may require enabled hardware, software, or service activation.

No product or component can be absolutely secure.

Your costs and results may vary.

All features may require software purchase, subscription or enablement by a software or platform provider, or may have specific configuration or compatibility requirements. Details at www.intel.com/PerformanceIndex. Results may vary.

© Intel Corporation. Intel, the Intel logo, and other Intel marks are trademarks of Intel Corporation or its subsidiaries. Other names and brands may be claimed as the property of others.