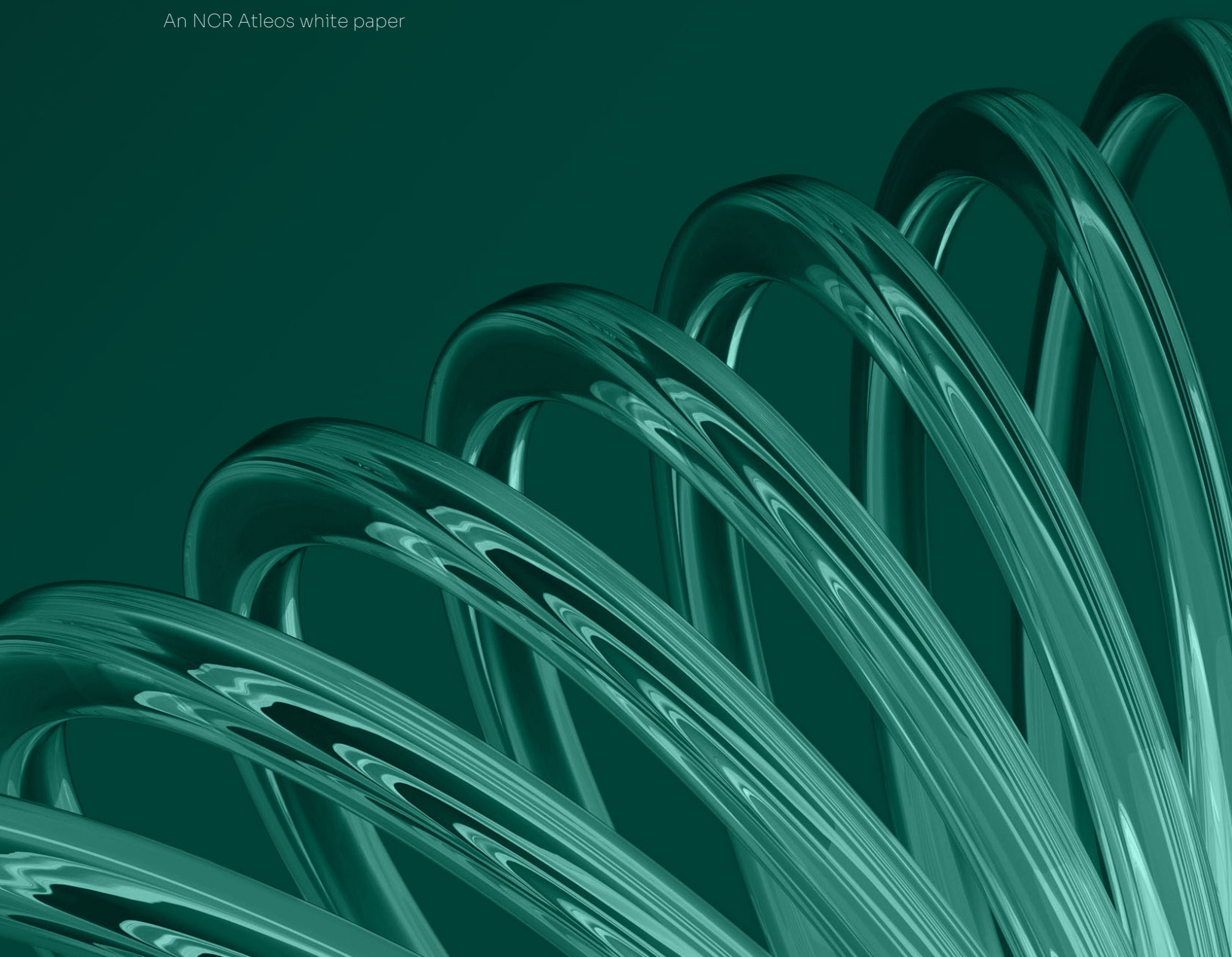




# Physical security

An NCR Atleos white paper





# Introduction

Physical attacks on ATMs are continuing to increase in frequency. Criminals are using new methods of attack, including hydraulic equipment to cut into safes and vehicles to pull open the safe doors. In some markets, explosive attacks are also continuing in unprecedented numbers. In light of these trends, the ATM customer needs to plan their defenses accordingly.

This NCR Atleos secure white paper is designed to provide an overview of the latest types of attacks and outline a range of security options that can help reduce your financial institution's risk.

# Understanding ATM crime: the modus operandi cycle

Criminals are constantly seeking new opportunities. They will continue to commit crimes until they see that their efforts are unsuccessful. From there, they move on and try something new. It's a never-ending cycle.

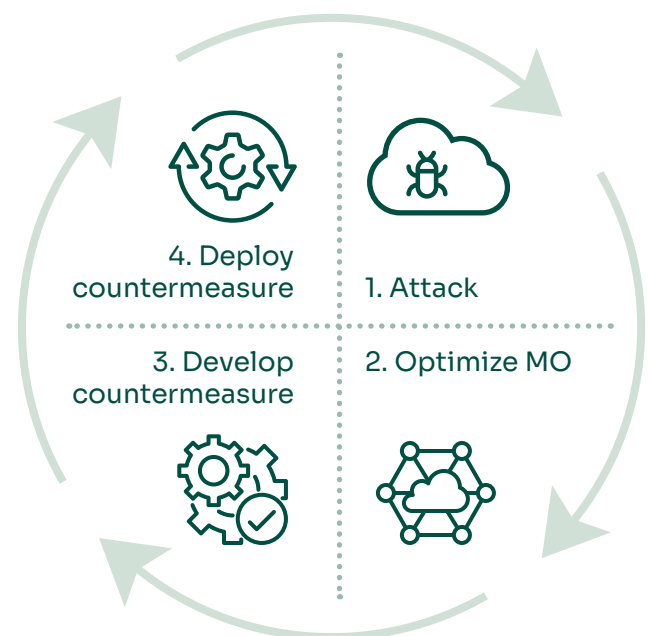
Understanding this mindset can help us understand how crimes evolve. It's difficult to know the next step a criminal will take, but understanding their modus operandi (MO) cycle and following trends in other markets can help.

There are four stages in the attack/countermeasure cycle (as the diagram illustrates). These stages are not of equal measure and some can last longer than others. For example, developing countermeasures can take time because of pressures like resources and budgets.

During Phase 1 (attack), criminals have found an opportunity and are attacking units using a new type of vector. As there are many test vehicles available to criminals, this new attack vector will see many iterations until the modus operandi is optimized by the criminals (Phase 2).

As we move into Phase 3, manufacturers/banks develop countermeasures to protect and prevent attacks from occurring. Then, in Phase 4, those new countermeasures are deployed into the field. Time, budgets and resources usually mean that the third and fourth phases can take considerably more time. Once a countermeasure is deployed and becomes effective, criminals need to develop new ways to compromise the ATM and the cycle begins again as a new MO arises.

For example, in Europe, criminals moved from on-site tool attacks to ram-raid/pull-out attacks to gas explosives to solid explosives. Countermeasures for each were developed and deployed over a 10-year period. Due to evolving MOs, many European countries now mandate higher security safes (CEN 3 or 4) as a standard and other countermeasures, such as note degradation systems. As a result of the changing landscape, NCR Atleos has made the strategic decision to move forward with the gas/ explosive resistance on multifunction high security safes as standard (CEN 3 and CEN 4) and CEN 3 GasEx as an offering on all of our ATMs.



# Changing criminal landscapes

There were 4,637 reported physical attacks on ATMs from all vendors in 2023 according to the European Association for Secure Transaction (EAST), the organization that tracks ATM attacks. That's 16 attacks per 1,000 ATMs in one year, including ram-raids, pull-outs, gas and solid explosive attacks.

Though in the past, most explosive attacks have used gas, there has been a shift in recent years to the use of solid explosives. While the materials used have taken different forms, the impact of financial losses and collateral damage have been the same.

Brazil has traditionally been a hotspot for physical ATM crime. But over a 10-year period, a collaboration with law enforcement, industry leaders and financial institutions reduced the number of attacks from over 3,500 per year to under 500. They achieved this through intelligence-sharing and the cooperative deployment of countermeasures such as ink staining systems, higher security safes and CCTV. Some of these countermeasures will be explored later in this white paper.

One crime that emerged in the USA and is now occurring in other parts of the world is the “hook-&-chain” attack—a new take on the “pull-out” attack. Beginning in late 2018, criminals began using hook-&-chain attacks on drive-up ATMs, using brute force to pull safe doors open using hooks attached to chains. The attacks were seen initially in Texas, but thousands of attacks have been reported in most US states using this MO, although not all have been successful in accessing the cash.

After releasing countermeasures for our CEN 1 drive-up range, the next step was to release higher security CEN 3 Gasex safes for stand-alone drive-up ATMs—not only to address the continuing threat of hook-&-chain attacks but also to protect against the growing threat of explosive attacks in some states.

## Safe strategy

The NCR Atleos strategic recommendations for safes have continued to evolve over the years, as we have continued to design the latest security features into our product families. The first significant change was the move from UL to CEN safes. UL safes are made of steel construction per UL specifications, but CEN safes are of composite construction, offering greater resistance to tool attacks.

The higher the CEN grade, the greater resistance to attacks with tools such as grinders, acetylene torches, drills etc. This is due to the added reinforcement within the safe body and doors. The gas explosive protection resistance is offered on the higher security CEN 3- and CEN 4-graded safes. The lowest grade of safe offered is CEN 1, but NCR Atleos has shipped tens of thousands of high security safes since their introduction in the early 2000s. Most of these deployments have been in Latin America, Europe and Australia. It has been observed that explosive attacks often migrate into neighbouring countries, mainly due to geographic expansion of organized crime groups and the opportunistic ease of obtaining explosives. But the US market has recently started to adopt these higher security safes.

The GasEx safes were designed for the higher-security safe models (CEN 3 and CEN 4) with the following features:

- Same physical space model (service footprint is maintained)
- Improved boltwork to resist explosions
- Improved barrier materials
- Additional internal materials

This additional boltwork is designed to contain the energy delivered by an explosion and expel without compromising the safe walls or safe door. The enhancement was a direct response to the increasing intensity and frequency of explosions. Designers developed new ways to prevent the ATM becoming a “bomb” and spreading collateral damage.

## Certification of safes

NCR Atleos and our safe supplier have selected European Certification Body (ECB-S) certification for our safes. This is an internationally recognized accreditation from a leading safe certification body.

ECB-S certification follows recognized European standards: EN 1143-1 (for grades 0-VI for safes, strongrooms, ATMs) and EN 1300/ EN 17646 for safe locks. ECB-S has been affiliated with renowned European test houses that must adhere to audits, standardized testing and procedures.

The ECB-S board is composed of a balanced representation of security industry experts, including insurers, users and manufacturers (security technology, protection against fire and burglary), as well as the management of European Certification Body. Their objective is to monitor the neutrality of the certification body, monitor



the product certifications and confirm that external quality surveillance audits are followed.

This affiliation with ECB-S ensures that our safe designs meet recognized international standards and are tested to meet those standards. This assures our customers that we meet industry guidelines and regulations, especially from an insurance point of view.



## Types of physical attacks

Protection against physical attacks on ATMs must begin with an understanding of the attack vectors facing financial institutions. While, this is not an exhaustive list, as some MOs have different approaches to them, these are recognised as the main areas of concern.

### Hook & chain attacks

In a hook-&-chain attack, criminals attach a hook and chain to the ATM and drive off at high speed in heavy-duty vehicles to attempt to gain access to the cash. This type of crime started in the US market, where there are many standalone drive-up island ATMs. However, there have been similar attacks on other types of ATM in less secured areas (vestibules, for example) in Mexico, the UK and other European markets.

Even an unsuccessful attack still results in significant damage to an ATM, as sometimes the pull-force can topple the ATM.

Prevention of hook-&-chain attacks varies depending on whether the unit is already installed or is new.

For existing units with CEN 1 level safes, NCR Atleos recommends deploying the NCR Atleos Safe Slot Reinforcement kits to fill the space where criminals typically insert hooks. Because the kits are not visible on the outside of the ATM, decals should be displayed to show that these units are protected.

Depending on an ATM's location, physical barriers such as security gates that span the width of the unit should be installed to provide a highly visible defense and to make the ATM less accessible.

Ink-staining solutions can also be deployed. These systems are designed to degrade banknotes permanently—staining them with ink to render them unusable—if the ATM is attacked. Once criminals realize that the notes retrieved from this attack vector/or a particular bank are worthless, they will move on to another strategy.

For the deployment of new standalone island drive-up units, the base level of a safe is now CEN 3 GasEx with Safe Slot Reinforcements. This provides a significantly higher barrier to unauthorized safe entry. Security gates and ink-staining systems are also recommended for high-risk sites. The CEN 3 GasEx should be considered for an interior unit facing a doorway or glass exterior wall in a vestibule, even if the unit will be located in an otherwise secure area.

## Explosive attacks

There are two types of explosive attacks: gas explosives and solid explosives. The latter has proven to be the most destructive.

In a gas explosive attack, criminals pump explosive gas mixtures into an ATM in an effort to compromise the safe door and gain access to the safe.

A solid explosive attack uses a similar MO but typically exerts more energy, causing substantial damage to an ATM and the surrounding area, including collateral damage.

External units and those with external fascia such as TTW are most at risk of explosive attacks, particularly if they are in unattended or remote locations. However, there have been reports of such attacks in supermarkets and convenience stores, without disregard for the safety of those in a crowded environment.

As with hook-&-chain attacks, prevention of these kinds of attacks depends on the vintage of the ATM. For a new ATM, it is recommended that a minimum of CEN 3 GasEx safe is deployed to contain any explosion and prevent collateral damage while preventing the safe from being breached.

Ink-staining systems are recommended as a deterrent against these types of crimes for both current installations of CEN 1 and CEN 3 GasEx safe units.

## Ram-raid/pull-out attacks

Ram-raid or pull-out attacks happen when vehicles are used to remove the entire ATM from its mounting with the intent to move it to a different location and attempt to open it later. Typically, the smaller footprint ATMs have been targeted for this type of crime, but some of the larger multifunction ATMs have also been targeted for it.

External standalone units are the most vulnerable, but local news accounts have reported smash-and-grab attacks in retail stores—with devastating consequences for the store owner in terms of collateral damage.

Ink-staining systems have been the defense of choice for many financial institutions in Europe. These systems contain seismic detectors that can trigger an activation of ink during an attack. They can be retrofitted into all units and safe types.

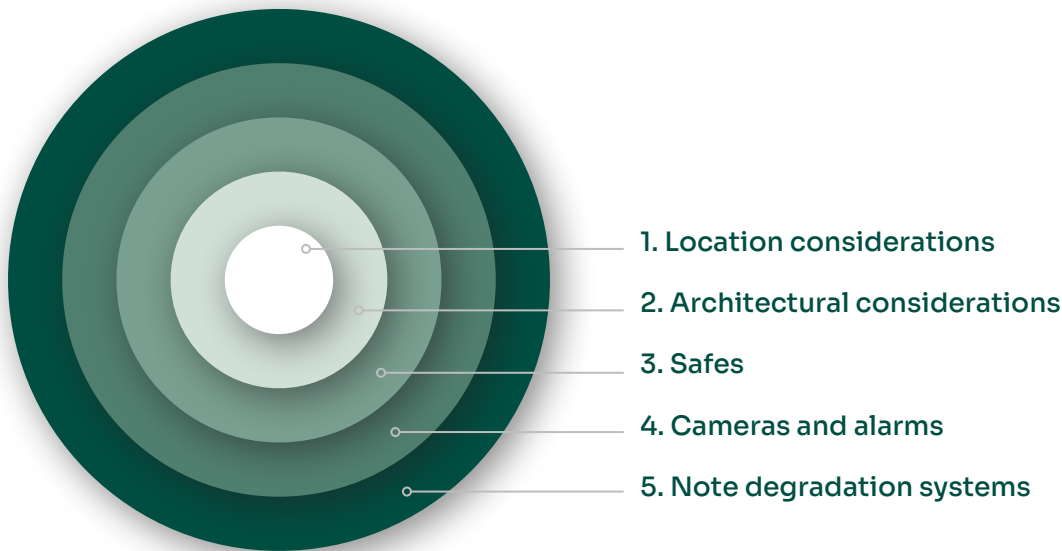
Anchoring systems and security gates are also recommended countermeasures to help defend against ram raid attacks. These keep the unit anchored to the ground and prevent it from being removed from its mountings. Anchoring systems are ideally deployed at the point of installation, but the security gate can also be retrofitted.

## ATM burglaries

An ATM burglary is defined as the compromise of an ATM onsite with the intent to steal the cash inside. These in-situ attacks take many forms and use many different types of tools. External units are considered the most vulnerable to these types of attacks, but interior units can also be highly vulnerable if not protected by a holistic security system (such as those found in bank branches) because their location provides the criminals with an enclosed space away from the public eye where they are unlikely to be disturbed.

Higher security safes (CEN 3 and CEN 4) with the ECB-S safe certification are specifically designed to protect against this type of in-situ attack. Ink-staining systems can also deter against these types of attacks, as ink will activate with certain movements within the unit.

# The 5 layers of physical security



Physical security: A layered approach

## 1. Location considerations

NCR Atleos recommends a layered approach to protection for physical security. The first layer, location considerations, should always be at the heart of this.

Before any ATM is installed, the deployer should execute a risk assessment to analyze crime rates in the area, location (rural or urban), population, proximity of police, use of general CCTV in surrounding area, proximity to major roadways (freeway, motorway, autobahn), local government mandates, etc.

These factors should determine the base level of the ATM (safe grade) and other countermeasures that should be deployed with the safe. Along with the risk assessment, an estimate of the volumes of cash expected to be held in the ATM and whether de-cashing at night is possible should also be considered. In some European countries, banks took the initiative to de-cash ATMs overnight

due to crime patterns in city centers. Others reduced the amount of cash in units situated near major roads. These measures reduced the size of the prize, reducing the motivation to attack. In extreme cases, ATMs have been removed from residential areas due to the increased risk of explosive attacks and associated risk of injury to the public.

In terms of placement of the ATM, a unit in a branch usually has the advantage of other security measures that have been installed in the building. At the opposite end of the deployment scale, exterior units may be considered more vulnerable as they are placed in secluded areas, where there is little or no public movement at night. The chart compares each type of deployment's typical vulnerabilities to attack as a starting point for discussion.

| Risk level | Placement                       | Key risks             |           |          |          |
|------------|---------------------------------|-----------------------|-----------|----------|----------|
|            |                                 | Hook & chain          | Explosive | Ram-raid | Burglary |
| level 1    | In-branch                       | OUT OF HOURS BREAK-IN |           |          |          |
| level 2    | Through the wall                |                       |           |          |          |
| level 3    | Semi-controlled vestibule/lobby |                       |           |          |          |
| level 4    | Off-premise                     |                       |           |          |          |

For example, an ATM located in a branch may be less vulnerable to certain attack vectors as it benefits from the security of the bank branch; the ATM itself is unavailable once the branch is closed. However, an off-premise standalone ATM in a gas station forecourt may be at more risk because it's in an unattended environment. These assessments can help determine which level of safe should be ordered for the site. We will cover this later in the white paper.

Stand-alone drive-up ATMs can also have a high-risk assessment depending on where they are situated. It was found that during hook-&-chain assaults on standalone drive-up ATMs, those with sufficient "runway" (space for the vehicle to get into position near the ATM and speed away) were more prone to this type of attack. The recommendation in this situation is to remove the runway by introducing chicanes in the drive-thru lanes or adding a bend in the lane after the last ATM. When the runway cannot be removed, some ATM deployers have introduced street furniture and security gates to deter criminals from attacking their units.

Security gates offer a visual deterrent against physical attacks as they have a barrier across the width of the drive-up ATM. These measures have proven successful against hook-&-chain attacks.

We recommend that all ATM sites should be formally risk-assessed, regardless of whether they are in-branch or off-premise and regardless of additional security measures that have been deployed.

## 2. Architectural considerations

The second layer is architectural considerations.

Rear access ATMs are considered more secure than front-access ATMs because the serviceable area of the unit is typically inside a building or within a secure room or other enclosure. This offers more protection to the teams servicing the units because other measures such as locked areas, cameras, alarms and fogging systems typically increase the level of security. Also, the cash exit slots of rear access units are placed on the front of the safe rather than on the door of the unit, so compromising the safe becomes more difficult.

Some ATMs also offer a split safe architecture, which removes the pathway into the safe away from the cash exit slots and prevents a direct path into the safe itself. These units offer the greatest protection from explosive attacks and hook-&-chain thefts as access to breach the safe via traditional means is removed.



### 3. Safes

The third layer, the safe, is at the core of all ATM defenses. While not all risks are evident at the time of installation and attack vectors evolve over time, at the point of the risk assessment, the safe level should be considered the foundation for security. Current standards range from CEN 1 to CEN 4.

External placements should have a minimum of CEN 3 GasEx safes, but some markets will mandate the use of CEN 4 GasEx as a minimum. Even if the crime isn't happening today, selecting high security safes will help protect against future crimes.

Ensuring that the safes are appropriately anchored is vital to the ATM's security. Time is a critical factor in all ATM crimes, so when criminals are able to remove an ATM and take it to a secure location, they have more time to breach the safe. Therefore, preventing the safe's removal may add additional pressures to criminals whose intention was to remove and open it later.

NCR Atleos provides guidelines on how to anchor units to the ground at the point of installation. Some installers and risk assessors may find it appropriate to use alternative methods to ensure the units are secured adequately depending on risk factors (potential ram-raid attacks, likelihood of hook-&-chain, etc.). However, the safe must be secured to prevent movement.

### 4. Cameras and alarms

The fourth layer is cameras and alarms.

Markets that have successfully reduced the number of ATM attacks have adopted a layered approach to security and include detection and alerting systems in their armoury. Being able to respond immediately to an attack relies on suitable camera and alarms systems, however, poor camera quality and cameras which can be damaged or deactivated during the attack are commonplace. Footage from events can also be used in subsequent police investigations to identify criminals, so it is important to have clear images.

Where possible, cameras must be angled with the best field of view of the ATM (or user of the ATM, depending on camera placement)—preferably not visible to avoid the notice of criminals, who may then vandalise them or take them offline during an attack.

While hardware is critical, so is collaboration with law enforcement and security providers. Alarms that create alerts that are not reacted to in a timely manner are not effective, therefore procedures for quick communication regarding alerts and police attendance needs to be agreed upon. Increasingly, countries are forming groups of industry experts, law enforcement and customers to share intelligence to prevent and solve ATM crime.

## 5. Note degradation systems

The fifth layer, note-degradation systems, compliments the first four layers.

Ink-staining solutions (or IBNS, intelligent banknote neutralization systems) are becoming more common in global deployments as a deterrent to physical attacks on ATMs. The objective of these solutions is to “destroy the prize”, which removes the motivation for the crime. Ink-staining neutralizes the value of the notes by permanently dyeing the notes with indelible ink.

The most common application of ink-staining is an intelligent sensing system that detects criminal activity. It’s designed to protect customers from both the crimes of today and the crimes of tomorrow, including explosive/gas attacks/ram raids/forced doors/physical attacks/hook-&-chain). In some countries, where solid explosives are of concern, passive systems can be used which rupture an ink pouch with the force of the blast.

Many of the systems employed are designed to meet the mandatory requirements for homologated countries such as France and enforced legislation as seen in countries such

as Malaysia. All countries with mandated ink-staining systems have reported a downturn in the number of physical attacks on ATM estates. And where such systems have been deployed as a result of customer choice in the US, those customers have experienced a decreased number of hook-&-chain attacks on their ATMs. The motivation for the crime has been removed and the cash in the ATM is protected.

Whether they are being deployed due to government mandates, central bank legislation or through customer preference, note degradation systems are growing in popularity.

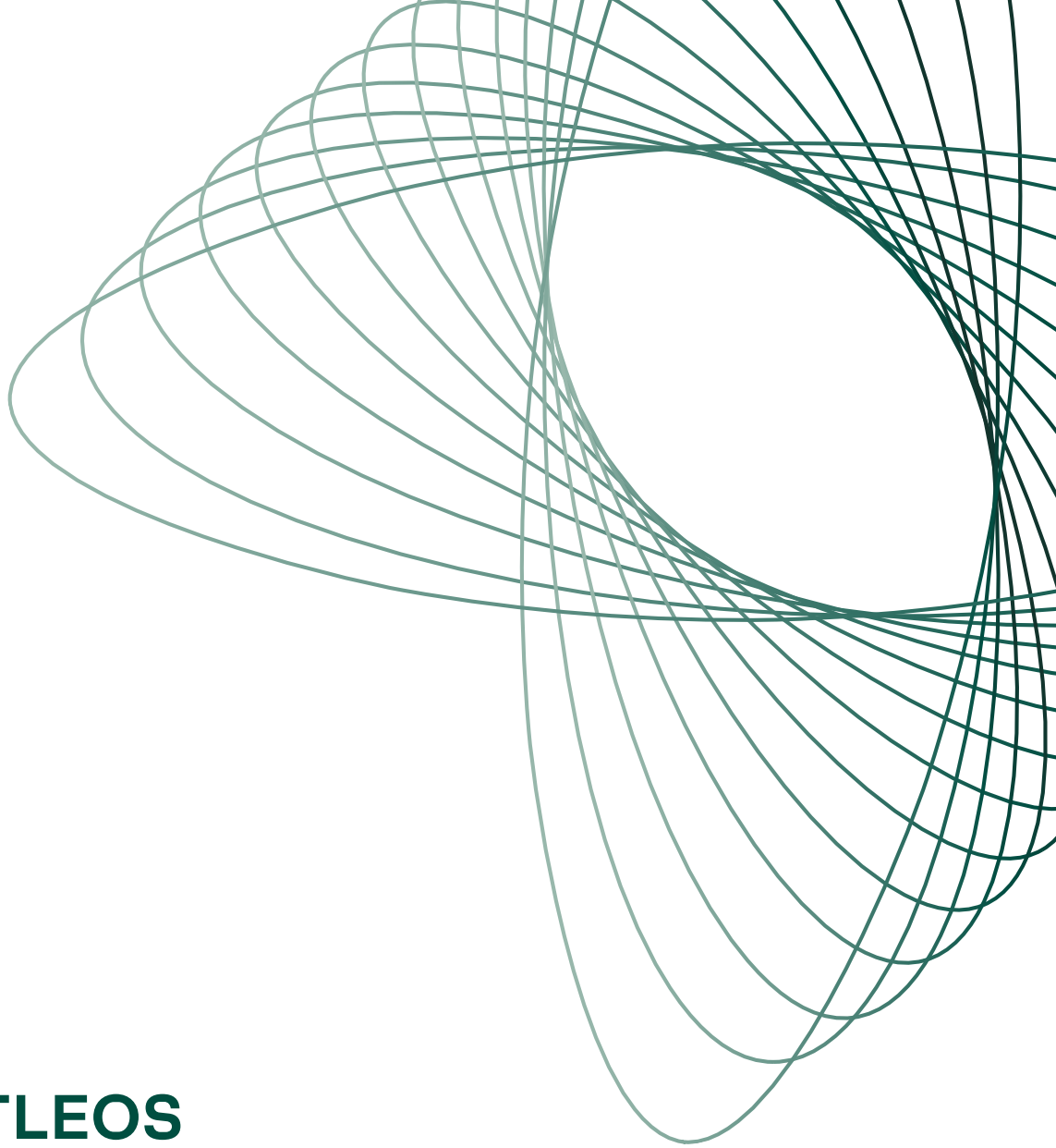


## Summary

In summary, physical attacks on ATMs are rising. Criminals will never stop developing with new attack vectors. They will continue to modify their attacks, attempt new attacks and expand attacks to other markets.

The only real defense is to stay proactive in our approaches to securing the ATM. No one solution fits all types of attacks, so considering the five layers, slowing down the attack and working with local law enforcement are key to success.

NCR Atleos is the largest ATM deployer in the world, #1 globally in ATM software application and middleware and services the largest number of ATM around the globe. Our teams are constantly innovating to expand our portfolio of security products and solutions. We are at the ready to help you assess and enhance the efficacy of your company’s ATM security measures.



# NCR ATLEOS

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