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Ransomware protection: Last line of defense, first step in data recovery

Ransomware — the moment of truth

A ransomware attack is a classic ticking-clock scenario. Your critical business data has suddenly been taken hostage. Hackers have used advanced encryption to render it inaccessible — and now they're demanding an exorbitant amount of money to decrypt it. How will you respond? Can you ensure the safety of your data if you refuse to pay — or even if you do? While you consider your options, your organization remains paralyzed. Every passing minute increases the pressure to make the right choice.

This scenario has already struck companies of all sizes across industries around the world. Yours could be next. Are you ready?

In this guide, we'll explore the ever-evolving threat of ransomware — and what you can do about it. First, we'll examine ransomware as one of the many **threats to recovery readiness** facing today's organizations. Then we'll drill deeper into the nature, impact, and direction of this **insidious form of attack**. Pivoting from awareness to empowerment, we'll then explore the elements of **risk management**, including planning, prevention, monitoring, fast restores, and testing. Finally, you'll learn how recovery readiness can keep you from becoming a victim by providing a critical **last line of defense** against ransomware.

Your stand against ransomware begins now. Read on.

Threats to recovery readiness

Recovery readiness means being in a position to restore your organization's data and applications quickly no matter what happens. In today's diverse IT environment, that's a major challenge. To begin with, you need to understand threats to backup data can come in many forms, both inside and outside the company.

Internal threats

People often think of a "threat" as something intentional and malicious. That's often the case, such as when someone inside an organization intentionally deletes data because of a grievance such as being passed over for a promotion or disagreeing with a corporate decision. That's what happened to one U.K. company's AWS accounts in **2019**. An internal threat might also originate with an outsider who has acquired credentials through theft, blackmail, or manipulation, and uses these for ill intent.

But internal threats can also be accidental in nature. An employee with legitimate access might simply click the wrong button and leave data exposed, or delete the wrong entity, and do untold damage to the organization. This almost happened to AWS itself in **2020**, when one of its engineers inadvertently leaked his own passwords and cryptographic keys to various AWS environments — though in this case, an outside analyst alerted the company before any damage was done. People are human; it happens.

External threats

External malicious actors are, in simple terms, bad guys. They're hackers or other individuals seeking to infiltrate your organization for their own purposes. Making money is a huge motivating factor for malicious actors. For example, cryptojacking has become a popular method of stealing compute resources within an organization for the purpose of mining cryptocurrency. Malicious actors may also be motivated by political or competitive reasons, with a goal to delete data, leak data, or disrupt business services. Whatever their intention, they use techniques such as password spraying to gain unauthorized access into an organization or system. Or they might try to exploit vulnerabilities, inject botnets and rootkits to steal, and delete data or simply disrupt an organization's ability to function.

That's where ransomware comes in. In a typical attack, the hacker uses malware, often delivered via an infected attachment or link in an email, to encrypt your data. As in a flesh-and-blood ransom situation, the hacker then demands payment — or you'll never see your data again. Without an effective recovery readiness strategy, your only option is to pay up and hope for the best.

The high cost and rising threat of ransomware

There's a reason ransomware makes the headlines. It's the kind of attack that gets your attention — it's sudden, brutal, and leaves the victim feeling helpless. In recent years, the rapid rise of ransomware has cast a shadow of anxiety across all types of organizations.

Alarmed business, IT, and security leaders aren't just being paranoid. In a Black Hat USA 2019 survey, 65% of respondents believe they will have to respond to a major security breach in their own organization in the coming year, up from 59% in 2018; most do not believe they have the staffing or budget to defend adequately against current and emerging threats.[1]

And the impact can be devastating.

- In 2017, FedEx reported that a cyberattack had cost them **$300 million**. And that's not from paying the ransom — in fact, none was collected by the attackers. Instead, this represents the cost of system downtime and disaster recovery following the attack. FedEx wasn't alone; global shipping giant Maersk reported a **similar incident that cost them close to $300 million in damages**.
- Municipalities face similar risks. Since getting hit by the SamSam ransomware in March 2018, the city of Atlanta, Georgia, has spent **more than $5 million** rebuilding its computer network, including spending nearly $3 million hiring emergency consultants and crisis managers.
- Currency dealer and travel money services provider Travelex was hit by ransomware over the critical holiday travel season at the start of 2020, taking its global websites offline — and forcing employees to revert to pen-and-paper methods at **1,200 locations across more than 70 countries**. Travelex partners including Royal Bank of Scotland, Barclays, Tesco Bank, and Asda felt the impact as well.
- No target is off-limits for hackers. In October 2019, DCH Health System in Alabama was forced to pay an undisclosed ransom after the IT system serving three of its hospitals was locked by hackers. Patient care continued under emergency procedures, but **incoming ambulances had to be diverted elsewhere whenever possible**.

When something works, hackers keep doing it — and keep getting better at it. As the technology and practice of ransomware continue to grow in sophistication, criminals will squeeze as much money as possible from any victim they can find. Here are a few more alarming considerations:

- Think you're safer on a non-Windows platform? Ransomware including Lilocked, BOrOntOK, HiddenWasp, and QNAPCrypt began **targeting Linux systems in 2019**, with further attacks sure to follow.
- Apple fans need to stay on their toes as well — Macs are just as susceptible to ransomware as any other platform, and **incidents are already on the rise**.
- Cybersecurity Ventures predicts ransomware will cost **$6 trillion annually** by 2021. That's more than the GDP of Japan.

Fighting back — or trying to

Common countermeasures to ransomware include antivirus, antimalware, and firewall blockers. These are certainly necessary, but they're not enough to keep you safe. In fact, the majority of victims already had these solutions in place. That means your ransomware strategy should aim to reduce the risk of attack as much as possible, while also seeking to mitigate the impact of an attack that succeeds anyway. It's all too likely that one will — so you need to be ready.

Ransomware: 4 ways to protect and recover. **Read >**

1 New Black Hat USA Research: Your Private Information Is Already Available to Criminals; U.S. Elections, Critical Infrastructure Also at Risk, July 1, 2019

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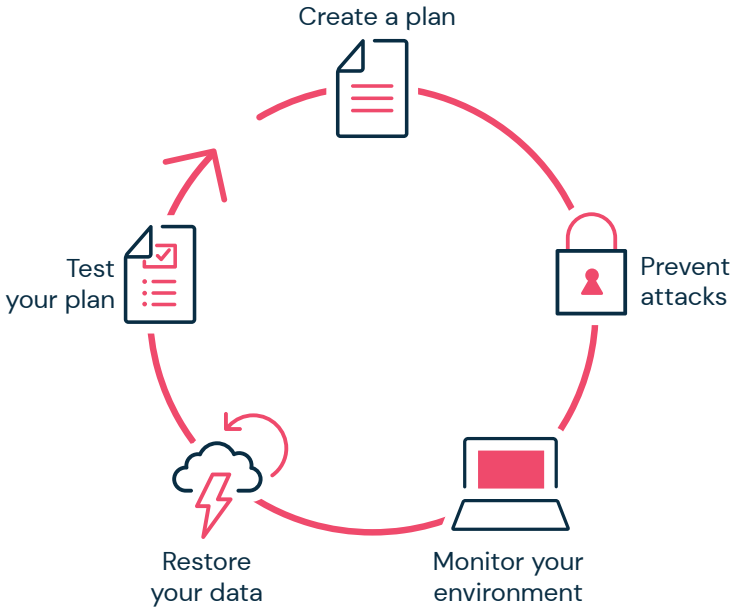
Learn how to protect against ransomware and manage risk

A complete ransomware strategy includes both reducing the risk of a successful attack and lessening the impact of an attack that does succeed. Broadly speaking, there are five things you need to do: plan, prevent, monitor, restore (quickly), and test.



1 Create a plan

An ongoing attack is no time for improvisation or ad hoc measures. An effective plan is the foundation for a full and speedy resumption of normal operations. The essential elements of an anti-ransomware plan — like any disaster recovery plan — are what, when, and who.

- **What** – Identify and prioritize critical applications so you can focus first on the systems and data that you'll need to recover first.
- **When** – Define the Recovery Point Objectives (RPO), Recovery Time Objectives (RTO), and Service Level Agreements (SLAs) for your systems, data, and applications. How soon is soon enough to recover? How far back do you need the restore to go? Metrics like these will help you understand whether you're adequately prepared for a ransomware attack, or if there's more work you need to do.
- **Who** – Which players will be involved in your data recovery efforts? How will they be notified? What conditions will trigger an escalation, and to whom? Your cast of characters should include both internal IT and line-of-business personnel, and external suppliers and vendors with a relevant role to play.

Disaster recovery planning for today's real-world outages. **Read >**

2 Prevent attacks

While it's not realistic to try to make your organization completely invulnerable, every attack you can prevent will save you tremendous pain, time, and cost. There are several ways to go about this.

Start with user vigilance — possibly the single most important step you can take. Most ransomware — and most malware in general — is delivered via email and triggered by an unsuspecting employee. Preventing this can be as simple as checking attachments to make sure they're from a known sender or trusted source before opening them. Similarly, software should be downloaded only from a legitimate vendor or app store, and should be scanned for malware before it's clicked. Measures as simple as these could have stopped many high-profile breaches.

IT needs to act responsibly as well. Updates and patches should be applied in a timely manner — especially given that most successful attacks exploit vulnerabilities for which patches have long been available. Sound IT practices are simply non-negotiable.

Once you've reduced the risk of a malware attack from entering your environment, the next step is to secure and protect your data against any exploits that do make it through. This should include:

- **Foundation hardening** – Vulnerabilities and configuration flaws in your operating system, database, application, and webserver technologies can provide an entry point for all types of cyberthreats. For example, you should disable the use of Server Message Block 1 (SMB 1), which does not support encryption. Hackers can use these vulnerabilities to compromise the integrity of your data protection platform and put your backups at risk. Make sure your foundation is free of cracks.
- **Application hardening** – Being able to access your applications directly makes life a lot easier for a cybercriminal. Use the AAA Security framework as a guideline for protecting your applications: Authentication, Authorization, and Accounting.

AAA Security framework for controlling access

Authentication	Authorization	Accounting
Proving and granting access	Control what level of access is required	Tracking and auditing access and capabilities

  - For **authentication**, Commvault integrates with virtually any secured LDAP-based directory service like Active Directory, as well as external identity providers, via protocols like Oauth and SAML. Commvault also supports two-factor authentication for advanced login security. Credentials and impersonation accounts used for backups are securely encrypted using the credential manager. As an additional measure, certificate authentication ensures that only Commvault resources can talk to each other, protecting against spoofing and man-in-the-middle attacks.
  - Once users have been authenticated, use fine-grained **authorization** to control the level of access they're granted. For example, admins should be allowed to manage backup data, but not browse, view, or restore data they don't own. Requiring a passkey to perform restores can help you maintain control. A data privacy lock can offer similar assurance, restricting browse and restore operations to the data owner or other select parties.
  - Accounting includes tracking and auditing users' data access and capabilities on a regular basis. Who has what access — and why? What are they using it for? Are there privileges you can remove to increase protection without impeding legitimate work? You should also audit data encryption regularly to make sure your most valuable assets aren't hiding in plain sight.
- **Ransomware protection** – Make sure the backups in your data protection platform are as safe as possible. This includes keeping the platform itself from being a conduit to spread malware to the backup data it holds. (Keep in mind that your data protection platform isn't designed to scan for or remove ransomware or other kinds of malware, or to prevent it from spreading to backup data from external sources.) There are several ways to protect backup data, each with its own advantages and challenges.
  - **A backup appliance** can harden your architecture with vendor-supplied hardware. This can be a good idea — though you're counting on the vendor to provide regular updates to maintain its effectiveness.
  - **Non-standard ports** can mitigate risk by making it harder for ransomware to reach your backup storage. For example, HTTP is typically configured on port 80 by default, and SFTP on port 22. Switching these ports can be a good short-term measure to dodge attacks.
  - **WORM (write once, read many)** technologies can block illicit encryption attempts by making it impossible to change or delete backup data. Just make sure it won't pose barriers to the recovery objectives you've defined.
  - **Data isolation using air gap techniques** can reduce the exposure of backup data to the risk of malware. If there's restricted network access or read/write access to backup copies of your data, there's no way to breach or corrupt that data as only verified backup processes can manage those resources. To be effective, you should also consider physical access to data — there's still the possibility of an insider inflicting physical damage to your storage library.

3 Monitor your environment

No matter how consistent and effective your countermeasures are, you have to assume that at some point ransomware will enter your environment. At that point, the focus shifts to monitoring: detecting the attack as quickly as possible so you can reduce its impact.

Detection can include scanning servers for anomalies such as unusual file system behavior that can signal that an attack is underway. Machine learning has become a key asset in this effort, using historic data to recognize the difference between legitimate activity and signs of potential trouble.

Honeypots take detection one step further by creating a hidden file of a type that's especially appealing to hackers, and monitoring it for signature changes and other anomalies.

4 Restore your data

Fast restores can greatly reduce the impact of a ransomware attack. Not only do you still have an intact copy of your data — you also have the ability to make it available to systems and users quickly so you can resume normal business operations.

There are three ways to back up data, each with different implications for restoration.

- **Traditional backup** operates at the file level. The system works through all the files and directories in the volume to determine whether they've changed and need to be part of the current backup. This can be a time-consuming and resource-intensive approach, though, as the system has to navigate every part of the index — an aptly named "tree walk."
- **Block-level backup** avoids the performance penalties of traditional backup by working on a block-by-block basis. The application doesn't care how many files there are or what your index looks like. That allows faster, more efficient backups, which in turn makes it feasible to perform backups more frequently.
- **Replication** takes a continuous approach to data backup. One way to do this is through **continuous data replication (CDR)**, which involves logging all file write activity on the source computer, transferring this log to the data recovery platform, and replaying it to create a near real-time replica. Another option is to use incremental replication to continuously apply changes from a source backup to a synced copy of the backup. **Volume block-level replication (VBR)** is often the best approach, combining the efficiencies of block-level backup with the near real-time advantages of replication. This allows granular point-in-time recovery, crash-consistent recovery points, application-consistent recovery points, and effective recovery point lifecycle management.

5 Test your plan

Once you have your plan in place, along with the procedures and technologies to execute it, make sure it's really going to work as needed. Perform frequent tests to verify that you can meet the SLAs you've defined for critical and high-priority data and applications.

Taking action against ransomware

Your Commvault data protection and recovery solution can be a valuable part of your anti-ransomware strategy. Advanced technologies powered by artificial intelligence and machine learning make it possible to detect and alert on possible attacks as they happen so you can respond quickly. By helping keep your backups out of danger, and making it possible to restore them quickly, you can minimize the impact of even a successful ransomware attack so you can get back to business right away.

IDC value survey statistics[2] illustrate the difference Commvault makes for customers. As companies seek to maintain data readiness in the face of ransomware and other risks, they report that we enable:

- **Simplification** to deliver cost savings by automating, consolidating, and more efficiently operating the data management process, including:
  - 44% reduction in annual spending on data infrastructure, software, services, and compliance
  - 15–30% reduction in data management point solutions

- **Risk reduction** in terms of reduced downtime, data loss, recovery speed, and litigation support, including:
  - 62% reduction in annual unplanned downtime
  - 49% improvement in average recovery time for messages, files, and VMs as well as Exchange, Oracle, SharePoint, and SQL applications
  - 57-392% improvement in data coverage for protection, analytics, encryption, and reporting
  - 50-61% reduction in annual exposure to compliance failures, audit failures, and/or data theft or breach
- **Productivity gains**, both tactically and strategically, through better ways of performing and managing backup and restore operations, including:
  - 31% reduction in weekly administrative hours across all data protection, storage, and data management operations
  - 30-58% reduction in the hours needed for tasks from disaster recovery testing to VM recovery

The **State of Colorado** used the Commvault platform to recover quickly and fully from a major ransomware attack against its Department of Transportation. In fact, the State first learned of the attack through a Commvault alert — before any of its dedicated security tools had detected the breach. A coordinated response plan across agencies, personnel, and technologies statewide helped immeasurably. **Watch >**

The **City of Sparks, Nevada** was hit with ransomware that locked its police department shared files and left crucial geographic data inaccessible by agencies across the city. In the past, unreliable backups had raised fears of data corruption, but with Commvault, the city achieved complete data recovery in only 12 hours. **Watch >**

Opportunity and risk— that's the reality for businesses today and for the people responsible for the data. A single event can threaten the bottom line or define a career. So how do you prepare? By making sure you're ready.

2 Quantifying the Business Value of Commvault Software, IDC 2018, US40773815

Learn more about using data protection as your last line of defense against ransomware. Visit **commvault.com/ransomware >**

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