

## White Paper

# One-Click Recovery: Prevent Data Loss and Reduce Downtime



## Introduction

There are a number of hardware and software recovery techniques available for SSDs. Software recovery solutions usually make efficient use of storage space, and offer malware protection, but often have a license fee, and training is a must. On the other hand, hardware recovery solutions require almost zero training after setup, but have an extremely high initial setup price. Generally speaking, software recovery solutions are suited to enterprise environments, whereas hardware recovery solutions are better utilized in applications where data protection is critical. For a long time, integrators have struggled to find suitable solutions for IoT devices.

## Challenges

Uninterrupted system operation is essential for IoT devices, but traditional hardware and software recovery solutions are not always suitable. Hardware solutions are not only expensive, but are bulky, and may not fit into the limited space of IoT solutions.

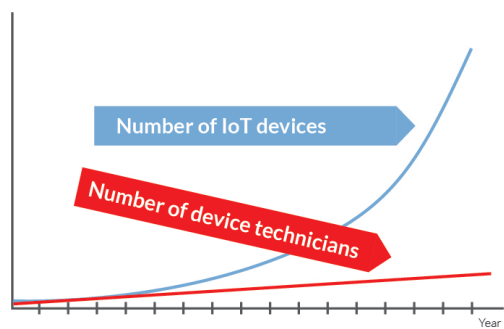


Image 1: The growth of IoT devices has left few technicians taking care of many devices

Software solutions do not add additional bulk to devices, but usually require trained professionals to complete system recoveries. The massive growth in IoT devices and the increasing reliance on near-24/7 operations have heightened expectations for system stability and lightning-fast recovery.

System recovery in data centers benefit from the centralization of resources. With automated systems to fall back on, and technicians on hand, they can initiate full system recovery in as little as a few minutes. However, handling these scenarios and eliminating downtime in remote locations is more complicated. Decentralized solutions implemented by system integrators offers data security and reliability benefits to customers needing secure low-maintenance on-site devices. Still, these remote location solutions are far from the specialized technicians required to perform recovery, which means long wait times between finding the problem and fixing the issue, as well as high costs for the company managing the solutions.

## Solutions

Innodisk InnoOSR alleviates system recovery headaches. InnoOSR series flash memory has patented firmware-based on-site recovery (OSR) technology that allows a physical button connected to a GPIO interface to initialize the recovery process.



Image 2: An InnoOSR SSD connected to a physical button wire, used for initiating recovery.

This simple operation restores the system from a recovery image without any software recovery tools, enabling fully automatic, push-of-a-button system recovery. Only two major steps are required to operate the system: initial recovery image creation on the InnoOSR device, and initiating the recovery when the system fails.

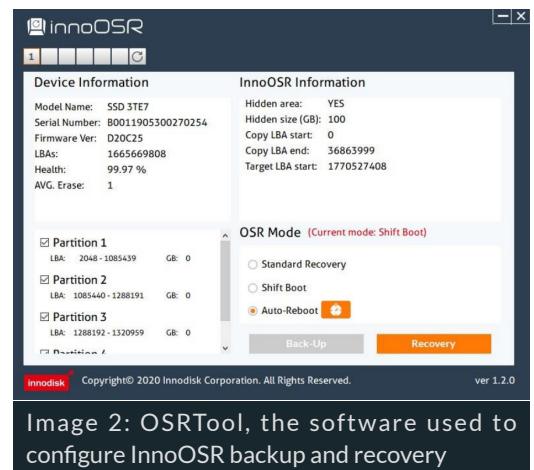


Image 2: OSRTool, the software used to configure InnoOSR backup and recovery

With the OSRTool, the user is able to see device information, partitions, and is able to configure the OSR mode with an easy to use interface and setup procedure.

InnoOSR features three modes, Standard OSR, Shift-Boot OSR, and Auto-Reboot OSR.

### Standard OSR

The Standard OSR mode is triggered manually, and is best suited to environments that can accept a longer recovery time due to the estimated 5-30 minutes required. In the event of an OS crash, the recovery image overwrites the working partition. Due to only using two partitions (recovery image, and active), Standard OSR suits applications where storage space is limited, or must be optimized.

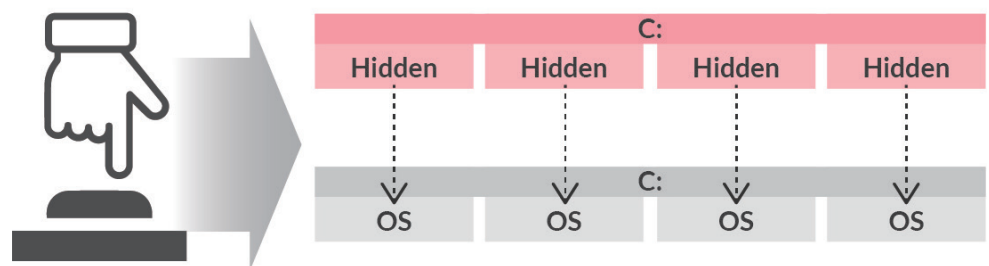


Image 3: With Standard OSR, the backup image in the hidden area is copied to the OS partition when the user activates recovery mode via InnoOSR's connected button.

### Shift-Boot OSR

The Shift-Boot OSR mode is similar to Standard OSR, in the sense that it also requires a manual trigger from on-site personnel, but it has a faster estimated recovery time of less than 1 minute, due to using three partitions (recovery image, active, and backup). In the event of an OS crash, the backup partition becomes active, and then the recovery image overwrites the faulty partition. With this method, more disk space is used, since the same data exists on three different partitions.

## Auto-Reboot OSR

The Auto-Reboot OSR mode uses the same three partition recovery as Shift-Boot OSR, and therefore has the same fast recovery and again uses a larger amount of storage space, but differs in the triggering mechanism used. Auto-Reboot OSR uses an OS level heartbeat sensor that sends signals through the motherboard to the InnoOSR SSD. If the SSD fails to receive a signal after a pre-defined time period, then recovery will be triggered. This mode, which does not require any personnel to trigger the recovery is most suited to hard-to-reach, or staff-less environments, such as digital signage, low-orbit satellites, and environmental monitoring systems.

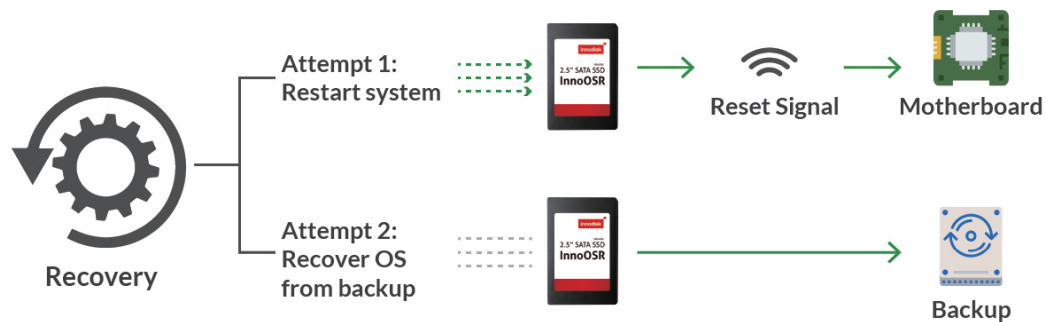


Image 5: With Auto-Reboot OSR, when the drive does not detect a signal from the heartbeat sensor, the drive triggers a system restart through a wired connection to the motherboard's restart pins. If the restart does not solve the issue, the OS is recovered from the backup.

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## Conclusion

As IoT devices become ever more prevalent in the lives of the public, and in industrial settings, straightforward recovery options will only become more and more in demand. InnoOSR, and other recovery solutions like it offer the ability for anybody to recover a system that is down, or for the system to recover itself automatically. This will enable system integrators to deploy even more complex solutions into even more hard to reach environments, to build an intelligent world.

Sources:

1.<https://iot-analytics.com/number-connected-iot-devices/>

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