

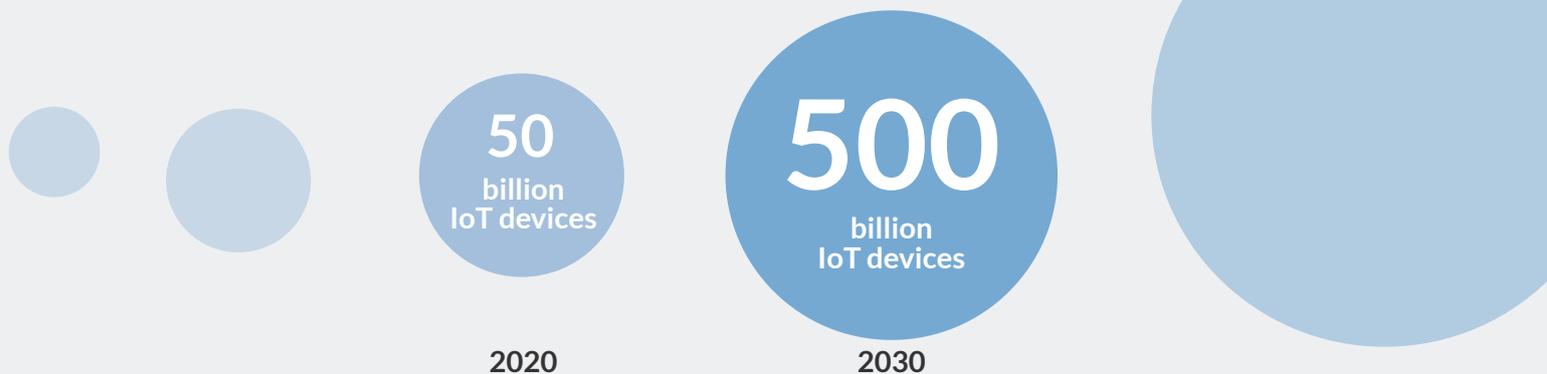


# The Future of the Internet of Things With Remote Management

Innodisk's next-generation remote management technologies are unlocking the next wave of IoT innovation.

# The Remote Management Opportunity

The Internet of Things (IoT) continues to grow at an unprecedented rate. Cisco estimates that there will be 50 billion IoT devices in the world by 2020. This staggering number is nevertheless dwarfed by the 500 billion IoT devices projected for 2030.



The key to business success in the future of 500 billion IoT devices – and beyond – of the future lies in device management capabilities. Specifically, in remote management capabilities.

Without advanced remote management capabilities, long-term and large-scale investments in IoT infrastructure are unfeasible. The ability to carry out cost-efficient device management and maintenance of staggering numbers of devices is quickly becoming the number-one value differentiator when businesses choose between different IoT solutions.

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## *Cost-efficient remote management is a prerequisite for viable IoT solutions*

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Indeed, companies risk declining even the best and most innovative IoT solutions simply on account of expensive device management options.

That presents IoT innovators with a huge opportunity to leapfrog the competition and delivering remote management-optimized solutions ready for the next 450 billion IoT devices – and beyond.

# The Remote Management Challenges

## ■ Key Figures



Part of annual revenue that the average small business spends on IT.



Share of IT costs incurred after the initial purchase.



Time the average employee spends attempting to fix device problems every week.

## ■ The Big Challenge

### IoT Connected Devices

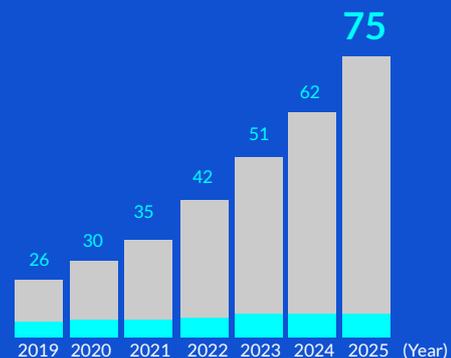


Devices



Operators

(in billions)



Edge computing faces a significant existential threat best described by the device-to-operator ratio. With the exponential growth of edge devices, managing and maintaining all these devices becomes an impossible task.

There will not be enough device technicians around to take care of all these devices. Therefore, a radical change to the ways we manage our edge devices is necessary.

## ■ For Every Cloud



Public Cloud



Private Cloud



Intranet

Different use cases have vastly different networking needs, making it important that remote management solutions offer wide support. For example, public cloud, private cloud, and intranet are all common in IoT infrastructure across every industry and application.

# The Dual Guarantee for IoT Infrastructure

Remote management capabilities provide IoT infrastructure operators with an effective means of managing countless edge devices in geographically dispersed locations. By allowing operators to seamlessly access device data and settings from anywhere, remote management is an indispensable tool as IoT networks grow.

However, state-of-the-art IoT infrastructure does not limit remote management device option to standard, so-called in-band management. Instead, they incorporate a fail-safe system called out-of-band management – providing massive and critical IoT infrastructure with unparalleled system stability and uptime.



**Standard Remote Management**  
*In-band Management*



**Fail-Safe Remote Management**  
*Out-of-band Management*

## Description

Software-based device management and control through the cloud/intranet.

Firmware-based device management and control through the cloud/intranet in addition to standard software-based remote management.

## Advantages

- No special hardware required
- Low barrier of entry
- Suitable for IoT infrastructure of any size

- Can recover severely malfunctioning devices
- Does not require a functioning operating system
- Can use an independent internet connection if the normal connection has failed
- Acts as an addition to in-band management, not a full replacement

## Requirements

- A cloud-based administration platform, e.g., Innodisk's iCAP
- Compatible hardware, e.g., Innodisk storage and DRAM products

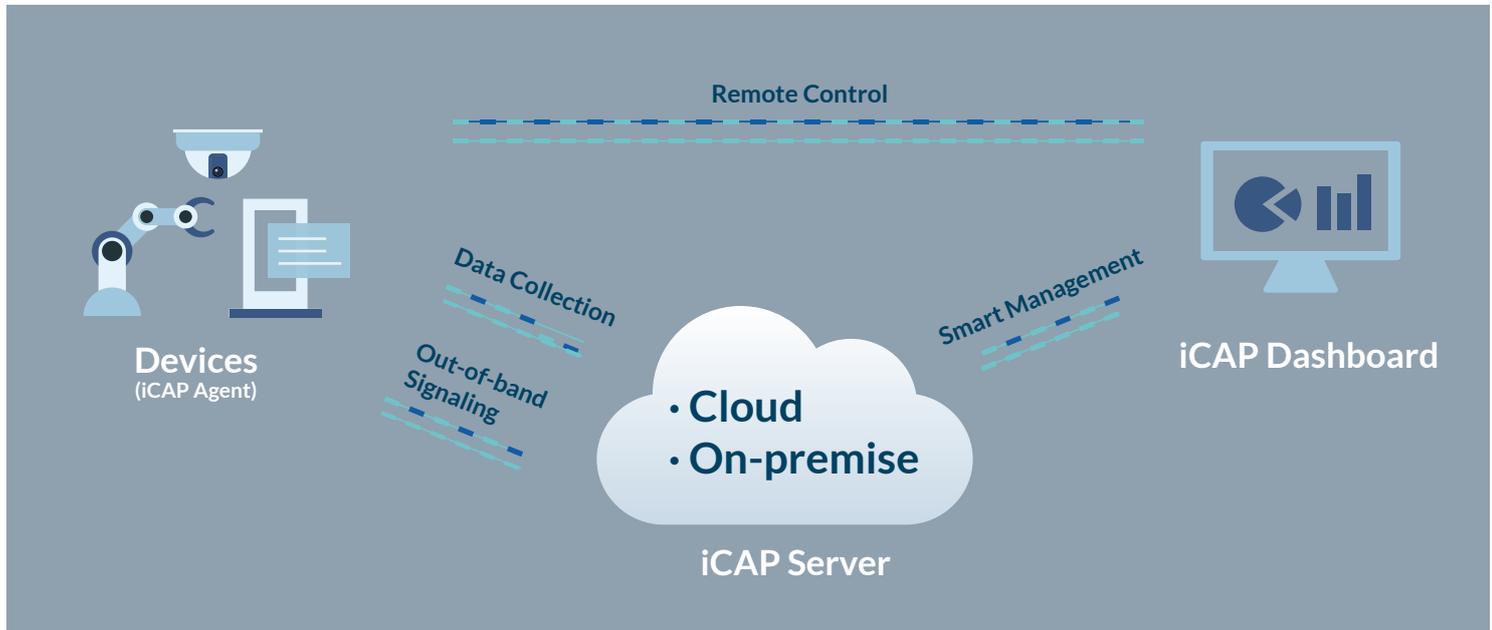
- A storage device designed for out-of-band signaling, e.g., Innodisk's InnoAGE
- A cloud service, e.g., Microsoft Azure or a private cloud
- A cloud-based administration platform, e.g., Innodisk's iCAP

# Cloud Solutions



iCAP™ is a browser-accessed management and maintenance platform that allows you to manage solid-state drives (SSDs), memory, and other components in edge devices. With iCAP, accessing device data and controlling devices is possible from anywhere, for example from your internet-connected cell phone, tablet, or laptop. Moreover, iCAP fully supports in-band and out-of-band management, making it easy to restore severely malfunctioning edge devices in no time.

## System Architecture



## iCAP Dashboard Management Interface

- 1 The web page dashboard enables the user to easily manage connected devices through supported browsers
- 2 Keep track of out-of-band-enabled devices' operating status
- 3 Keep tabs on current CPU and Memory loading
- 4 Effectively monitor remote device status
- 5 User-friendly monitoring function allowing the user to manage and analyze storage information in detail
- 6 By analyzing the read/write behavior of connected storage devices, iCAP can accurately predict remaining storage device lifetime
- 7 Customizable widgets including gauges, Google Maps, and various tables presenting device data

The screenshot shows the iCAP dashboard with several data widgets. Callouts point to specific features: 1 points to the dashboard header; 2 points to the 'InnoAGE Status' widget showing 1 online and 0 offline devices; 3 points to the 'CPU Loading' widget showing a bar chart; 4 points to the 'Device status' widget showing 917 devices; 5 points to the 'Storage Health' widget showing a pie chart with 615 devices in the red zone and 594 in the yellow zone; 6 points to the 'Storage Lifespan' widget showing a donut chart with 190 devices in the red zone and 1312 in the yellow zone; 7 points to the 'Google Map(M)' widget showing a map of a city with device locations marked.

## iCAP Advantages

Windows

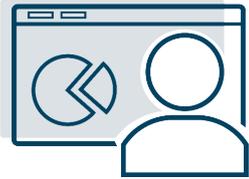
Linux

### Extensive Compatibility

The iCAP agent is supported on both Windows and Linux platforms and can be seamlessly accessed through a wide range of browsers.

### Flexible Dashboard

The user can freely alter the dashboard through a dynamic UI and device grouping and choose the parameters and widgets relevant to their application.

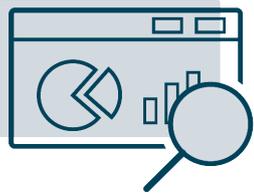


### Remote Disaster Recovery

iCAP fully supports in-band and out-of-band management with one-key recovery, bringing malfunctioning devices back to normal in no time.

### Effective Event Tracker

The event notification tracker will log all changes and keep the user up-to-speed, enabling swift resolutions to any issues that may occur.

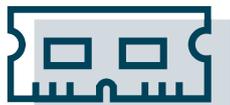


### Comprehensive Indexing

The index table accessible through the dashboard allows you to quickly get more details on device status.

### 3rd-party Support

iCAP can also monitor devices of other brands as long as it runs Innodisk storage components.



### DRAM Monitoring

iCAP supports DRAM monitoring, providing the user remote access to iSMART DRAM information and module prediction.

## System Requirements

### Web Service

Web browsers that supports HTML5, CSS3, JavaScript:

Microsoft Internet Explorer 10+ | Google Chrome:9.0+ | Firefox:15.0+ | Safari:5.1+

### Server

Hardware Minimum Requirements:

IntelR Core™ i3 2.3 Ghz CPU or above | 4 GB RAM | 20 GB root partition for the system | 100 GB data storage

Operating System:

Ubuntu 14.04+ | Docker 17.03+

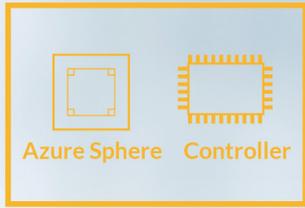
### Agent

Hardware:

Bundled with Innodisk Storage products

Operating System:

Windows 10/8.1/7/XP kernel 32/64-bits | Ubuntu 16.04 64-bits | Debian 8 64-bits | Others by request



Secured Storage

Secured Software

Cloud Security

01ACD9

78BCCA

A01387

23FFC5

9898AA

ABGG77

AAB659

767GH6



Flash Storage

## InnoAGE: The Future of Edge Computing

Cloud-connected Storage for a World with Smart Devices Everywhere

Innodisk's state-of-the-art InnoAGE™ SSD is engineered to be the perfect storage device for cutting-edge AIoT solutions and the future of edge computing. The InnoAGE SSD combines the best of Innodisk's flash storage technology with secure and connected solutions developed in partnership with Microsoft to create a truly next-generation AIoT solution.

The InnoAGE SSD is the best way to bring your edge computing to the next level.

## It's Always Connected; You're Always in Control

The InnoAGE SSD features out-of-band signaling technology, allowing it to remain connected and controllable even if its host system has broken down. Thanks to the InnoAGE SSD's independent Wi-Fi and Ethernet connectivity and its advanced remote management system, system operators can easily bring their devices back up to speed when something has gone wrong.

With the InnoAGE SSD, AIoT system downtime is a challenge of the past.

### Why InnoAGE SSD?

#### Edge-optimized Security



The InnoAGE SSD is fortified with Innodisk's advanced security technologies on the hardware, firmware, and software levels – from edge to cloud.

#### Swift Device Management and Maintenance



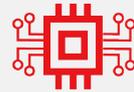
Designed for efficient remote management and timely maintenance, the InnoAGE SSD makes management and maintenance hassle-free.

#### No Time for Downtime



Revolutionary out-of-band signaling technology makes downtime a memory of the distant past as system recovery and control are only clicks away.

#### Industrial-grade Everything



The InnoAGE SSD is packed with industrial-grade components and technologies carefully designed to meet the strictest of industrial requirements.

### Uncompromised AIoT Flash Storage

**64 GB - 1 TB**  
Flexible Capacities

**M.2 and 2.5"**  
Key Form Factors

**-40 – 85 °C**  
Wide  
Temperature-ready

**Anti-shock  
& vibration**

Ready for the  
Real World

**Wi-Fi  
& Ethernet**  
Independent  
Connectivity

**Multi-function  
I/O**  
Flexible Interface  
Expansion

**Storage  
Security**  
Advanced Storage  
Security Technologies

**Data Security**  
360-degree Data  
Security from  
Edge to Cloud

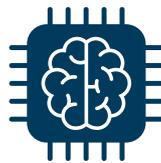
# Customized to Perfection



Innodisk is committed to providing the industry's best customer service – and that commitment starts with our products. Innodisk provides product customization service unparalleled in the industry, allowing Innodisk products to bring out the best of customers' solutions and power great innovations. This commitment to customization and our customers is not limited to Innodisk's hardware, firmware, and software, but includes fully integrated solutions that bring true innovation to life.



**Hardware customization**



**Firmware customization**



**Software customization**



**Fully integrated solutions**



# Smart Nurses' Station Monitoring Systems

## ***Patient Care and Nursing Cart Monitoring Through iCAP™ Integration for Nurses' Stations***

A client realized that their traditional way of running nurses' stations was inefficient and demanded a lot of manual work from their staff. In response, they reached out to Innodisk to give their nurses' stations a smart and connected upgrade. One of the key requirements with the new smart nurses' station is that it should make it easy to not only monitor patient status but also keeping tabs on critical equipment around the medical service facility, such as smart medical carts, across parameters such as battery life and component health

### **Challenges**

- The user interface must be intuitive and user-friendly for quick and easy operation by all nursing staff
- The nurses' station needs to collect critical battery and component information from the facility's medical carts
- The new platform must support real-time notifications to deliver timely status updates about patients and medical equipment

### **Solutions**

- Innodisk's iCAP platform provides an intuitive dashboard with user-friendly management features ideal for the upgraded nurses' station
- The iCAP client collects pertinent battery and device information through serial ports for instant access through the nurses' station
- iCAP's dashboard allowed integration with bedside care systems to trigger automatic alerts when patients press the help button

### **Our Roadmap to Success**

Customized iCAP Platform for Healthcare Applications

- Easy-to-use dashboard available from anywhere, including off-site
- Comprehensive device information to make sure that all equipment is running normally and not at risk of breaking down
- Customizable for monitoring of other healthcare equipment and their pertinent parameters
- Excellent security for safeguarding critical information and mitigating the risk for security breaches

### **Result**

With Innodisk's intelligent cloud monitoring solution, the new smart nurses' stations allowed staff to quickly and seamlessly access important patient and equipment data, reducing the need for manual work and inspection. Thanks to Innodisk's customizations, the iCAP platform helped the client gather information on all their equipment, thus vastly simplifying equipment management and maintenance.



# Manufacturing the Future Together: A Smart Factory Concept

## *Bringing the future to the manufacturing sector with smart and robust components ready for AI on the edge*

Innodisk, with ecosystem partners DFI and Supermicro, created a concept factory that delivers exceptional operational efficiency and reduced costs by leveraging the best hardware in the industry.

### Challenges

- Downtime is required to be kept to a minimum to ensure maximum efficiency
- Staff needed to be able to manage devices in the factory even without staff on site
- In the event of device failure or service outages, devices still need to be accessed remotely for recovery purposes
- The components need to operate in challenging industrial conditions along all stages of the manufacturing process

### Solutions

- Industrial-grade InnoAGE SSDs with out-of-band management
- Innodisk's iCAP device management platform for seamless remote maintenance and management
- Innodisk's rugged DRAM and embedded peripherals for factory equipment and industrial PCs

### Result

By leveraging the Innodisk InnoAGE SSD throughout the smart factory's manufacturing process, the concept factory was able to ensure the best possible uptime. With the InnoAGE SSD's independent communication channel, factory operators were able to manage devices remotely, even in the event of equipment failure or a network outage—and regardless if any staff was physically present in the factory.

Thanks to the InnoAGE SSD's technology combined with Innodisk's signature ruggedness and its ecosystem partners' intelligent solutions, the smart factory proved a successful concept that serves as an inspiration in ongoing smart industry projects.

### Partners



美超微電腦股份有限公司



# Innodisk-Powered Remote Management Excellence

## ***Making DFI's innovative RemoGuard possible with excellent hardware and software solutions***

Innodisk's AIoT ecosystem partner, DFI, is a leading embedded solution provider and its products are used in a diverse set of edge computing applications by its global customer base. One of the greatest challenges its customers faced in such applications is achieving cost-efficient device management. Eager to help customers reach all their edge computing goals, DFI reached out to its AIoT ecosystem partner, Innodisk – a leading remote management solution provider.

### **Challenges**

- Customers want to achieve future-proof and cost-efficient edge device management
- The solution needs to provide exceptional security and the highest possible device uptime
- The solution must be fully integrated into DFI's solutions to provide its customers a seamless experience

### **Solutions**

- Innodisk's cloud administration platform, iCAP, provided all the remote management functionality needed to meet clients' goals
- iCAP's traditional in-band management technology combined with the InnoAGE SSD's out-of-band management capabilities provided a unique dual-band solution for maximum uptime
- By fully integrating iCAP and InnoAGE technologies with DFI's own software platform, RemoGuard, Innodisk provided DFI with a platform that is uniquely DFI's – powered by Innodisk

### **Our Roadmap to Success**

#### Fully integrated iCAP solution

- Complete integration of iCAP's features and benefits with DFI's hardware solutions and software platform
- Remote management and maintenance solution that supports device management and monitoring of device hardware such as DRAM modules and flash storage devices
- Secure cloud-based platform accessible from anywhere – at any time – using either public or private clouds

#### Intelligent out-of-band-enabled InnoAGE SSD

- Smart flash storage device that can be remotely controlled through an independent out-of-band connection if the regular in-band connection is unavailable, for example because of a system crash
- Industrial-grade SSD with Innodisk's trademark industrial hardware and firmware technologies

### **Result**

Through the full integration of Innodisk's uniquely powerful iCAP and InnoAGE technologies with DFI's edge computing platform, DFI was able to provide their customers with an exceptional remote management solution that still feels uniquely DFI. Thanks to the Innodisk InnoAGE's powerful out-of-band management features, DFI's customers could also enjoy the true power of fail-safe remote management – all easily operable from DFI's RemoGuard platform.

## Our Vision

# Absolute Integration™

Absolute Integration™ is our envisioned path that moves toward a more interconnected world.

“To us, integration is not merely the combination of hardware, software and firmware; it is a philosophy that assimilates all relevant elements to create an optimal solution.”

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