

Cybersecurity

Preparedness
& Mitigation



An Essential Priority within the
BeneVision Distributed Monitoring System

mindray



Mindray is committed to protecting patient data and ensuring privacy.

We promote deeply-embedded partnerships with our customers to assist in driving the implementation of strategies to mitigate cybersecurity risk. We focus on three key areas – **Endpoint Security, Patient Privacy and Security by Design.**

The digitization of healthcare in the U.S. continues to accelerate. From Electronic Medical Records (EMRs) to millions of connected medical devices, the flow of patient information is increasing exponentially.

With such an increase in the volume and modes of data transmission, there comes a greater vulnerability to cybercrime. As a result, cybersecurity is an ever-growing concern within the healthcare sector.

- Cyberattacks have proven particularly damaging to the healthcare sector. In 2020, UHS suffered a cyberattack compromising 250 facilities nationwide and the VA experienced a data breach that compromised the sensitive information of about 46,000 veterans.¹
- According to Fortune, an industry watchdog, a ransomware attack in Germany caused network outages that forced a clinic to reroute patients in need of emergency care. One 78-year-old patient who required immediate attention for an aneurysm died after being sent to another city, perhaps serving as the first recorded death linked to a ransomware attack.²
- The financial impact on healthcare can be significant. A study outlined in Security, an industry communication, found healthcare companies are incurring the highest average breach cost of any industry, \$7.13 million per incidence, a 10% increase over the 2019 study.³

¹ <https://www.securityinfowatch.com/healthcare/article/21209720/healthcare-cybersecurity-sets-new-course-of-action-in-2021>

² <https://fortune.com/2020/09/18/ransomware-police-investigating-hospital-cyber-attack-death/>

³ <https://www.securitymagazine.com/articles/93770-healthcare-cybersecurity-strategy-start-at-the-end>



Endpoint Security

Endpoint security focuses on minimizing the threat of unauthorized access through devices such as laptops, workstations, mobile and bedside medical devices. Mindray starts by reducing the network attack surface by segmenting the network, eliminating unnecessary pathways, and restricting access to communications on the network. Finally, locking down and securing these medical devices is the definitive and core component of Mindray Endpoint Security.

In addition to requiring secure firewalls and antivirus protection for network deployment, Mindray applies Whitelisting and Operating System (OS) Hardening for further safeguarding. Whitelisting is a security practice that, by design, allows access or privilege to a known user or application and denies this same access or privilege to an unknown user or application. OS hardening is the process of making the operating system more secure. This is done through various steps such as removing unnecessary services, executables and registries from the operating system, while aggressively blocking unneeded ports.



One of the most challenging aspects of Endpoint Security for healthcare institutions is the staggeringly high number of devices requiring safeguarding.

Mindray alleviates this challenge by providing Endpoint security coverage for Mindray devices deployed within the BeneVision Distributed Monitoring System.



Mindray's approach to protecting PII incorporates secure encryption, password management, and secure data deletion.



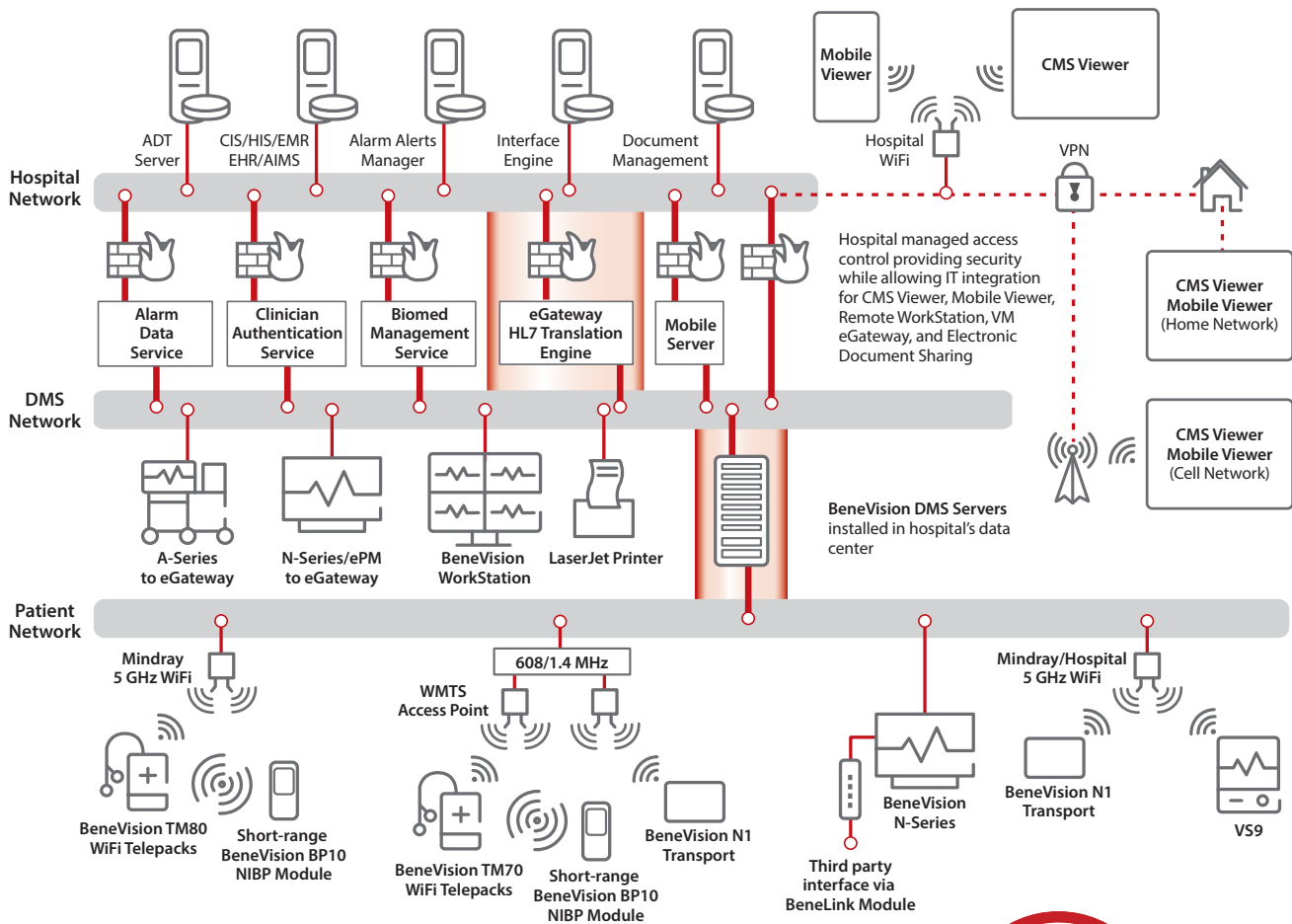
Patient Privacy

Since 1996, compliance with the Health Insurance Portability and Accountability Act (HIPAA) has been a mandate for all hospitals. Since its introduction, the associated terms have evolved some — electronic Patient Health Information (ePHI) has morphed to Personally Identifiable Information or PII. This shift in language reflects a broadened definition of any data that can establish identity. PII can be either non-sensitive or sensitive. Non-sensitive PII might include data found in a phone book or a government listing. Sensitive PII is data that, when disclosed, could violate an individual's privacy and potentially cause harm. This is PII that must be securely protected for the sake of patient privacy.

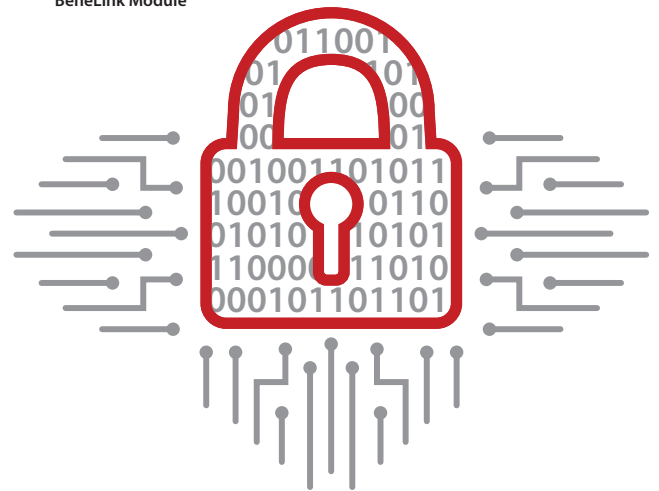
The BeneVision Distributed Monitoring System (DMS) utilizes user access controls and customized screen configurations to support patient confidentiality. Data displayed on the screen or in reports is configurable to limit patient information. Patient data is securely encrypted on the DMS Servers and in transit. Logs obtained for troubleshooting are extracted without PII or encrypted to protect patient information. Lastly, Mindray integrates with the hospital's Active Directory to centrally manage user accounts, rights, and permissions to comply with secure password policies. When deployed simultaneously, these various strategies prove effective in supporting patient privacy.



Security by Design Throughout the Network



This type of security is focused on elements that are inherent in the device or system with the explicit purpose of maintaining security. It all starts during product development, where security risk management, security design practices, and security code analysis are performed. Rigorous testing such as Fuzz testing repeatedly bombards a computer application with erroneous random data to look for system crashes and memory leaks. Data obtained from this type of testing can identify any system instability in very challenging circumstances so that these instabilities can be addressed in the design phases before product release. Like Fuzz testing, Penetration testing is another automated technique that simulates a cybersecurity attack to identify both vulnerabilities and strengths within a software application or system. Security by design continues well beyond product release; Mindray continuously evaluates patches and security updates to ensure product security over time.



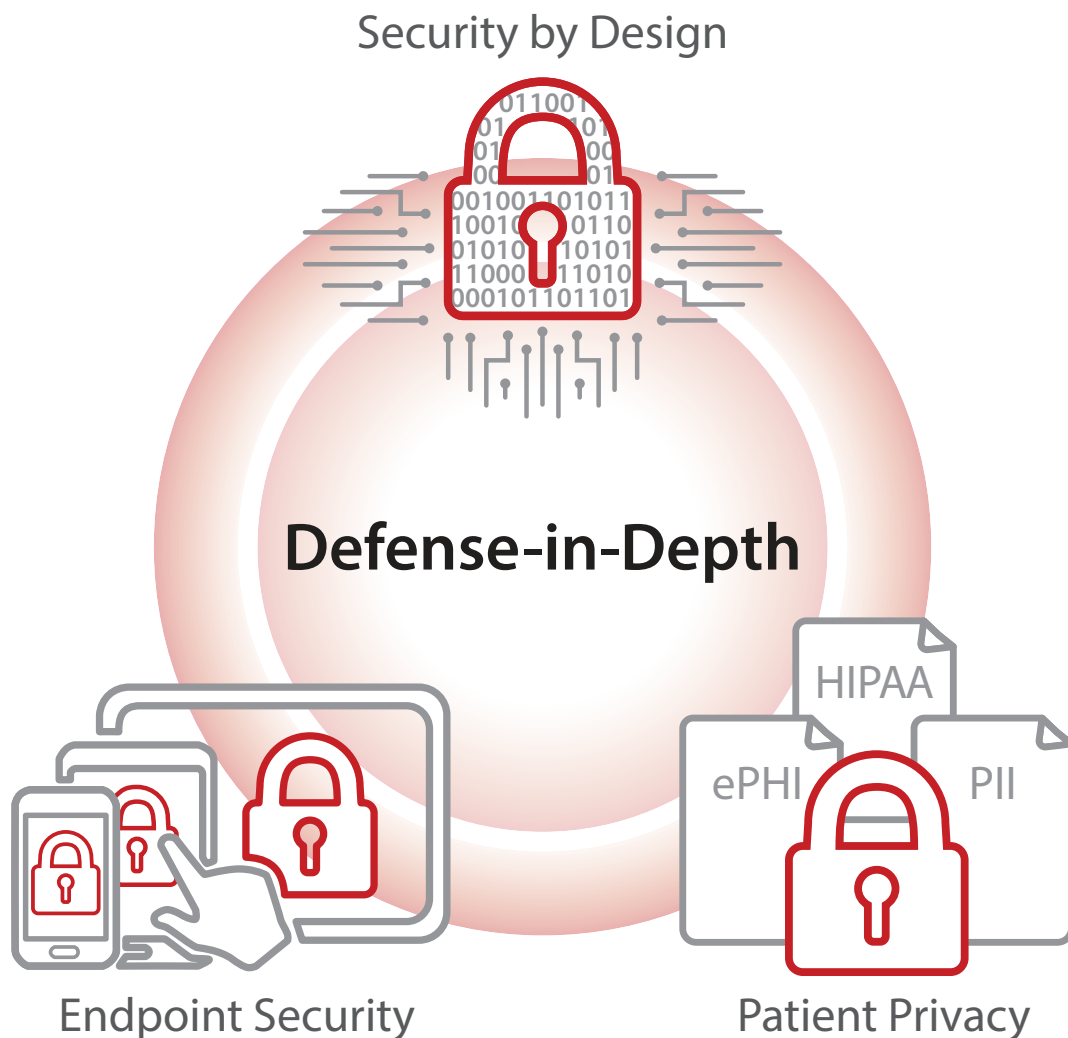
This strategy of Security by Design is indicative of the critical emphasis Mindray places on the security of the BeneVision Distributed Monitoring System and all its associated devices.

Defense-in-Depth

Mindray's multifaceted cybersecurity strategies can best be described as Defense-in-Depth. There is no single solution for cybersecurity, but rather a series of measures working together in unison to have a net positive effect. All of the strategies described here are methods that complement existing institutional efforts to reduce the incidence of cybercrime.

The Mindray BeneVision Distributed Monitoring System has been designed and developed with a focus on cybersecurity.

Mindray, in partnership with our valued customers, proactively implements these measures and techniques to combat cybersecurity threats and better protect patient privacy.



Defense-in-Depth Measures within Mindray BeneVision DMS

Mindray Endpoint Security Components

Component	Description	Endpoint Device
Whitelist	A program that acknowledges and allows predefined and preapproved applications to access a particular service. A Whitelist is the opposite of blacklist which tracks known malware.	DMS WorkStations, DMS Servers, eGateway
Anti-Virus	A program that monitors a computer or network to identify all major types of malware (viruses) and prevent, detect and remove them.	Virtual eGateway, Mobile Viewer
OS Hardening	Encompasses all efforts made to make the operating system more secure. This includes removing unnecessary services, executables, and registries while aggressively blocking all ports.	DMS WorkStations, DMS Servers, Patient Monitors, eGateway, Anesthesia
Digital Signature	All Mindray software applications provide a digital signature for increased protection.	DMS WorkStation, Mobile Viewer, eGateway, MLdap, CMS Viewer and eICU Multi-Patient Viewer
Encryption	All PII is encrypted with AES on the device at rest and with TLS 1.2 in transit.	DMS WorkStation, Mobile Viewer, eGateway, Patient Monitors, Clinician Authentication Services, CMS Viewer and eICU Multi-Patient Viewer
Secure Data Deletion	Utilizes built-in tools to securely remove patient data across all Mindray devices	Patient Monitors, DMS WorkStations, DMS Servers, eGateway
Firewall	An application or device that effectively creates a barrier, preventing unauthorized communication to pass into a server.	Firewall deployed on Patient Monitors. Windows OS Firewall deployed with DMS WorkStations, DMS Servers, and eGateway.

Personally Identifiable Information

Component	Description	Endpoint Device
Protect PII on all Displays and Reports	The configurability of BeneVision DMS allows the end user to customize what data is displayed on screen and reports.	Patient Monitors, DMS WorkStations, eGateway, Anesthesia, and Mobile Viewer
Protect PII in Logs	All logs used for troubleshooting are extracted without PII or encrypted to protect valuable patient information.	DMS WorkStations, DMS Servers, eGateway, Anesthesia, Patient Monitors
Audit Logs	Fully encrypted audit logs available for review.	eGateway, DMS Servers and Mobile Viewer
Password Management	The BeneVision DMS supports the use of strong and editable passwords, roles, access timeouts, as well as integration into the Active Directory to adopt hospital policies.	Patient Monitors, DMS WorkStations, DMS Servers, eGateway
User Access Control	BeneVision DMS integration into the Active Directory to provide access to centrally-managed user accounts, permissions and password policies	Patient Monitors, DMS WorkStations, DMS Servers, software only eGateway or Virtual eGateway
User Account Control (UAC)	UAC can be enabled on a customer managed host running Mindray's HL7 translation engine.	eGateway customer host
Protecting Discharge List	BeneVision DMS has the ability to automatically remove patients.	DMS WorkStations, DMS Servers, and Patient Monitors

Cybersecurity by Design

Component	Description	Endpoint Device
Risk Management	Identification and mitigation of security risk before development and after product release	All Mindray devices
Code Analysis	Automated analysis of source code looking for common implementation issues which lead to vulnerabilities.	All Mindray devices
Patching Policy	An ever-vigilant approach to monitoring Microsoft® Patch release to shore up vulnerabilities in the Microsoft Operating System	All Mindray devices
Fuzz Testing	Automated software testing techniques that subject a software application to intentionally invalid or erroneous messages for the purpose of testing application stability	All Mindray devices
Penetration Testing	An automated testing technique that simulates a cybersecurity attack to identify both vulnerabilities and strengths within a software application or system	All Mindray devices

healthcare within reach



monitoring • anesthesia • ultrasound

Vision: Better healthcare for all

Mission: Advance medical technologies to make healthcare more accessible

Mindray is a leading developer, manufacturer and supplier of medical device solutions and technologies used in healthcare facilities around the globe. We believe we can change lives by making the most advanced healthcare technology attainable for all. We do this by empowering healthcare professionals through innovative, high-value solutions that help create the next generation of life-saving tools across patient monitoring, anesthesia delivery and ultrasound imaging.

At Mindray, we understand the shift in healthcare from volume to value and continuously deliver solutions that matter in this evolving environment. Our team is disrupting the industry, radically addressing today's needs with the technology of tomorrow. We are creating innovative, game-changing products and partnerships, shaping a new conversation for healthcare providers across North America. We work with thousands of healthcare providers day-to-day to drive the development and implementation of smarter technology – solutions that are simple and affordable, easy to adapt, and return bottom line results and meaningful outcomes. Together, we are creating a higher standard for healthcare.

Mindray North America is headquartered in Mahwah, New Jersey. Our Ultrasound Innovation Center is located in San Jose, California with additional facilities in Nashville, Tennessee and Seattle, Washington.



Mindray North America Corporate Headquarters, Mahwah, NJ



Innovation Center, San Jose, CA

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