



Unified Medical Imaging Solution

Powered by Arrow Electronics, Dell Technologies OEM Solutions, and Microsoft

DELLTechnologies

ARROW

Microsoft

Unified Medical Imaging Solutions: The Next Evolution for Imaging

Medical images have become critical enablers of decision-making in various healthcare settings. Several different technologies are available to view the human body to diagnose, monitor, or treat medical conditions. Each type of technology gives information about the area of the body studied or treated, related to possible disease, injury, or the effectiveness of medical treatment.

Diagnosis and treatment of various health conditions hinge on images from radiology, cardiology, dermatology, and endoscopy, to name a few. Today, medical images are of very high quality and resolution, but the improvement in image quality has come at the cost of enormous file sizes. Additionally, the sheer volume of medical images — an estimated 600M¹ images were acquired in the US alone the last year — has made storage of medical images one of the most significant challenges for medical facilities.

Medical images create a heavy load for hospital IT infrastructure and require proactive strategies to manage the variety of images and the large file size. Imagery can quickly inundate IT infrastructure as typical file sizes can range from 10MB in radiography to over 2GB in highly detailed pathology. Further, new imaging techniques and longer-term studies are creating richer, more precise, and voluminous scans as well as longitudinal image libraries that contain more data and increase file size. Proper archiving, retrieval, and dissemination are key aspects of medical image management systems. Modern medical image management allows healthcare providers to:

- Collect, archive, and make available images from medical equipment and various medical departments to the right personnel at the right time
- Implement workflows that allow medical professionals to collaborate using images from various medical equipment in real-time scenarios
- Streamline image management of medical imagery by automating file management and ensuring time and resources deployed for image management are optimized to consume
- Protect patient confidentiality and integrate the imaging management system into the other systems that manage patient information, hospital workflows, and demographics
- Deploy advanced artificial intelligence mechanisms to identify patterns and other image features that aid in faster and more accurate diagnosis by medical professionals

Arrow Electronics and Dell Technologies OEM Solutions collaborate with our customers to develop customized strategies that define the ideal storage and processing requirements to support the right clinical workload at the right cost.

¹Source: Dell



Key Infrastructure Requirements for PACS/VNA Systems

PACS (Picture Archiving and Communications System) has been the standard technology adopted for medical images and allows easy storage and retrieval of related data to ensure proper image archiving. However, PACS is often vendor-specific and creates ongoing data islands that lack interoperability and burden systems and staff. Healthcare organizations are moving beyond combined departmental PACS databases to unified imaging solutions that are genuinely vendor-neutral, allowing for the incorporation of non-DICOM and other imaging file formats and helping improve patient care. New technological advancements in image-based intervention and treatment also require many healthcare organizations to manage multiple PACS and image repository systems. Over the past decade, a new approach has emerged to imaging data storage: VNA (Vendor Neutral Archive), which dissociates itself from any specific medical imaging equipment. VNA overcomes the problems of PACS by allowing medical images to be stored and viewed in an integrated manner from multiple devices and locations. VNA can also manage imaging data from different PACS repositories, thus increasing the healthcare provider’s control over medical data. VNA allows healthcare providers to migrate from one vendor to another without worrying about imaging data loss. With PACS or VNA, the transformation of medical imaging systems relies heavily on scalable storage and data protection to drive operational and diagnostic imaging workflow performance improvement. The convergence of advanced imaging, automation, and powerful analytics like natural language processing (NLP), machine learning (ML), and artificial intelligence (AI) in healthcare is bringing together the tools needed for clinicians to unlock medical breakthroughs at a pace like never before. Several features outlined below are critical as stakeholders choose between various solutions available in the marketplace.

Expandable Storage

PACS and electronic patient records (EPR), require a large storage capacity to be fully exploited. Storage should be scalable, cost-effective, and support current and future needs.

High-performance Computing and AI

Processing large volumes of data, analyzing and retrieving images and the corresponding metadata and other patient information requires high-performance computing power and AI-enhanced processing.

Data Integrity, Protection, and Resiliency

Storage systems should support data integrity features like error-correcting code (ECC), checksums, and the T10 data integrity field (DIF) standard to ensure that healthcare data is always accurate and accessible.

Security and Data Privacy

To ensure data remains secure and protected from hackers and other “cyber security threats,” providers need to encrypt their data, often at rest and in-flight, with techniques like AES 256 encryption.

NVMe

Nonvolatile memory express (NVMe) is an increasingly adopted storage protocol for performance-sensitive workloads. NVMe delivers much lower latencies, higher performance density, and streamlined infrastructure.

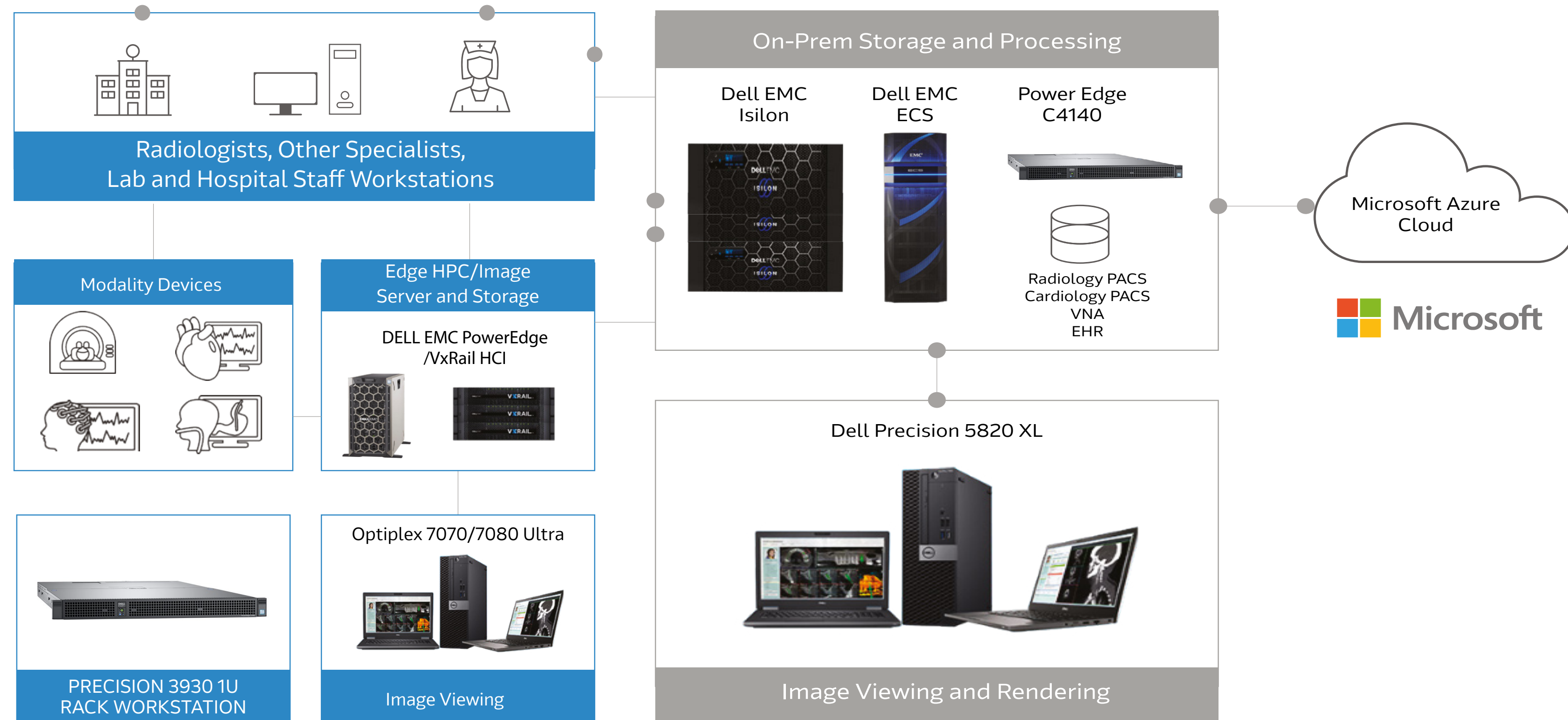
Storage Tiering

Healthcare infrastructure should support both a storage platform’s native storage capacities and the platform’s ability to tier storage automatically to archive tiers such as object-based storage or the cloud.

End-to-end Solution to Streamline Imaging Systems

Effective data management and processing challenges need to be addressed seamlessly for modern imaging solutions to facilitate quick and precise diagnosis, augment the workflow, and lead to better patient care. The benefits are maximized when this integrated data architecture combines high-performance computing, fast servers, flexible scale-out network storage, and direct, secure access to a multi-cloud environment with big data analytics capabilities.

Shifting from disconnected or independent departmental PACS and VNA instances to interoperable medical imaging solutions, organizations can: Enable clinicians, researchers, and healthcare systems to ingest and analyze data in real-time, retain images based on regulatory and compliance requirements, limit their potential liability exposure, and seamlessly share data with collaborators, patients, payers, and other healthcare-life science organizations to improve outcomes. Modern healthcare infrastructure from Dell Technologies OEM Solutions and Microsoft, combined with Arrow Electronics' services portfolio, help facilitate next-generation medical imaging strategies. Together, we provide critical solutions and partnerships that enable healthcare organizations to balance clinical requirements with the resources needed to deliver a unified medical imaging solution.



Benefits of the Solution

- Access images anytime, anywhere with ease
- Achieve massive performance at any scale
- Consolidate healthcare data and eliminate silos
- Protect and ensure patient health information privacy

Flexible Storage Systems for Medical Imaging

A centralized imaging data repository for a wide range of imaging data sources enables caregivers to: -deliver improved patient care through real-time documentation- integrated reporting, improved and faster collaboration, and- the potential for clinicians and patients to have direct access to their medical images “on the go.” Dell Technologies works directly with healthcare providers and imaging application partners to help achieve the equilibrium between cost and retention while delivering a modern IT infrastructure ready for future AI applications.

Dell EMC PowerScale — the industry’s #1 family of scale-out network-attached storage systems and Dell EMC ECS Object Storage provide the high-performance and scalability options needed to grow dynamically as your imaging requirements change. A full range of options are available to work with both on-premises and multi-cloud environments-from all-flash devices for extreme performance to lower-cost archival solutions as well as object-storage platforms able to manage unstructured data at exabyte scales.

Block	Block and File			Unstructured Data		VMware	Multi-hypervisor
				File & S3 Object	Object		
Dell PowerVault	Dell Unity XT	Dell PowerStore	Dell PowerMax	Dell PowerScale	Dell ECS	Dell VxRail	Dell PowerFlex
							
Affordable entry storage Purpose-built and optimized for SAN/DAS simplicity and accelerated performance	Value focused hybrid storage Flexible hybrid storage for cost sensitive enterprises that want to leverage a combination of flash and disk for lower \$/GB	Adaptable all-flash storage Flexibility, scalability, simplicity and performance with market-leading economics	Mission critical storage Unmatched performance, resiliency, and cutting-edge innovation for critical workloads	Scale-out NAS For demanding enterprise file and “big data” workloads. True scale-out file – 10TB to 92 PB	Scale-out object For demanding enterprise object workloads. Enterprise object, analytics & cloud native applications	Built for VMware, with VMware, to enhance VMware Fastest path to outcomes in VMware environments	Software-defined infrastructure Virtual, bare metal & container workloads (including vSphere)
– Block (SAN/DAS) – Affordable/simple – CloudIQ support	– Simple – All-flash/hybrid – Virtual option – CloudIQ support	– Scale-up/out – NVMe – AppsON – CloudIQ support	– Scale-up/out – E2E NVMe – 6-Nines HA – CloudIQ support	– Scale-out – All-flash to archive – Multi-protocol file – CloudIQ & DataIQ	– Cloud-scale – Deep archive – SDS options – CloudIQ & DataIQ	– Turnkey system – VMware vSAN – Life-cycle mgt – CloudIQ support	– Scalable SDI – Multi-hypervisor – 2 layer/HCI/ storage – CloudIQ support

High-Performance Computing (HPC) at the Edge and the Core

Dell EMC PowerEdge servers offer enhanced performance across the widest range of applications to accelerate fast retrieval, including Dell EMC VxFlex Hyper-Converged Infrastructure (HCI) and appliance-ready options. Dell EMC’s comprehensive HPC solutions, including NVIDIA GPU- and Intel® FPGA-accelerated servers, deliver specialized processors and accelerators for intensive precision medicine workloads such as AI-enabled image analysis. The latest 15G PowerEdge server portfolio, supported by the latest generation processors from Intel® and AMD, is built to power healthcare innovation and meet the challenges of digital transformation with a secure infrastructure that supports a full range of modern workloads and objectives. PowerEdge servers deliver the productivity and performance needed at the edge and the core.

OEM Solutions PowerEdge 15G Portfolio Overview

Deployment	Essential	Scalable	Mainstream	Specialized
Description	Entry-level technology with essential features, limited scalability, and enterprise-class management	Performance technology that balances capability and capacity with enterprise features	Latest technology, designed for best-in-class performance	Latest technology, focused on specialized compute needs
Use cases	Enterprise-class capabilities for small to medium business (SMB) and remote office / branch office (ROBO) deployments	Right-sized compute for enterprise workloads	High performance for XaaS providers and enterprise data center workloads	Extreme performance and density for emerging workloads and usage models
Specific workload examples	General IT infrastructure for file and print	- VDI - Cloud applications - Software-defined storage (SDS) - Anything-as-a-Service (XaaS)	- Virtualization - Big data analytics - SDS - In-memory databases - Data center infrastructure - Financial applications - Customer relationship management (CRM) - Enterprise resource management (ERM)	- HPC - AI/ML - Object storage - Cloud storage - Databases - Edge computing - Rugged environments - Scale-out storage for structured databases - Web tech
Recommended Dell PowerEdge servers	R550, R450, T350, T150	R750xs, R650xs, R7515, R6515	R750, R650, R7525, R6525, MX750c	XE8545, XR11, XR12, R750xa, C6525, C6520



PowerEdge R550



PowerEdge R650



PowerEdge R750

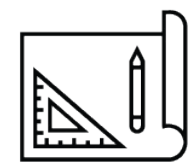


PowerEdge XR11 and XR12

Simplify Development, Support, and Deployment

Arrow Intelligent Solutions and Dell Technologies OEM Solutions can take your product to market with the right services, support, and technology to ensure differentiation and success in the marketplace. Together we can design the right combination of capabilities that match your expectations.

Drawing on an extensive technology partner ecosystem, products and services portfolio, expertise, and scale, Arrow orchestrates solutions that simplify your technology lifecycle experience, enabling you to bring your products to market faster and grow your business.



Design

Design and validation, prototype and testing, cloud adoption, platform architecture, and manufacturing first articles



Customization

Mechanical, cabling, re-branded, space requirements, extended life, and ruggedization



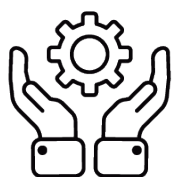
Integration

Kitting and labeling, configuration services including imaging, application install, BIOS, SIM card installation, and product testing



Fulfillment

Global footprint and support, transportation services, compliance, and export requirements, direct fulfillment services (build to order (BTO), finished goods, configure to order (CTO) options)

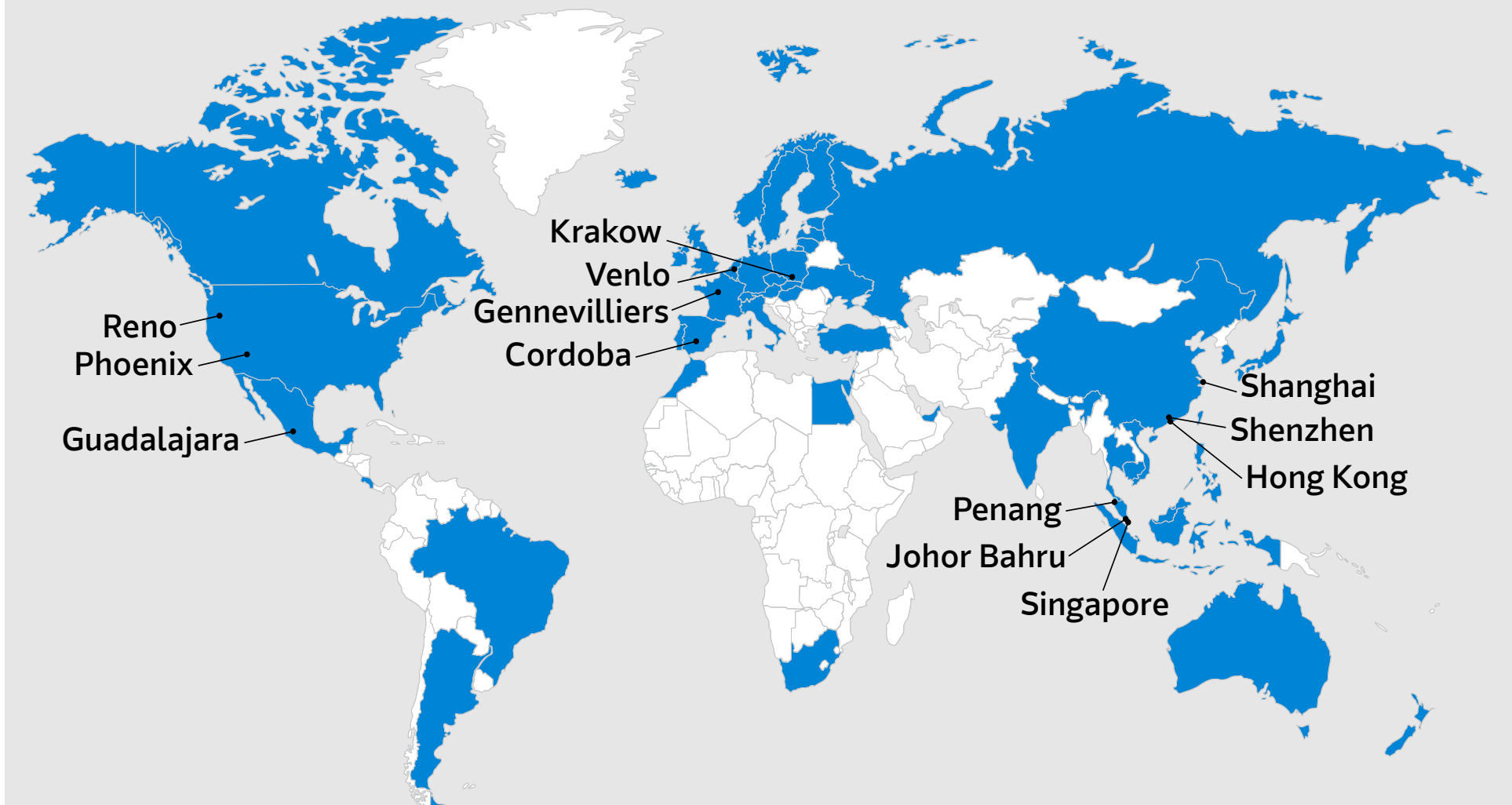


Support

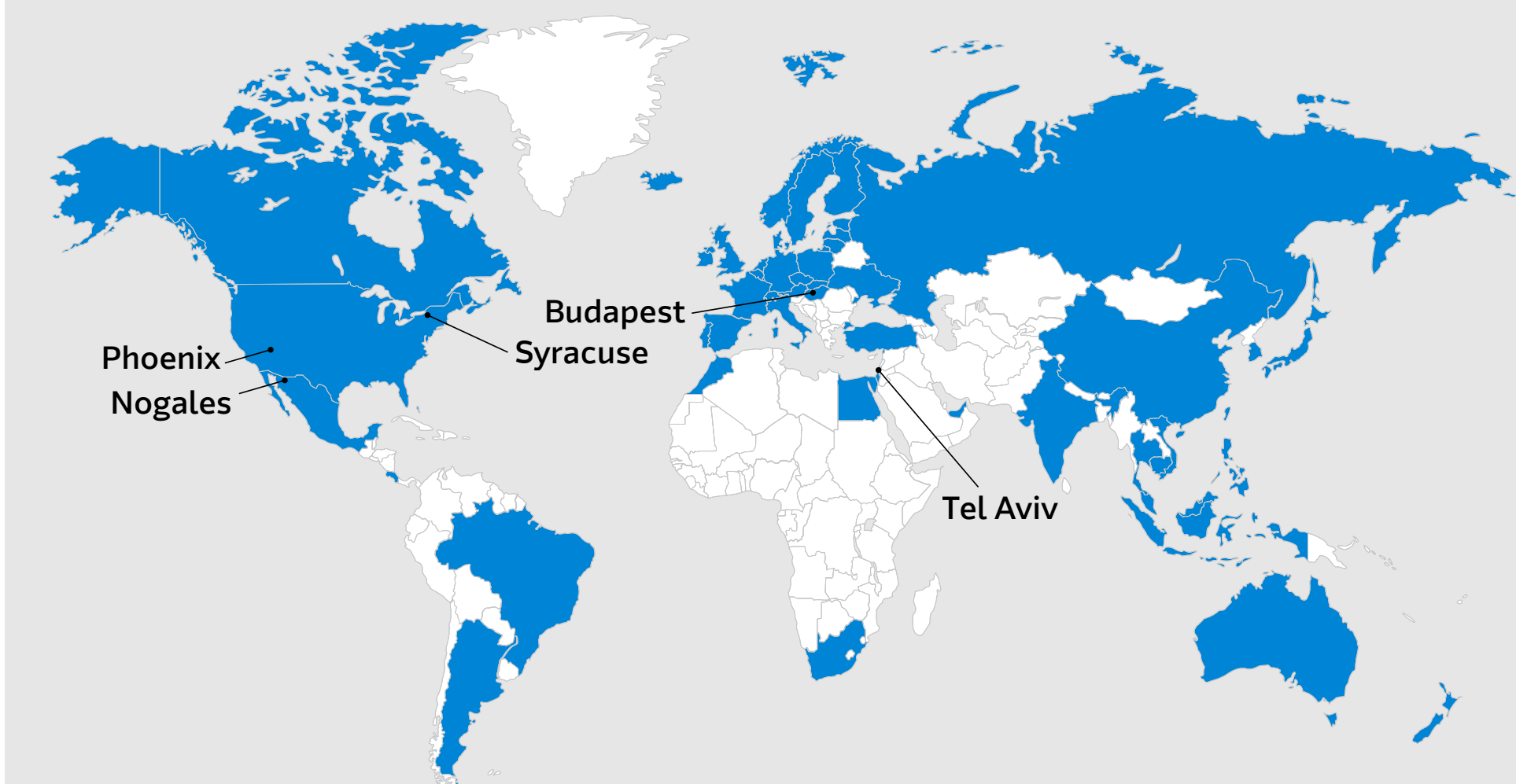
Deployment and installation support, 24x7 local support, L1/L2/L3 support, obsolescence management, repairs, and replacement

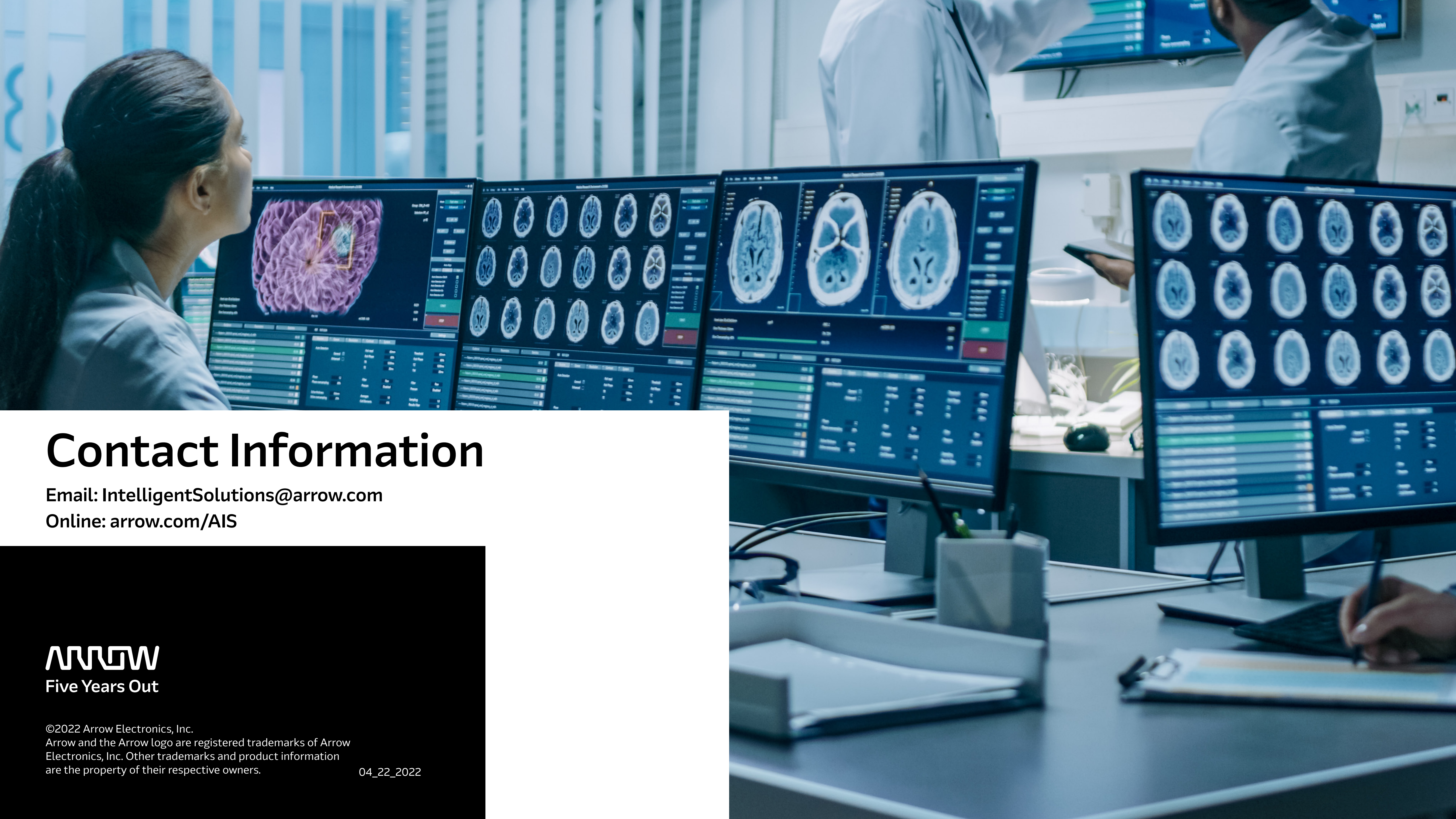
Arrow offers Local and Global Support

Fulfillment Centers



Integration Centers





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