



Health Care Information Pulse
Delivering Tomorrow's Technology Today

Preparing Today for Tomorrow's Health Care Applications



The health care industry is at the forefront of the technological revolution, with massive change being driven by advances in diagnostics and monitoring, electronic medical records, patient information systems and digital imaging technologies. These advancements enhance patient care but require real-time access to volumes of information and reliable transmission of large files like patient x-rays or digital scans. Health care systems around the nation are faced with the need to upgrade their network infrastructures and data centers to support these growing trends across numerous facilities and ultimately reduce health care costs for the regions they serve.

General Cable understands the key challenges faced by today's health care systems. With superior expertise and a full line of cabling solutions, General Cable can assist health care delivery systems in properly managing data, supporting convergence and revolutionizing patient care.

Managing Data

Governments and insurers are encouraging health care systems to adopt more sophisticated electronic medical record (EMR) solutions to protect and store critical patient data, replacing outdated processes like scribbling prescriptions, maintaining paper patient records and processing and preserving X-rays on film. Today's health care systems must ensure business continuity and disaster recovery, expedited and enhanced care, and closer collaboration among caregivers by enabling secure, fast and efficient transfer of information to and from their data centers.

Intelligent medical devices are emerging as a critical component of EMR environments. The ability to automatically capture and manage patient data from these devices improves patient care, safety and clinical outcomes. The EMR Adoption Model classifies hospitals in eight stages, with the ultimate goal of being completely paperless. As health care facilities advance beyond Stage 3 of the EMR Adoption Model, many will integrate biomedical operations and information technology to ensure proper deployment, maintenance and upgrades of the interfaces required to capture data and to manage and control EMR devices.

US EMR Adoption Model™

Stage	Cumulative Capabilities
Stage 7	Medical records fully electronic; HCO able to contribute CCD as byproduct of EMR; data warehousing in use
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS
Stage 5	Closed-loop medication administration
Stage 4	CPOE, Clinical Decision Support System (CDSS) (clinical protocols)
Stage 3	Nursing or clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology
Stage 2	Clinical Data Repository, Controlled Medical Vocabulary, Clinical Decision Support System, may have Document Imaging; HIE capable
Stage 1	Ancillaries - Lab, Rad, Pharmacy - all installed
Stage 0	All three ancillaries not installed



Supporting Convergence

Hospitals around the nation are no longer single entities but are fast becoming part of comprehensive regional health care delivery systems that encompass several hospitals, specialty clinics, outpatient facilities, pharmacies and home care. As health care systems merge and reorganize operations across multiple regional facilities, they provide an array of services that offer patients “one-stop shopping.” The resulting increased amount of information and demand for access and communications are driving bandwidth requirements and necessitating the need for high-performance copper and fiber cabling infrastructures in data centers and facilities across the entire service region. These infrastructures must be kept resilient to accommodate changing business demands and technologies.

Revolutionizing Care

As technology advances, traditional applications are being replaced with innovative patient care devices. The flexibility and cost-effectiveness of high-bandwidth communications, such as those listed below, have enabled a revolution in available applications for health care systems to improve patient care.

- **Computerized Physician Order Entry (CPOE)** captures patient diagnostic information or prescriptions via handheld devices that can eliminate possible delays in treatment or human error.
- **Disc Mirroring** ensures continuity of care by synchronously storing data to multiple redundant data centers via Fiber Channel protocols.
- **Electronic Medical Record (EMR) Systems** store critical patient information on the network for remote caregiver access and monitoring of patient progress.
- **Grid Computing** splits processing loads across dispersed facilities for affordable, seamless collaboration among medical and academic professionals.
- **Picture Archiving and Communication Systems (PACS)** allow caregivers to digitally store and share cardiology and radiology images.
- **Physiological Monitoring** relays real-time telemetry data from intensive-care units for critical monitoring and analysis of a patient's condition.
- **Robotic Arm Surgery** lets skilled surgeons operate on remote patients by viewing magnified images and guiding a robotic arm that makes precise incisions, which allow for faster recovery.
- **Telehealth** delivers health-related services and information via telecommunications technologies.



Rural Hospital
2 a.m.

Electronic Image Transmission



Radiology Interpretation Service,
San Francisco
24/7

Through Telehealth, physicians communicate with hard-to-reach patients, exchange ideas and techniques with colleagues, transmit medical data for diagnosis and even remotely monitor patient health. For immediate medical response, much of this communication and data exchange must be done in real time.

General Cable – Performance and Reliability When and Where It Counts Most

General Cable is a leader in the development, design, manufacture, marketing and distribution of high-performance copper and fiber optic wire and cable products for reliable communication, electronics, specialty and industrial needs of the demanding health care market.

The Company's expertise and breadth of products make General Cable a single source for all your health care cabling needs, providing performance and reliability when and where it counts most: diagnostic imaging, patient care, network communication, life safety and security, building automation, and facilities and electrical infrastructure.

Diagnostic Imaging

Advanced medical technologies like radiographic X-rays, CT scans, MRIs, nuclear medicine, thermography and ultrasound capture images of the body for patient diagnosis. These imaging devices require significant amounts of bandwidth to capture and send images and a reliable power supply to maintain operability. The backbone of a successful health care system is a resilient infrastructure that minimizes life-threatening and costly downtime of diagnostic imaging equipment. Communication or power failure can impair the entire network and hinder the delivery of potentially life-critical data.

Technology Brief: Typical File Transmission Times*

Study	DSL (.76 Mbps)	T1 (1.5 Mbps)	3Mb Cable (3.0 Mbps)	T3 Line (45 Mbps)
CT Brain 100 images	8.65 min	4.43 min	2.22 min	1.33 min
CT Body 250 images	21.6 min	11.1 min	5.55 min	3.33 min

*Other factors that may impact transmission time: latency, location, compression factors, number of studies.

High-Bandwidth Medical Imaging — Driving Migration to 10 Gigabit and Beyond

Yesterday's networks with legacy copper cabling simply may not have the bandwidth to reliably support advanced medical imaging systems. Only Gigabit and 10 Gigabit data centers and networks with modern high-bandwidth cable infrastructures can provide the throughput needed for fast and reliable digital image transmission, storage and retrieval. Without it, even the most robust network may disappoint users and undermine patient care.

Even when cable performance measured in the laboratory looks good, real-world installation factors can raise error rates, causing data resends and slower downloading speeds. These include:



- Mismatched connectors not optimized to work with the cable
- Electro-magnetic noise caused by environmental factors and equipment
- Resonance in short data center links where noise contribution is greater
- Substandard installation practices

The impact of these factors becomes clear when transmitting a CT brain scan comprised of 515 images and totaling 150 megabytes of data within a facility. A network providing true 10 Gigabit data throughput lets caregivers anywhere in a health care delivery system view the scan in just 2.2 seconds. At 1 Gigabit, that same task can take 22 seconds, and at legacy speeds of 100 Mb/s, it can be as long as 3.5 minutes. That delay can cause more than just frustration when fast diagnosis is vital to a patient's health.

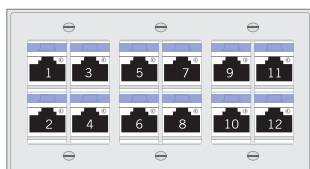


Patient Care

Throughout a health care facility, cabling infrastructures connect patient rooms, nurse call stations, ICUs, surgery, maternity, or other patient care areas to the local network. New information-sharing technologies allow access to patient medical records over the network. This often enables facilities to provide more efficient care by allowing patients to be treated in one room during their stay.

These integrated health care systems facilitate physician workflow by allowing caregivers at one facility within the system to electronically submit laboratory and radiology orders for instant remote viewing by physicians at another facility. This type of information sharing requires a versatile network infrastructure and data center consisting of robust communication, electrical and control cables.

Future of Patient Care Network Needs



1 Network 1 (Primary)	3 Network 2 (Internet)	5 Patient Video (TV)	7 Physical Monitoring	9 Patient Phone	11 Spare
2 Medical Device 1	4 Medical Device 2	6 Remote Support (Telehealth)	8 Spare	10 Charting/ Stats-Portable Nurse/MD	12 Spare

Network Communication

In addition to diagnostic imaging and patient care advancements, health care systems are becoming more dependent on effective communication. Health care facilities throughout a region are not only beginning to work with each other but also with general practitioners and social service agencies. To optimize resources across many sites, these cooperating groups must be connected via strong Wide-Area Networks (WANs) with reliable, high-capacity data centers that deliver traffic to local networks at each site, further increasing the need for high-bandwidth cabling.



File Size Examples

Type of Study	Approximate Size
X-ray computed radiography	5 MB
Angioplasty	500-1000 MB
Nuclear medicine	200-500 MB
Positron Emission Tomography (PET) scans	200-500 MB
Computed tomography	150-1000 MB
Ultrasound	100-500 MB
Cardiology	5-10 GB
Radiology	5-10 GB +

Future-Proof Your Network

General Cable's **GenSPEED® 10 MTP™ Category 6A 10 Gig Cable** features the revolutionary **Mosaic Crossblock™** technology that provides an unshielded-twisted pair (UTP) design that performs like a shielded or foil-twisted pair (STP/FTP) cable to provide industry-leading protection from external cable noise sources, also known as alien crosstalk (PSANEXT and PSAACRF).

General Cable – Supporting Growing Trends in Health Care



From imaging and patient care to life safety and building automation, General Cable satisfies virtually every cabling requirement for the latest health care applications. GenSPEED® 10 MTP™ cable with proven 10 Gigabit throughput, combined with a full line of fiber optic, coaxial, cross-connect, central office, industrial and outside plant cable solutions, provides robust and reliable physical layers for WANs and local networks to easily transmit medical images and a wide range of patient information, allowing caregivers to collaborate and improve the efficiency and effectiveness of patient care.

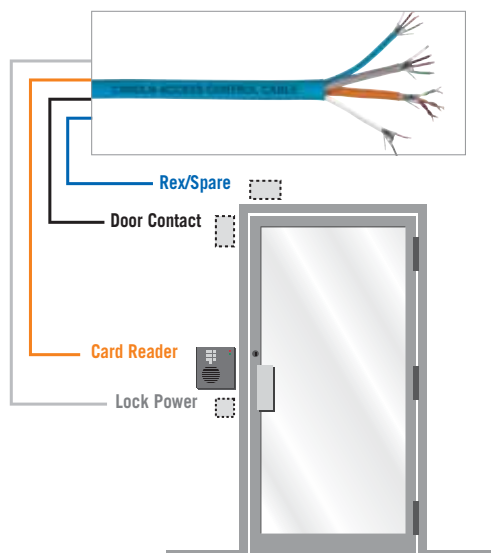
Life Safety and Security

Health care facilities are increasingly concerned with the cost of keeping people and property safe and secure. Conventional life-safety systems like fire alarms and fire protection are vital to safety, while security systems like intrusion monitoring and access control are critical for securing valuable equipment, medical drug storage areas, infant care facilities, psychiatric care wards and laboratories. With the added emergence of mass notification solutions, unforeseen regulatory burdens, and the need to protect increasing amounts of critical information, the complexity and cost can seem staggering.

Today's health care administrators are looking for new, innovative ways to alleviate these economic pressures while still maintaining the safest possible environment for patients and caregivers alike. Interoperability across life safety and security systems and departments is key to success, allowing systems to be tied together for better annunciation and effective monitoring from a single command center.

Carol® Brand Access Control Cable

General Cable's Carol Brand Bundled Composite Access Control Cable is designed to allow for a single cable run that incorporates several components in building access and control, such as card readers, door contacts, locking power, and retinal scanners. With multiple cables under one jacket, these installer-friendly access control cables save time in preparation, set-up, pulling and termination, ultimately reducing cost and making them a popular choice for multiple access control applications.





Integrated Building Systems and Automation

Intelligent building systems seek to integrate disparate systems on a common infrastructure. Building cabling technologies are rapidly moving toward providing scalable, interoperable open systems for both power and communication, and that has initiated efforts from different industry segments to come together and build integrated systems. Enhanced life safety and security is perhaps the most commonly cited example of how integrated systems are beneficial. In the event of a fire, the alarms sound, and other building systems begin to react: Exhaust dampers open, the IP paging and intercom system issues instructions to occupants, the access control system unlocks doors for evacuation, and CCTV cameras provide emergency responders with a view of the fire.

With most health care facilities being open 24 hours a day, simple automation systems can drastically reduce energy consumption and optimize efficient operations. Studies have shown that lighting and HVAC can account for upwards of 70 percent of a hospital's energy consumption. Smart lighting, audio and temperature controls allow for efficient, cost-effective operation without sacrificing comfort.

Integrated building systems and automation call for high-performance cables designed and developed to ensure reliable operation. Manufactured in a variety of specialized and general purpose designs, General Cable's Carol® Brand and Sheer Wire™ lighting, thermostat and bundled audio/video automation cables deliver solutions for a multitude of cross-platform standards and systems.



Facilities and Electrical Infrastructure

During new construction and expansion projects, health care facilities require reliable, long-life, high-performance low- and medium-voltage industrial cables for critical power back-up, redundancy and control wiring for equipment. General Cable is strategically positioned as a leader in the industrial marketplace. Composed of associates with expertise in technology, engineering, quality, manufacturing, supply chain, inside and outside sales and product management, our Industrial team is solely focused on providing quality industrial products and outstanding service to the industrial market.

Industrial Cables for Health Care Facilities

- Type TC Tray Cable for control wiring of equipment
- MV-90 and MV-105 Cable for electrical upgrades, medium-voltage power back-up and redundant systems
- 600V Single Conductor Cable for low-voltage power back-up and redundant systems
- Type MC Metal-Clad Armored Cable for facility installations
- GenFree™ LSZH Industrial Cables for facility installations where LSZH is required

As health care technology evolves, buildings with an enhanced IP backbone and cabling infrastructure will be ready to support future applications.

General Cable's Product Offerings and Applications

From imaging, patient care and network communication to safety, building automation and power, General Cable's products satisfy virtually every application for the health care market.

Product	Diagnostic Imaging	Patient Care	Communication Network	Life Safety and Security	Integrated Building Systems and Automation	Facilities and Electrical Infrastructure
GenSPEED® Category 5e, 6, 6A Cables	●	●	●	●	●	
NextGen® Fiber Optic Cable	●	●	●	●	●	
Blolite® Air Blown Fiber Optic	●	●	●			
Cross-Connect Wire			●			
Central Office Cable			●			
Outside Plant Cable			●			
Carol® Brand Coaxial Cable	●	●		●	●	
Carol® Brand Low Skew Cable	●		●	●	●	
Carol® Brand Portable Cord	●					●
Carol® Brand Cordset Products						●
Carol® Brand Multi-Pair Computer Cable	●	●		●	●	
Carol® Brand Sound & Security Cable		●		●		●
Carol® Brand Access Control Cable		●		●	●	
Carol® Brand Fire Alarm Cable				●		
Carol® Brand CATV Cable			●			
Carol® Brand Electronic Communication & Control Cable				●	●	●
Carol® Brand Sheer Wire™ Bundled Audio/Video Cable		●		●	●	●
Carol® Brand Sheer Wire™ Lighting Systems Cable		●		●	●	●
Specialty Harnesses	●	●	●			●
Durasheath® 24kV MV-90						●
5kV to 35kV Uniblend® MV-105						●
5kV to 35kV Unishield® MV-105						●
Multi-Pair Instrumentation Cable (300 & 600V)						●
Multi-Conductor Control Cable (300 & 600V)						●
Carol® Brand Type W Flexible Power Cable						●
Single Conductor Hook-Up Wire						●

Designing for the Environment

General Cable is committed to achieving industry-leading standards and responding proactively to environmental issues. As part of this commitment, General Cable is continuing to find innovative ways to reduce and, where possible, eliminate hazardous substances in our products. This proactive initiative reflects our stewardship in producing more environmentally sustainable products without compromising the high standards of safety and performance. Ask about our 17 FREE™ data communication product offering.



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