



Cybernet: Redefining Medical Grade Computing

Evolving Terminology

Medical Grade

Antimicrobial

A White Paper by Cybernet Manufacturing, Inc.

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Why should hospitals and medical facilities use medical grade computers? Patient health and safety, and ROI. Medical grade computers ensure patient safety and reduce the potential liability, they are built to run 24/7 (as hospitals must), and represent a positive long-term return on investment. Cybernet is redefining medical grade computing.

Evolving Terminology

With the increased use of computers in hospitals and medical facilities, along with the continued evolution of computer technology and form factors, computers are sometimes referred to as another type of “medical device”. That is a measure of how essential computers have become to hospital operations. So as not to confuse computers with conventional medical devices such as those used for diagnosis, therapy, or surgery, here we use the term computers or PCs – more precise descriptions of their functionality.

The Enterprise Mindset

It’s tempting for hospitals to follow the non-medical enterprise mindset: buy the same Tier 1 brand desktop or laptop computers as your servers. However, medical facilities have important different concerns than non-medical enterprises: liability, patient health and safety, and 24/7 operation (including EMR software). The enterprise model doesn’t work for medical facilities. Computers used in medical environments need to be designed differently. They need to be medical grade.

A New Definition of Medical Grade

The term “medical grade” is loosely applied to many products that are used in a medical environment, but there is no universally accepted definition. Sometimes it means that the product has met an industry standard or has been tested in a laboratory to measure impact on some aspect of patient health or safety. As applied to computing or computers, manufacturers use “medical grade” to mean any number of things that may or may not be backed up by any testing. However, Cybernet’s definition of “medical grade” is quite thorough and has several attributes. Cybernet’s medical grade all in one computers are antimicrobial, are medically certified, may be fanless and have sealed front bezels, and have 24/7 reliability.

Antimicrobial:

Straight from the headlines are many stories about hospital-acquired (nosocomial) infections during hospital stays, from contact with humans or inanimate objects such as medical equipment or devices, which can include computers. Microbes have been shown to live longer on plastics, such as those used in computer hardware. Patients can acquire serious infections that result in serious illnesses that go on for months, or even result in death. According to a 2002 article in the Journal of America Medical Informatics Association, 2 million patients acquire these infections annually, resulting in 19,000 deaths. The annual cost to treat these infections is \$28-\$34 billion. There are health and economic issues at stake. Despite waivers signed by patients prior to surgery or admission, hospitals and doctors can still be sued for damages. Such lawsuits are not only costly, but damage the reputation of the hospital and/or doctor.

Infection control is critical, and antimicrobial technology has been developed for computer hardware that can help maintain a germ-free environment. Computers used in the areas of the hospital where patients can come in contact with them (or where health care workers can transfer germs from computer to patient) should definitely have antimicrobial technology.

Medically Certified:

The International Electrotechnical Commission (IEC) is the standards body responsible for the IEC- or EN-60601 standard for electromagnetic compatibility and safety for medical devices. The EN60601-1 designation is the European name for the standard, and is slightly more stringent than the U.S. UL60601 standard. Therefore, if a medical device or computer is EN60601 certified, it has met the highest requirements for safety and electromagnetic compatibility. The IEC continues to evolve the standard. In 2001, the current version was EN60601-2. In June 2012, the EN60601-3 (third edition) version goes into effect. The EN60601 standard provides requirements for common hazards related to electro-medical products, and the objective is to protect patients by reducing the likelihood of these hazards. When a product undergoes EN60601 certification testing in a lab, it is tested for hazards related to: electrical shock, mechanical impact, radiation, ignition from flammable anesthetics, fire, and excessive electrical energy output.

The process of obtaining EN60601 or UL60601 certifications takes at least several months and costs up to \$30K per device. The testing must be done by an approved independent laboratory. Once the product is certified, no more changes can be made to the product; otherwise it has to be re-certified. Medical certification adds a lot of time to the product cycle for computers, often adding years to the development cycle. Many Tier 1 manufacturers implement development and production schedules that result in the release of new models every 6 months, targeted for sale to both consumer and businesses at the same time. They use a “mass production” development cycle instead of a development cycle that incorporates specialized testing and certification for the medical market. Cybernet, on the other hand, does build the medical testing and certification process into the development cycle for all of its medical computers. Consequently, the development and production cycle for Cybernet’s medical grade computers ranges from three to five years.

Fanless Operation:

A fanless computer is desirable for sterile environments such as an operating room. It eliminates the circulation of dust or other particulates that could compromise the sterile environment. (Even if a computer is located several feet away from a patient in a sterile environment, the computer’s fan can still circulate dust or particulates within the room and affect a patient.) Using fanless computers is an additional way to implement infection control and ensure patient safety. Many of Cybernet’s medical computers are fanless, and these are recommended for the operating room, ICU, or the ER.

To implement a fanless solution, it all starts with the design of the PC, especially the CPU and the motherboard components. The primary cause of heat buildup in today’s PC is the heat generated by the CPU, as a function of the frequency and voltage at which it operates. Therefore, using CPUs that have lower power consumption (10 to 30 watts instead of a typical 95) will generate less heat and eliminate the need for a fan.

Fanless computers eliminate noise and are very clean. Fanless computers also have greater reliability than a conventional PC because there is no external debris that would otherwise circulate inside the computer that can build up over time and adversely affect performance. PC product life is also improved due to the absence of fans because there are fewer moving parts subject to mechanical failure.

Sealed Front Bezels and IP Certification:

Some computers have a sealed front bezel or an “IP” certification. This means that the front of the computer can be cleaned with water or solutions without damaging the internal electronics of the computer. In a health care environment, this is one more way to maintain a hygienic and germ-free environment. If a computer has a sealed front bezel, it will have an IP code that describes the degree of protection.

An IP code is a designation established by the International Electrotechnical Commission (IEC), and consists of the letters “IP” followed by two digits and an optional letter. This code specifies the degrees of protection provided against the introduction of dust, solid objects and water in electrical enclosures (hardware). For IP65, the first digit “6” means that the enclosure is dust tight, and offers complete protection against dust. The second digit “5” indicates the enclosure is protected against water being sprayed by a water jet or nozzle at a rate of 12.5 liters per minute from a distance of 3 meters (and a second digit “6” means that it can be sprayed with a power nozzle will have no harmful effect.) Cybernet has been producing medical grade computers with sealed front bezels for many years, and currently there are four Cybernet medical all in one PC models that have IP certifications.

24/7 Reliability:

A hospital never has down time. Computer systems must operate 24/7. That means that the computer must be designed with this level of reliability. Tier 1 mass-produced PCs are designed for multiple markets, including home use. They are not meant for 24/7 operation of the medical applications that hospitals must run continuously: EMR/database software such as Meditech, radiology imagery, diagnostic analyses, and laboratory reports. The IT departments in most hospitals are responsible for 24/7 uptime and for all maintenance, so reliability is a critical concern.

Cybernet medical all-in-one computers are designed for medical environments that require 24/7 use and operation versus home/consumer grade PCs made by HP, Dell, Lenovo and other Tier 1 manufacturers. Tier 1 manufacturers may offer the same home/consumer grade PCs to their medical customers, however, those units aren’t designed or built to survive heavy use and continuous demand in a medical environment and therefore require more frequent service after the first 12 months. Cybernet medical all-in-one computers are designed for reliability from the beginning, down to the component level of the motherboard.

Cybernet uses very high grade Japanese discrete components (capacitors, resistors, transistors, diodes, etc.) in its manufacturing of motherboards and PCBs; all are designed to last 5+ years and provide a strong MTBF of 50,000+ hours. However, other Tier 1 manufacturers use standard commercial grade discrete components that are made in Taiwan and have a much lower MTBF.

Cybernet medical grade computers are designed for the reliability needed to sustain 24/7 hospital operations, and reduce the time and cost of routine maintenance. That’s why reliability is an important part of the “medical grade” definition.

Return on Investment

Computers have become an essential part of the technology infrastructure of today’s hospital or medical center. Although computers are not nearly as expensive as sophisticated medical equipment, they should be analyzed for long-term return on investment (ROI). Because computers will be used to run nearly every aspect of hospital operations from administration to patient care, the quantity of computers may number in the hundreds, so price becomes an issue. Maintaining them to ensure 24/7

operation is also a factor that contributes to the investment. Since hospitals are in the primary business of patient care and safety, computers in patient areas must be medical grade, and the price will be slightly higher. Although medical grade designation is not usually a financial concern, it could become one if the hospital is sued for damages related to non-medical grade computers, so the risk should be quantified and considered in the analysis. Therefore, the return on investment analysis for computer assets needs to take into account:

- Projected maintenance cost (more reliable PCs reduce cost)
- Price of computers (medical grade slightly higher)
- Risk to patient safety (medical grade reduces risk)

Medical grade computers may have a slightly higher initial price, but that is balanced out by reducing the potential for patient risk; almost a form of “insurance”. Additionally, medical grade computers as we define them have greater reliability, reducing the maintenance cost over time. Overall, investment in medical grade computers results in a positive long-term return on investment.

The Procurement Cycle and the Decision-Makers

There are three main constituencies involved in the decision-making process for procuring computers in a hospital or medical facility whose needs must be met. They include Finance, Regulatory/Legal, and IT.

- The Finance department has budgetary review and approval, and usually manages the procurement process. Their biggest concerns are pricing and keeping the procurement process simple, preferring not to have to set up or negotiate new agreements with vendors. Hospital finance departments often choose a well-known Tier 1 brand for their entire hospital’s computers. They go with a brand they know and expect to receive volume pricing.
- The Regulatory/Legal department is focused on compliance with government regulations and safety standards, and reducing legal risk of litigation or malpractice. They have an interest in making sure that the hospital or medical facility is not audited or sued. They are not as concerned with the brand of equipment that is purchased, as long as it meets the standards that the medical facility has adopted.
- The IT department is usually understaffed and responsible for maintaining all information technology assets throughout the facility. They may also have a prominent role in sourcing, recommending and procuring new computer equipment depending on the size of the organization. They may prefer a certain brand, but are likely to be more objective and make recommendations based on technical specifications and performance rather than brand. They are interested in acquiring computer hardware that is easy to deploy and that can process all the software applications necessary, with the reliability to reduce the amount of maintenance they need to conduct.

Here is how the three constituencies view the Pros and Cons of a Tier 1 supplier, and how Cybernet compares. Cybernet can easily address the concerns of all three constituencies.

	Tier 1 PROs	Tier 1 CONS	Cybernet PROs
Finance	Volume pricing, familiarity		Volume pricing
Regulatory/Legal		Patient risk, may not meet standards	Standards-compliant, reduces risk
IT		Higher maintenance	High reliability = less maintenance

Customer Testimonials

Cybernet surveys its customers regularly about how and why they purchase its medical computers. From more than two dozen case studies, Cybernet has gained insight into the decision-making process from the IT managers at hospitals and medical facilities. Customers often consider Tier 1 PC suppliers during the process, but reject them due to inferior reliability and increased maintenance costs, and go with Cybernet instead. Another factor for choosing Cybernet is the requirement to find all-in-one PCs that have medical certifications and antimicrobial technology, and are delighted with the wide range of medical grade computers to choose from. Here are some quotes from Cybernet's health care customers:

“Cybernet's all-in-one PCs have the performance we need to practice real-time medicine in our clinics and hospital, and their superb reliability makes maintenance a breeze.”

Shawn Reichle, Systems Administrator, Northern Montana Hospital

“CyberMed MP15Ts are ideal, and with all of the available modules, they'll yield a great return on investment. I'd recommend Cybernet to anyone; their level of service is above and beyond!”

O'Neil Denton, Director of IT, Sephardic Nursing & Rehabilitation Center

“Cybernet's iOne-MP171s helped us streamline the process for updating EMR data, making everyone more productive.”

George Gardner, IT Manager, The Woodland Inc.

“Cybernet's all-in-one PCs were the perfect choice for our new, state-of-the-art VillageCare Rehabilitation and Nursing Center. Deployment was a breeze, and the reliability surpassed our expectations.”

Michael Della Villa, Managing Director of IT, VillageCare



CyberMed MP15T

The Whole Hospital Solution

Cybernet has a full range of medical grade and non-medical computers to serve the needs of your whole hospital, end to end. Hospitals shouldn't be deploying the same non-medical desktop or laptop computers throughout both the administrative and patient areas just to save money. Hospitals need to use medical grade computers in patient and treatment areas, and can use non-medical PCs in the back office and administration areas. A mix of PCs will work much more effectively. Whether you replace older models incrementally as needed or deploy them all at once, Cybernet can put together the right combination at the right time to fit your budget.

All of Cybernet's medical grade all-in-one PCs fit the definition of "medical grade": they have antimicrobial technology, are EN60601-1 certified, have 24/7 reliability, and some are fanless and have sealed front bezels.

Use this handy chart to plan your Cybernet Whole Hospital Solution:

Cybernet PC Model	Mounting options/ portability	Other Specifications	Suggested uses:
<i>Medical Grade: (antimicrobial, EN60601 certified, high reliability)</i>		<i>(all medical grade PCs are available with touch screen)</i>	
CyberMed G45	Wall, medical cart, desk		Patient rooms, nurses' stations, labs, exam rooms
iOne-MP171	Wall, medical cart, desk	IP65 sealed front bezel	Patient rooms, nurses' stations, labs, exam rooms
CyberMed T10 tablet	Completely mobile	Fanless, IP65 sealed front bezel	Anywhere in the hospital
CyberMed MP15T	Wall, medical cart, desk	Fanless, IP66 sealed front bezel	OR, ER, ICU, patient infotainment, nurses' station
CyberMed N19	Wall, medical cart, desk	Fanless	OR, ER, ICU, patient rooms, nurses' station
iOne-MP172	Wall, medical cart, desk	Fanless, IP65 sealed front bezel	OR, ER, ICU, patient rooms, nurses' station
<i>All-in-One Non-medical:</i>			
iOne-GX45	Desktop, wall	Available touch screen	Admin/back office, nurses station, reception
iOne-G4	Desktop, wall	Available touch screen	Admin/back office, kiosk
iOne-H5	Desktop, wall	Available touch screen	Admin/back office, kiosk
ZPC-D5 keyboard PC	Desktop		Admin/back office, nurses station, reception

Cybernet All-in-One PC Model Comparison

Feel free to visit Cybernet’s website to review detailed specifications for medical grade and non-medical grade all-in-one computers, but this comparison chart may be helpful in choosing the model that may be right for you.

Cybernet PC Model	Screen Size	Memory	Processor	Networking
<i>Medical Grade: (antimicrobial, EN60601 certified, high reliability)</i>				
CyberMed G45	19"	Up to 8GB DDR3	Intel Core 2 Duo E5500	1Gb Ethernet, WiFi
iOne-MP171	17"	Up to 4GB DDR2	Intel Core 2 Duo T7500	2x1Gb Ethernet, WiFi
CyberMed T10 tablet	9.7"	Up to 4GB DDR3	Intel Cedarview N2600	1 Gb Ethernet, WiFi
CyberMed MP15T	15"	Up to 2GB DDR2	Intel Dual Core D510	1 Gb Ethernet, WiFi
CyberMed N19	19"	Up to 8GB DDR3	Intel Dual Core D2500/2700	1 Gb Ethernet, WiFi
iOne-MP172	17"	Up to 4GB DDR2	Intel Core 2 Duo ULV	2x1Gb Ethernet, WiFi
<i>All-in-One Non-medical:</i>				
iOne-GX45	17" or 19"	Up to 8GB DDR3	Intel Core 2 Quad	1 Gb Ethernet, WiFi
iOne-G4	18.5"	Up to 8GB DDR3	Intel Core 2 Quad	1 Gb Ethernet, WiFi
iOne-H5	20"	Up to 8GB DDR3	Intel Core i3/i5/i7	2x1Gb Ethernet, WiFi
ZPC-D5 keyboard PC	n/a	Up to 4GB DDR3	Intel Dual Core D525	1Gb Ethernet, WiFi



CyberMed T10 Tablet