



APPLICATION NOTE

Healthcare Industry
Intel® Core™ Processors
Intel® vPro™ Technology
Intel® Active Management
Technology

Manageability of Computerized Medical Equipment

Hospitals today are being transformed into sophisticated medical facilities with computer-based medical equipment becoming ubiquitous. Medical devices are evolving from fixed function devices to intelligent, connected medical devices. Healthcare facilities are becoming digitized and networked, with a wide array of high-tech medical devices supplying data to a centralized electronic medical record (EMR).

Medical equipment such as diagnostic equipment, laboratory/analytical equipment, drug dispensing carts, computerized physiotherapy, patient infotainment terminals, multi-parameter patient monitoring, endoscopy and Computers on Wheels (COWs) are all leveraging PC based architectures and are feeding data into the EMR, which acts as both a permanent repository for health information and a system that can be accessed instantly by doctors to assist with clinical decisions.

As healthcare providers deploy more and more technology into hospital settings, laboratories and clinics, remote management of these devices becomes critically important in helping to contain costs, reduce complexity and increase the quality of healthcare. Intel® remote management technologies can help deliver these benefits across the healthcare enterprise. Intel remote management is already enabled in management tools in desktop PCs, servers and some tablet PCs.

So what are these management technologies called, and what exactly can they do? They are part of Intel® vPro™ technology with Intel® Active Management Technology (Intel® AMT), and they implement a unique capability in Intel® chipsets that can access and control an embedded system even if it is powered off (called out of band management) or in need of repair. This hardware-based feature can essentially expand and enhance the ability of healthcare IT to remotely monitor, maintain and repair medical devices that are based on embedded Intel® architecture.

Therefore, it makes sense for medical devices that have Intel AMT-enabled PC platforms to fully utilize this technology to further improve overall device manageability. Intel works closely with healthcare providers and equipment manufacturers worldwide to effectively integrate these advances into the healthcare information environment.

Multiple medical devices installed at locations around the country can be managed from a central location by using, for example, 3G to connect them to the internet. Minimizing the need to send repair teams to the hospital, clinic or dental practice by diagnosing issues remotely reduces operational and maintenance costs. This can be expected to increase the utilization of the device itself by minimizing downtime. Intel AMT also supports a feature, called KVM redirection over internet protocol (IP), permitting the keyboard, video and mouse (KVM) for an IT console to control and display the graphical user interface of a device in the field.¹ This does not require any additional hardware. All it requires is an Intel vPro technology-enabled platform with integrated Intel® Graphics Technology.

Intel® Active Management Technology: Discover, Heal and Protect

The Intel AMT value proposition for desktop PCs is often summarized as: “discover, heal, protect.” The advanced manageability and maintenance features of Intel AMT allow IT staff to query, restore, upgrade and protect devices remotely, even when the devices are powered off or experiencing software failures. The same benefits are just as critical in networks of intelligent connected embedded medical devices.

Remote manageability capabilities are only available in Intel® Core™ vPro™ processors.¹

- **Discover** what embedded devices and software are running, and what is their operational status. And if you have a failure, is it something you can deal with remotely?
- **Heal** to recover from failures as fast as possible. Certain failures are not recoverable without hands-on intervention, but many on-site trouble tickets for networked systems are attributable to software-related or procedural issues that can be resolved through Intel AMT remote manageability.
- **Protect:** Protection is the area where manageability and security capabilities converge. Intel AMT enables security capabilities, including the ability to continuously check for the presence of security software agents, check for malicious packets, block ports used by suspicious software to disable access to the network, and isolate a system in case it is compromised.



If you look at Intel’s embedded product line, you see a wide range of solutions, such as Intel Core vPro processors, that support Intel AMT OOB solutions. Intel AMT is built into select Intel chipsets and employs a silicon resident management mechanism. This circuitry establishes a new communications channel, using an “out-of-band” link that operates independently of the “in-band” channel of the computing system and provides persistent connectivity.

The Intel AMT out-of-band link employs a dedicated manageability engine (ME) that enables control over non-functioning systems. Other Intel AMT elements include a small amount of memory residing in the FLASH device and a firewall with filters supported in the Intel chipset. When the system is functioning properly, the Intel® processor communicates with the Intel® Management Engine (Intel® ME) using manageability service software it runs locally.

In contrast, traditional remote management consoles communicate with devices using their standard networking capability, called an in-band link, which utilizes the device’s operating system, CPU and network drivers.

When the network is the problem; or if the end system fails after a power surge; or the operating system crashes, not much can be done by the in-band remote access software as it has the drawback of relying on the continued operation of many equipment components, significantly limiting the types of problems or failures that can be fixed remotely.

1.1. POC-W211 Medical Point of Care Terminal

Advantech* is a leader in providing a wide range of certified medical computing systems and services. The company has recently released the POC-W211 Point-of-Care terminal, which is a medical-grade device with a versatile array of options that allow these devices to fulfill a variety of medical usage cases.

Today, these systems and services are being employed in a diverse range of applications ranging from data acquisition to vital signs monitoring devices, Patient Data Management Systems (PDMS) and visualization (x-ray, endoscopy), and they play a critical role in the provision of medical care to patients in helping to display, collect and disperse images, and other patient data.

These devices are ideal in helping to bring EMR (Electronic Medical Records), PACS (Picture Archiving and Communication System) and CPOE (Computerized Physician Order Entry) to the point of care, so they need to be UL60601-1/ EN60601-1 3rd edition compliant, as well as CE, CCC and FCC Class B certified. These units also must be IP65-certified for dust and water resistance, and need to be easy to clean and maintain using disinfectant cleaners to help prevent bacterial contamination.

The POC-W211 runs on the 2.2 GHz Intel® Core™ i7-2655LE processor and chipset, and it is capable of displaying crystal clear images on its 21.5" wide-screen display. Additional performance can be obtained by enabling Intel® Turbo Boost Technology, which adjusts processor speed for more performance when you need it.

The POC-W211, housed in a slim 6.5 cm casing, weighs only 7 kg. The system also accommodates a 5-wire resistive touchscreen for ease of use, with many other optional features also available, including Bluetooth, RFID, WLAN and more.

Another important feature is its fanless operation, which makes it an ideal computerized solution for image intense medical applications in operating arenas, at bedside, nursing stations or other point-of-care locations within the hospital or clinic.

1.2. POC-W211 and Intel® Active Management Technology (Intel® AMT)

Within the hospital environment, as the sheer number and complexity of devices expands, the big challenge facing the IT department is how to integrate, manage and secure these devices.

Point of Care terminals are typically scattered in many different locations throughout a hospital setting. Advantech has incorporated the feedback from end customers and is now offering advanced management capabilities based on Intel AMT, one of the ingredients of Intel vPro technology available in the 2nd generation Intel® Core™ i5 and Intel® Core™ i7 processors.



In order to enable this functionality, Advantech has developed a software suite called POC_Link, which is a remote computer management software based on client/server architecture (see Figure 1). It provides POC (Point-of-Care) devices with remote monitoring and management capabilities for critical managed items, including real-time battery capacity, system health, LCD, power and network status updates.

POC_Link integrates Intel AMT technology and POC management functions to provide a single management console. It allows biomedical and IT staff to configure, deploy, manage, monitor, diagnose and maintain distributed POC terminals remotely irrespective of where they are located within the hospital. With POC_Link, biomedical and IT staff can administer device management more efficiently and provide higher Point-of-Care quality.

1.2.1. Main Features of POC_Link

The main features of POC_Link are as follows.

- Web-based structure: Modularized, OS-log-off data transfer, online service/update.
- Monitor system health: CPU temperature, voltage, battery capacity and remaining time, and network status.
- Discover system information: Hard disk drive(HDD) capacity, BIOS information and system information.
- Manage platform: LCD brightness, power management, volume and hot key control.

- Picture quality evaluation.
- Intel AMT 7.0 capable, which:
 - ✓ Enables IT to remotely troubleshoot and repair systems even when they don't boot. Using Intel AMT it is possible to remotely boot a device from a networked drive, called a golden disk, with known good software. IT staff can also remotely change BIOS settings or reload a driver or OS, whether or not the system is running.
 - ✓ Provides a reliable mechanism to turn systems on/off, if needed, to save power.
 - ✓ Allows IT staff to quickly deploy security patches, remotely unlock encrypted drivers and manage data security settings.
 - ✓ Gives IT staff complete control over a system with keyboard-video-mouse (KVM) remote control.
 - ✓ Allows remote hardware and software asset tracking.
- Simplifies management from a centralized console providing detailed information and allowing the ability to connect and configure remotely.

All in all, POC_Link can help enable an IT team simplify and streamline actions such as centralized deployment configurations, low-level virus detection and repair, improved uptime, automated power management, and hands-off software distribution and updates.

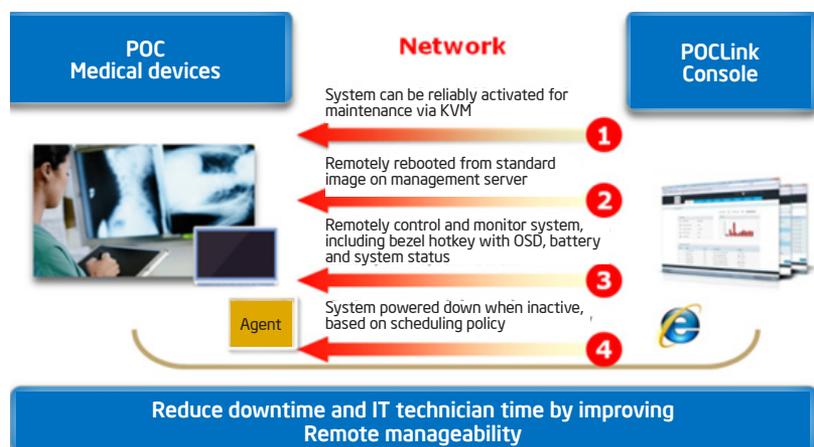


Figure 1. POC_link with Intel® AMT

1.3. Simplifying the Manageability of Point of Care Devices

The manageability of intelligent distributed embedded systems used in “mission critical” applications, such as medical devices, is a critical requirement. Point of Care terminals are deployed in all areas of a hospital such as the operating room (OR), intensive care unit (ICU) and laboratory. They are typically connected to the hospital information system (HIS) network and are essential in ensuring that all information gathered is made available in real time to the attending healthcare practitioners. Point of Care terminals can be either wall mounted or attached to a mobile cart (or onto an anesthesia device), and as a result, this makes remote management even more important.

Advantech, in developing POC_link, is making it effortless for their end customers to maximize the return on investment by adopting technology that will provide greater flexibility and enhanced productivity.

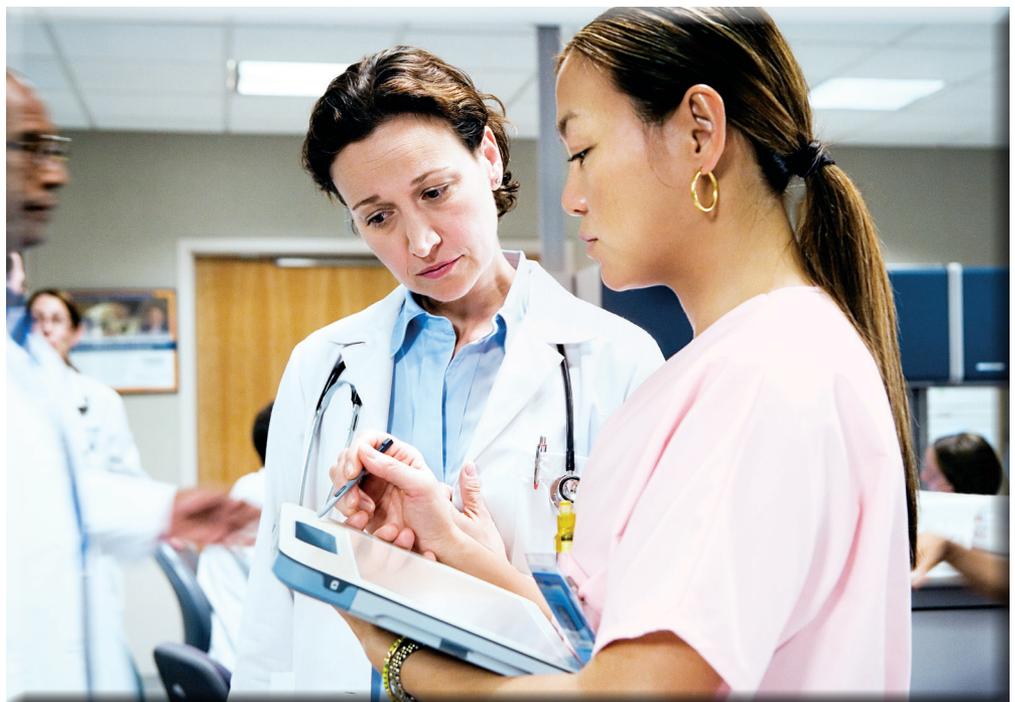
Medical IT personnel, application developers or system integrators, outside of utilizing the management console software POC_Link, also have the option of developing their own manageability software. In addition, for these kinds of users, Advantech provides WMI and SUSI (Secure & Unified Smart Interface) manageability software development kits (SDKs). Advantech’s WMI and SUSI SDKs (Software Development Kits) help to reduce the development time and cost for these applications, as well as facilitate customers who want to centralize monitoring and managing of remote devices in real time. It provides a set of user-friendly, intelligent and integrated interfaces, which speeds development, enhances security and offers add-on value for Advantech platforms.

1.4. Advantech* Digital Healthcare

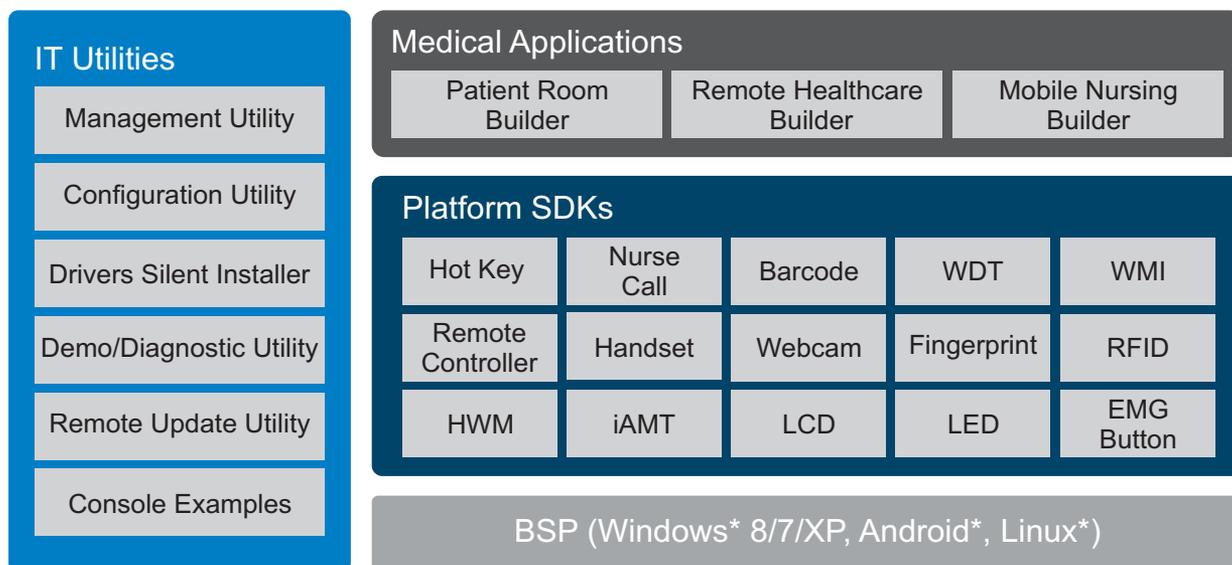
Advantech was established in 1983, and today, it is one of the leading suppliers of medical certified computing systems and services for the medical market. The company has worked with all the prominent medical device OEMs and system integrators, and their medical grade computing systems are essential in helping hospitals provide real time care in operating rooms, intensive care units, exam rooms and wards. Advantech healthcare solutions are essential in allowing healthcare practitioners to connect to hospital information systems (HIS) at the bedside to assist in patient consultations and treatment. They provide numerous medical systems technologies, such as:

- ✓ Point-of-Care Terminals
- ✓ Patient Infotainment Terminals
- ✓ Mini PCs and Box PCs
- ✓ Mobile Clinical Assistants
- ✓ Medical Tablets
- ✓ Single Board Computers
- ✓ Computer on Modules
- ✓ Diagnostic displays

Advantech’s portfolio of products includes a diverse range of touch screen equipped POC terminals built specifically for the medical environment with a choice of configurations and screen sizes ranging from 10 to 22 inches diagonally.



To seamlessly integrate medical platforms and medical applications, and provide efficient manageability capabilities for medical devices, Advantech provides an application-ready platform software suite. This software helps medical IT departments, application developers and system integrators achieve rapid application development, easy system deployment and smart system management.



For more information about healthcare solutions from Advantech, visit www.advantech.com/healthcare

For more information about Intel® solutions for healthcare, visit www.intel.com/go/medical

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¹ Intel® Atom™ processors do not support Intel® vPro™ technology

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