

Versatile Embedded Computer for Efficient Marine Communication



Introduction

Good marine communication is vitally important for ensuring the safety of ships and crew. Ever since the use of semaphores and flags in the old days, to radio signals and satellites later on, the maritime industry has gone through a long history of applying advanced technologies and tools to enable ship-to-ship and ship-to-shore communications for distress alerts, safety calls, routine messages, or just small talk and weather news on local channels.

Today, modern satellite services are the basic requirements for marine communication when vessels are far away on the ocean out of the range of terrestrial wireless communication stations. With the help of SATCOM and on-board communication devices, crews can acquire information through voice-calls, e-mails, text messaging, or net-surfing, or even communicate with people on the shore via a professional management and control system installed in the onboard computer.

The implementation of the latest cloud technologies has enhanced the remote and real-time capabilities of marine communication systems and enriched the functions it can deliver. The onshore control center can even change the settings of their offshore

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vessels via specialized software and cloud-based communication.

According to a market research report released by Research and Markets, the global marine communication systems market is expected to grow at a CAGR of 8.27% during the period 2017-2021 with increasing focus on better and faster communication mechanisms, and SATCOM-based communication systems will be a major trend.

Our customer in this case is a vessel communication solution provider who has designed a SATCOM-based system installed with proprietary software providing a professional interface to implement ship-to-ship and ship-to-shore communications, as well as remote monitoring and control functions so that the management onshore can be situationally aware of the real-time status of all their vessels out to sea.

Advantech's fanless embedded computer ARK-2230, with unparalleled ruggedness in a highly compact design, as well as IoT and cloud-services software, and unique flexible and optional communication modules, was chosen as the onboard computer for implementing this specialist marine communication system.

Application Requirements

For this maritime application we needed to consider the highly turbulent environment and extreme temperature changes onboard vessels at sea. The obvious choice was an industrial-grade computer with extreme ruggedness in terms of anti-vibration capability, wide temperature operation, and wide voltage input support. Plus, multiple communication interfaces were needed to accommodate the needs of different communication devices and methods including SATCOM, WiFi, Ethernet, GPS and others.

Solution

The customer's ship communication solution will deploy an onshore server with their proprietary application software, a rugged and compact computer onboard each vessel under the owner's management, and a communication hub integrating Internet services, voice calls, and satellite communications. Their application software provides a web-based and password-protected interface through which the operator can fully acquire the operating status of their vessels and control the settings onboard.

Advantech provided ARK-2230, a ruggedized, compact, fanless, embedded modular

computer with an Intel® Celeron® Quad Core J1900 SoC processor, a dual LAN iDoor communication module, and the remote monitoring control software WISE-PaaS/RMM to meet the crucial requirements of the marine communication system in the most effective ways.

Advantech's iDoor modules are exclusive offerings for ARK computers, which are standardized, detachable, and interchangeable modules that can be optionally purchased and flexibly added to ARK computer systems to provide or augment extra interface as required for specific applications.

In this case, the ARK-2230, with its two LAN ports and additional dual LAN iDoor module, is able to support a total of four LAN ports, which are used to connect to SATCOM receiver/signal switch, on-board WiFi router, on-board telephone system, and onboard Local Area Network switch respectively, which is in turn connected to the central control system of the ship.

Such deployment connects each ship to a satellite-enabled, IoT and cloud-based marine communication system, enabling remote control and management over the owner's fleet, and providing voice calls and Internet services to the crews on each ship whilst ensuring their safety on the ocean with better and faster marine communication.

The ARK-2230 is reinforced with a rugged design designed to meet the challenges for reliable operation on the sea. A lockable DC jack power input is provided to enhance power supply reliability in the highly turbulent onboard environment. Wide voltage support (9-36V) was needed to be compatible with all the various power supply scenarios, and wide temperature support from -20°C to 60 °C will meet all environmental challenges on the sea.

To enable IoT and cloud applications, Advantech computers are preinstalled with Advantech WISE-PaaS IoT/cloud platform software, which provides a rich set of SDK tools and API support to help customers develop and integrate their applications faster. In this case, WISE-PaaS/RMM suite was especially advantageous in helping develop functions for remote monitoring control and device management.

Benefits

- Reliable fanless/wide-voltage/wide-temperature/ lockable DC jack designs ensure ruggedness for vessel applications

- Flexible add-on iDoor modules to augment LAN port support
- Platform-ready software – WISE-PaaS/RMM for developing and integrating remote monitoring and control for faster time-to-market
- Improves vessel fleet management with better and faster marine communication which combines the use of Satellite, WiFi and LAN communications

System Diagram

