

# International Space Station welcomed aboard HP Networking

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Rolf Schmidhuber, Columbus data management system, technology team leader for EADS ST

## The Customer

When HP received an enquiry from EADS Space Transportation at the beginning of 2003, no one could have suspected what was to happen in the months that followed. EADS was interested in equipping the International Space Station's (ISS) European Columbus module with a number of Ethernet switches. The plan was not to equip EADS's networking workstations in Germany, but rather to use them as the basis for the first Ethernet switching solution on board the International Space Station. This enquiry developed into one of the most demanding and unusual customer orders in the history of HP Networking.

## The Challenge

EADS planned to create an Ethernet switching solution on board the International Space Station. The solution needed to be absolutely reliable and have a service life of at least ten years.

## The Solution

EADS rigorously tested devices from manufacturers including HP, Avaya, and Cisco. Only the HP Switch 2524 met all the requirements in terms of performance, radiation resistance, mechanical resistance, and management features.

## Results

EADS configured and installed a number of HP 2524 switches. These were developed and optimized to ensure viability for use in space.

## HP on board Columbus

Based in Bremen, Germany, EADS was responsible for the planning, development, and manufacturing of the Columbus research module, which in 2007 docked with the International Space Station. The module enabled scientific organizations and businesses to conduct research and experiments on the ISS. On board Columbus, a data management system and a local area network (LAN) connect the research module internally, allowing uninterrupted data exchange between the Space Station and its communication systems.

Three computers manage the IT tasks on board Columbus, carrying out functions such as data acquisition, data transmission to the ground station as well as the initiation of scheduled IT-related activities. The computers are currently networked together via 10 Mbit/second Ethernet in half-duplex mode. Thanks to the capabilities of the HP switches, the payload systems can be networked at 10 Mbit/second or 100 Mbit/second (full-duplex mode). In the center of the network, there are two redundantly networked Columbus LAN switches (CLSW), developed by EADS.

To maximize its research and computing capabilities, Columbus required the implementation of a high-performance, reliable, and highly resistant managed Ethernet network, to ensure that the network on board Columbus is equipped to enable scientists the maximum research possibilities in a zero-gravity environment. This network implementation on the European module of the Space Station, the requirements of which demanded a service life of at least ten years, meant that for the first time in the history of space travel, there would be fully functional, production Ethernet switches operating in space.

### HP customer case study:

HP Switch 2524

Industry: Aerospace



## A rigorous selection process

Extensive tests were carried out at the Proton Irradiation Facility in Villigen, Switzerland, where switches from various manufacturers were exposed to radiation in a particle accelerator under conditions similar to those found in space. Switches from manufacturers including Avaya, Cisco, Netgear, and D-Link were put through rigorous examinations over a lengthy period of time. The results revealed that the HP Switch 2524 was the only switch to meet the Space Station's needs in terms of performance, robustness, reliability, and radiation/mechanical resistance. Furthermore, impressively, the HP Switch 2524 used in testing was one taken from the standard production line.

Rolf Schmidhuber, Columbus data management system technology team leader for EADS ST, explained how the components of the HP Switch 2524 were a key determining factor in the selection process:

"Inside the HP Switch 2524, a central switch fabric handles the majority of tasks, while the switches from other manufacturers tend to distribute across a number of chips. By using significantly fewer chips on the circuit board, this proved much more advantageous to us, as the fewer components present, the lower the susceptibility to radiation and mechanical duress during the launch into space. This was a key reason why HP beat the competition."

Another decisive factor for EADS was that the HP Switch 2524 comes with a wealth of administration and configuration options. After the decision was made to implement the HP solution, the EADS team further developed and optimized the HP Switch 2524 to ensure its viability as a switch for use in space. The task of developing and optimizing this implementation was handled by the EADS team responsible for Columbus system technology for on-board data processing.

Schmidhuber concluded: "To put it simply, HP was the only networking vendor whose switches offered us the level of reliability and performance required to handle the intense demands on board Columbus."

## The home stretch

After nearly three years of development time, the EADS team, supported by HP Networking, finally completed the installation in April 2005. The HP switches were finally configured and were then in a position to undergo qualification testing prior to installation onboard the Columbus module.

The finishing touches were made to the HP network installation on the Columbus module in December 2005. The Columbus docked with the ISS and became fully functional as of 2007. These HP 2524 switches became the first commercial Ethernet switches in space. Given that Columbus will be operating some 400 kilometers above the Earth, EADS has on this occasion kindly waived HP's usual next business-day on-site replacement policy!

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