

Upgrading a network – in space.

Goodrich needed a company with extensive experience in networking, a flexible business model – and long term support.

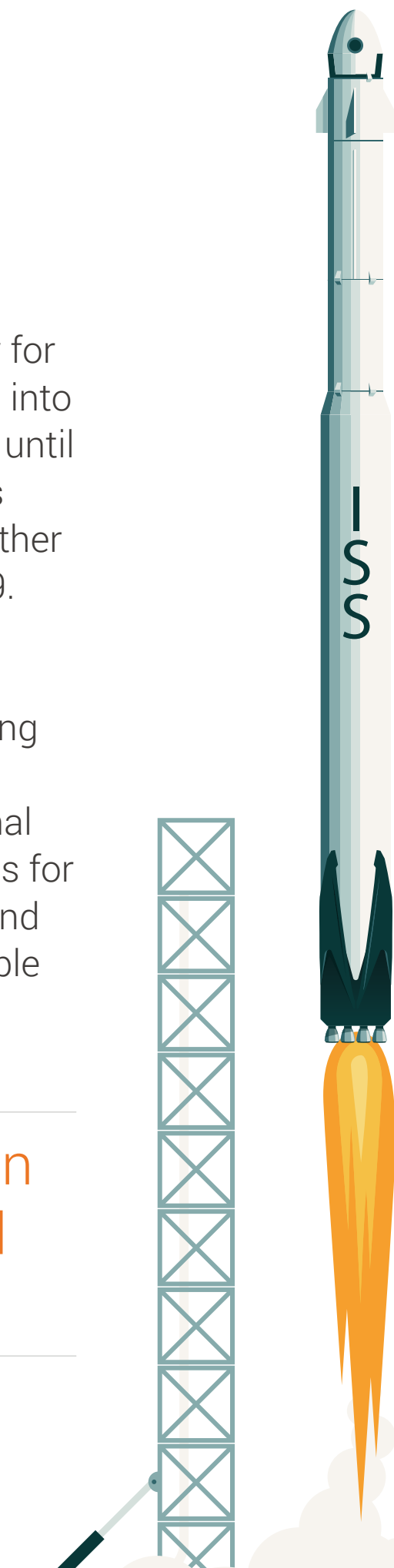


Overview

The International Space Station (ISS) is a habitable artificial satellite, in orbit 205-270 miles above the Earth, and is used primarily as a research laboratory for scientific experiments. Its first component launched into orbit in 1998, and the station is expected to be used until 2028. Development and assembly of the station has continued during the 20 years since launch, with further components scheduled for launch in 2018 and 2019.

Goodrich corporation (now part of UTC Aerospace Systems) is in the business of protecting and enabling life in space. The company provides Environmental Control and Life Support Systems on the International Space Station as well as providing systems solutions for defense platforms that operate in the air, land, sea and space. UTC Aerospace hardware is designed to enable survival in even the harshest environments. ●

Goodrich approached Abaco in early 2009 to explore **rugged Ethernet switch** solutions.



The challenge

Goodrich was tasked with upgrading the Payload Ethernet Hub Gateway on the ISS. The PEHGs allow experiments to access the medium data-rate Ethernet network aboard the ISS, which is used for command and control of experiments. The new improved PEHG - iPE-HG - developed by Goodrich would operate at 100mbps instead of the previous 7mbps bandwidth, providing a secure network infrastructure capable of surviving the hostile environment of the ISS.

Goodrich approached Abaco in early 2009 to explore rugged Ethernet switch solutions. The initial discussion revolved around the RM921 and RM922 IPv6-enabled, 6U VME 24-Port Managed Layer 2/3+ Gigabit Ethernet switches.

It became apparent that, while the RM921 and RM922 offered exactly the functionality, performance and security required by the application, the 6U VME form factor was not appropriate for a space-constrained environment. Also, while rugged enough to withstand the rigors of deployment on the battlefield, neither switch was available with the ability to counter the problems experienced with space radiation.



In all other respects, the RM921 and RM922 met Goodrich's criteria. Absolute reliability was a paramount requirement: one of the implications of this was that Goodrich needed a proven switch design based on proven technology. It was also vital that support for the switches could be guaranteed at least through the ISS's planned decommission in 2028. Similarly important to Goodrich was that the switches be controllable from the ground, rather than by the crew onboard the ISS. ●

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The solution

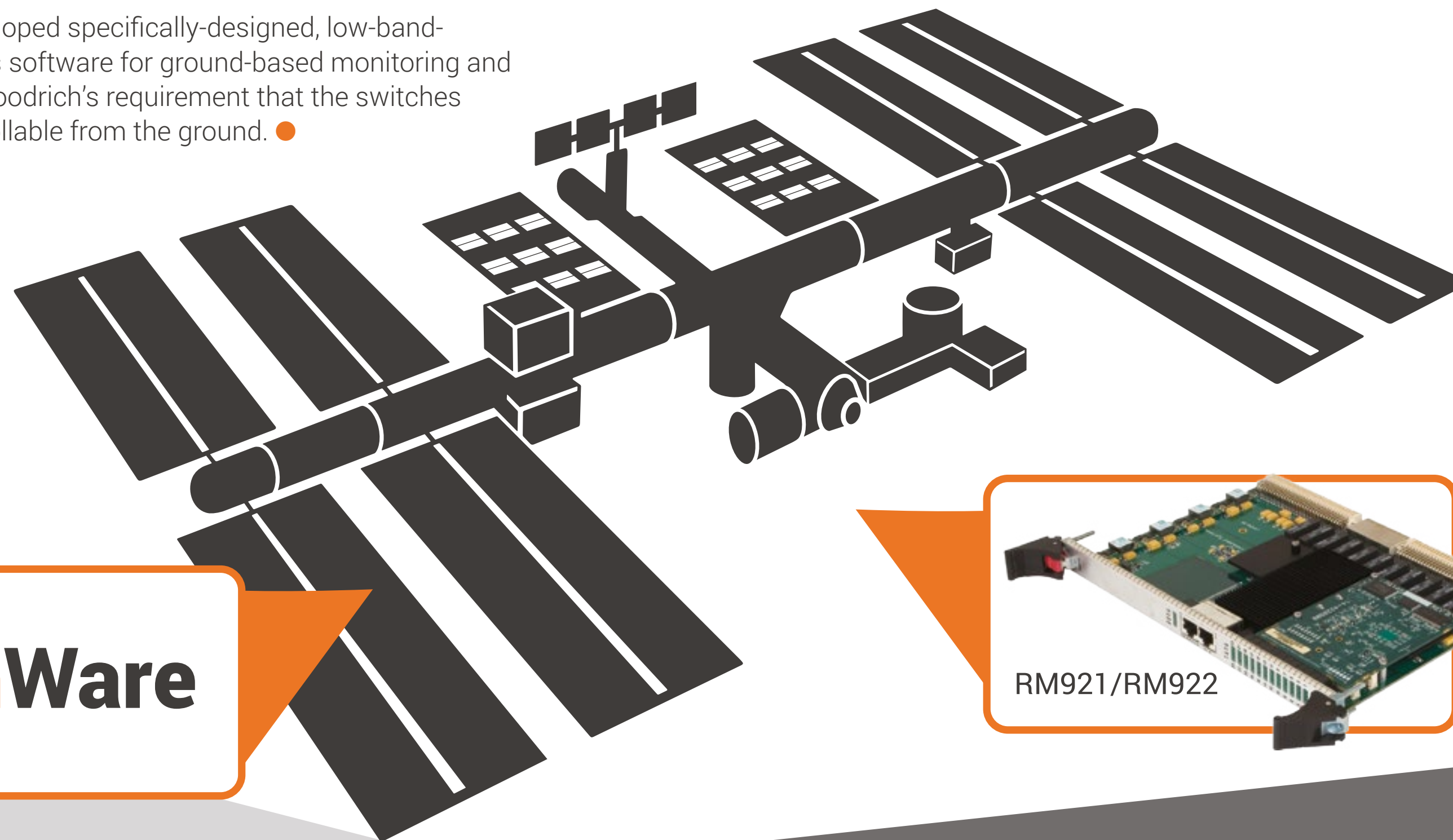
Abaco offered to licence the hardware design of the RM921/RM922 to Goodrich so that a custom version, in the appropriate form factor and with the required radiation hardening, could be developed by Goodrich in-house. We also contracted with Goodrich to port our switch management software environment – OpenWare – to the custom boards. This required us to develop in-depth knowledge and understanding of the communications requirements on the ISS, as well as extensive engineer-to-engineer collaboration. Goodrich also leveraged our advice and consultancy on their hardware design.

Additionally, Abaco developed specifically-designed, low-band-width, remote telematics software for ground-based monitoring and control, responding to Goodrich's requirement that the switches should be entirely controllable from the ground. ●

OpenWare

“The comprehensive, long term support Abaco was able to offer and their willingness to engage very closely with Goodrich were key to our decision. The International Space Station is a long term, highly prestigious program in which reliability and maintainability – as well as superior performance – are key requirements.”

Al Zaleski, General Manager, Goodrich ISR Systems.



The outcome

Three of the iPEHGs were launched on HTV-3 and Progress M-16M in July and August of 2012, and a fourth was launched on SpX-1 in October the same year. The installation of the iPEHGS allow for a substantially increased flow of payload data between the space station and Earth, which was greatly needed given that the ISS communications system was running at capacity due to the sheer amount of payloads operating on the platform.

The increase in communications capability provided by Goodrich shows that the ISS is capable of evolving to meet the ever growing needs of the scientific community. According to NASASpaceFlight.com, the leading online news resource for everyone interested in space flight specific news, it is direct evidence that, despite being designed over 20 years ago, the ISS is fit to perform its duty as a 21st century orbiting science laboratory.

Abaco hardware and software have now been deployed onboard the ISS for close to a decade. They are expected to remain in service until the end of the ISS's active life, which is planned to be a further decade into the future: the switches will have had a service life of 20 years or more. We are proud to have partnered with Goodrich, enabling the ISS to continue to serve and benefit mankind in its mission of discovery for a long time to come. ●

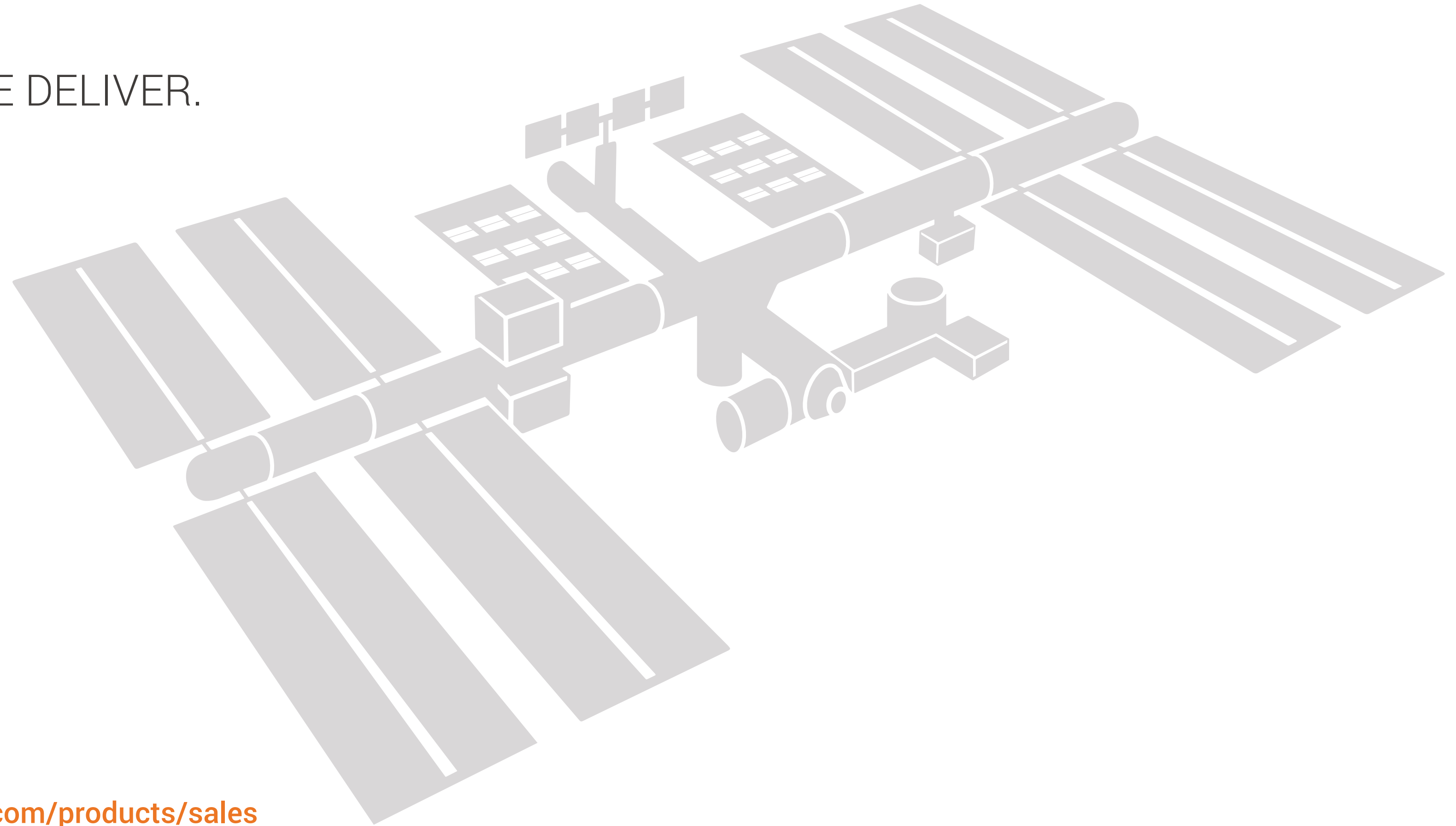
20+ years service life.

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