European Space Agency

Network Background

The European Space Agency (ESA) operates the ESTRACK worldwide system of ground stations used for telemetry, tracking and command in support of spacecraft operations. The ESTRACK stations are connected to ESA's mission operations control center in Darmstadt, Germany via OPSNET, the Agency's ground communications network. Established as a private wide-area network, OPSNET has permanent links with NASA's NASCOM network as well as temporary links with CNES (France), DLR/GSOC (Germany), and NASDA (Japan).

Given the criticality of the network in support of spacecraft operations, ESA chose to update it with a solution provided by Netrix. By implementing this solution, ESA gained the ability to support the multi-protocol requirement of X.25 packet switching, circuit switching (TDM sub-rate multiplexing), Frame Relay, and ATM. Additionally, the capability of a converged voice and data network in a single product was available for future migration to voice over frame relay.

Transfer of Data

Data traffic is generally comprised of telemetry, tele-command and tracking data required for spacecraft control, station monitoring, and control data. In addition to these static requirements, the network provides for temporary demands such as the control of instrumentation and experimental apparatus used in SVT (Spacecraft Validation Tests) and Satellite LEOP (Low Earth Orbit Phase). The fault-tolerant Netrix Network Exchange (Nx) 2510 and 2550 are utilized to transfer this mission-critical data.

Transfer of Voice

Voice traffic interconnects the individual on-site intercom systems and supports the conferencing of voice coordination loops. Voice is transferred over Frame Relay connections using Nx 2200 series equipment. The analogue channels are connected using 4-wire E&M interfaces, and digitization, compression and fragmentation are then performed by the Nx 2200 with the core network handling the switching of voice frames.

Network Management

The Netrix nodes are managed by a single dedicated Netrix Network Management System (NMS) with a redundant NMS as back-up. The NMS provides advanced features for fault and configuration management, in addition to comprehensive performance monitoring functions.

Fault Tolerant Networking

Network Management via GUI

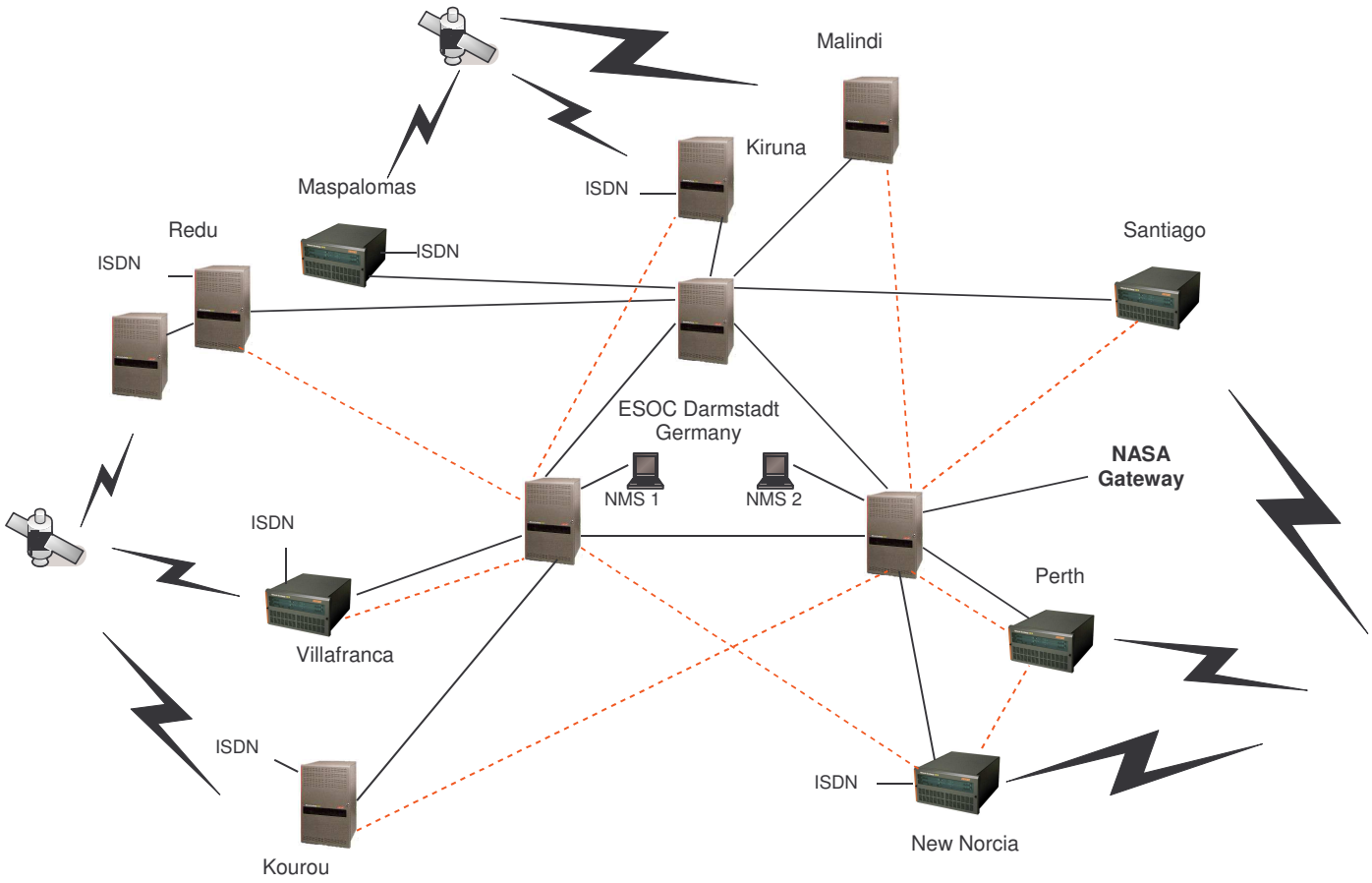
Multi-Protocol Support

Converged Voice and Data on a Single Platform

Physical Interconnections

All interconnections between sites are established across circuits leased from PTT's, with circuit bandwidths varying from 64Kb up to 256Kb. All ground stations providing routine mission support are interconnected with ESA's network operations center through a minimum of two circuits which are diversely routed wherever possible. Additionally, back-up and overflow ISDN circuits are in place when extra bandwidth is needed.

OPSNET Network Diagram



Key reasons for choosing the NETRIX solution

Fault Tolerant Networking. Dynamic adaptive routing and cost-effective redundancy of system components eliminate single points of failure, resulting in a network that automatically heals itself to provide for high availability user demands.

Network Management via GUI. Extensive network operations, administration, and maintenance capabilities are provided for effective management of the network. Monitoring, configuration, and administration are accomplished via a color graphics interface, incorporating alarms and statistics with reporting capabilities. The inclusion of Netrix' selectview™ multiple sub-network management means that services such as virtual private networks can be offered, enabling individual customers to have varying levels of management and control.

Multi-protocol Support. The Netrix products provide support for TDM and low-speed connections together with X.25 Packet and Frame Relay traffic. With the Netrix solution, voice and data can be integrated onto a single platform. Additionally, the product also provides an easy migration path to IP and ATM.

Summary

OPSNET supports the simultaneous operation of several unmanned spacecraft through one mission control system and a number of ground stations. The network must provide guaranteed, reliable voice and data transport performance. With the Netrix solution, ESA receives the network reliability and performance necessary for this mission-critical application.

About NSGDatacom

NSGDatacom designs, manufactures, sells and supports a wide range of voice and data products focused on real world business communication needs.

Combining key strategic acquisitions with its own core development team, NSGDatacom utilizes a wide range of proven, stable technologies. NSGDatacom creates solutions with these technologies to maintain and preserve organizations' network investments and mission-critical applications while enabling a smooth migration to newer technologies.

NSGDatacom products are deployed worldwide in corporate, financial, government, military, carrier, satellite, and cellular networks.

About ESA

The European Space Agency is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe.

By coordinating the financial and intellectual resources of its fifteen member states, ESA is able to undertake programs and activities far beyond the scope of any single European country.

Additional information about ESA can be found at www.esa.int.

NSGDatacom

www.nsgdata.com

3863 Centerview Drive Chantilly, VA, 20151-3232 USA Phone: +(1) 703 793 2000 Fax: +(1) 703 793 2001	7435 New Technology Way Frederick, MD, 21703 USA Phone: +(1) 301 662 5926 Fax: +(1) 301 694 6279	The Brackens, London Road Ascot, Berkshire SL5 8BE, UK Phone: +(44) 1344 893 000 Fax: +(44) 1344 891 990