

GSAW 2002
Breakout Session 10C:

Adrian J. Hooke
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California Institute of Technology

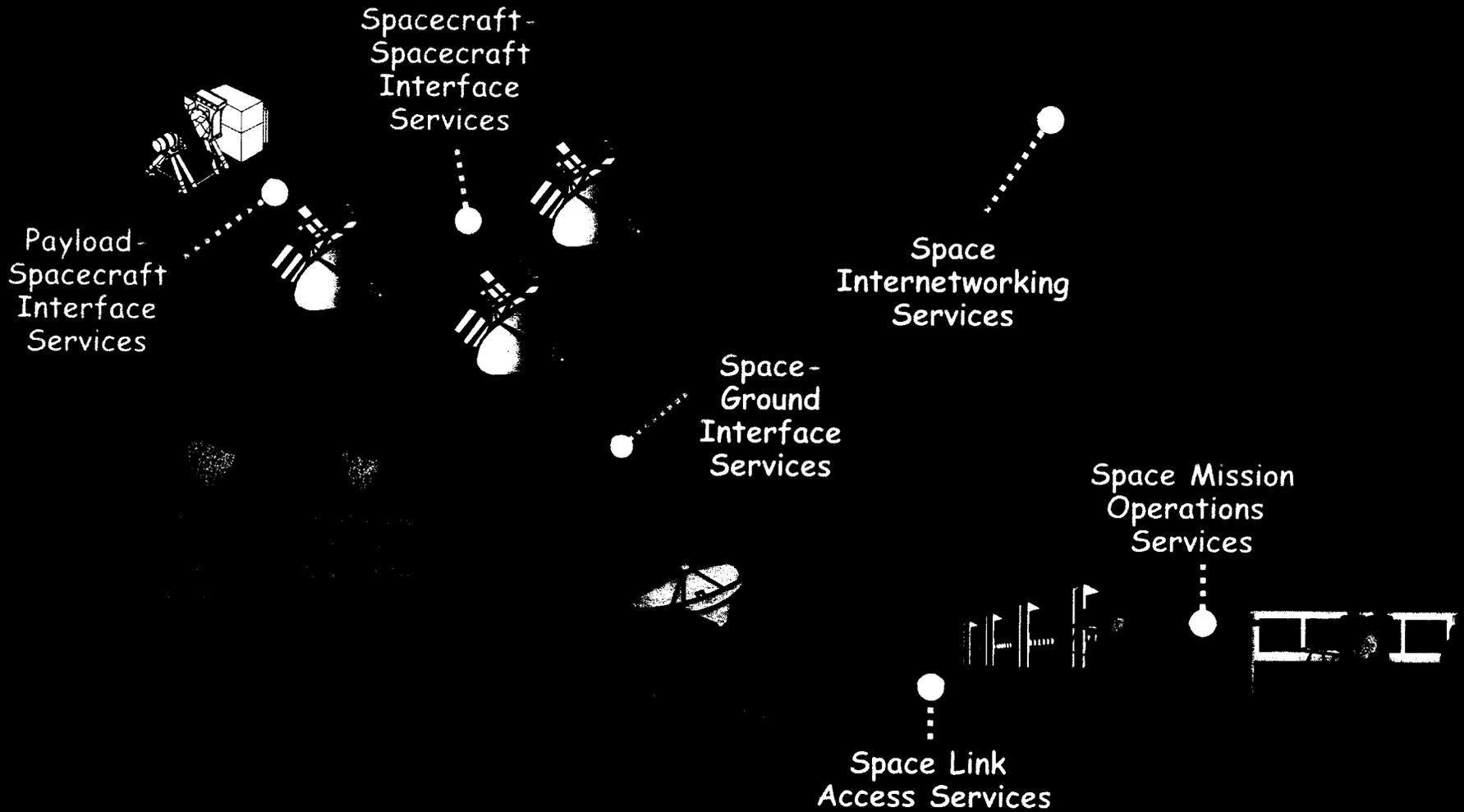
Everyone wants interoperability between satellite control networks, but what will it take to get?

Are there standards and architectures that can meet both military and civil space needs?

Will they emerge through the invisible hand of the market place, or do we need government planning and direction to achieve interoperability?

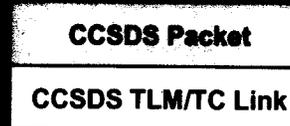
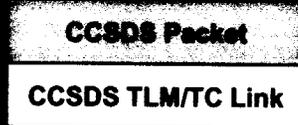
Will it bring cost savings or cost increase?

Potential Space Mission Interoperability Points

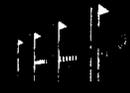
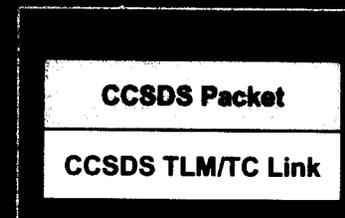
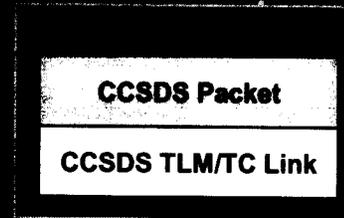
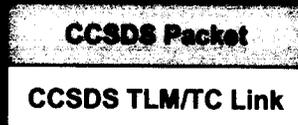


The Current "Hot Three"

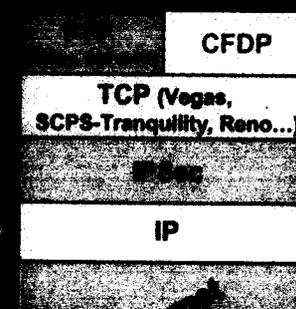
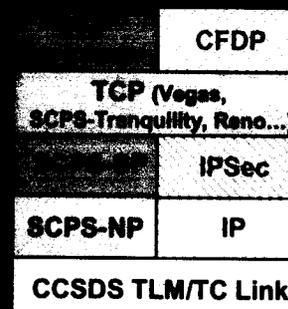
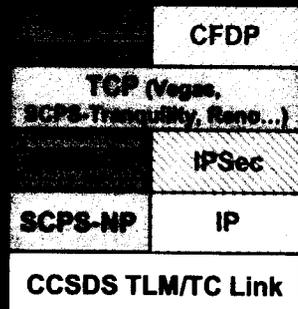
Space-Ground
Interface
Services



Space Link
Access
Services



Space
Internetworking
Services



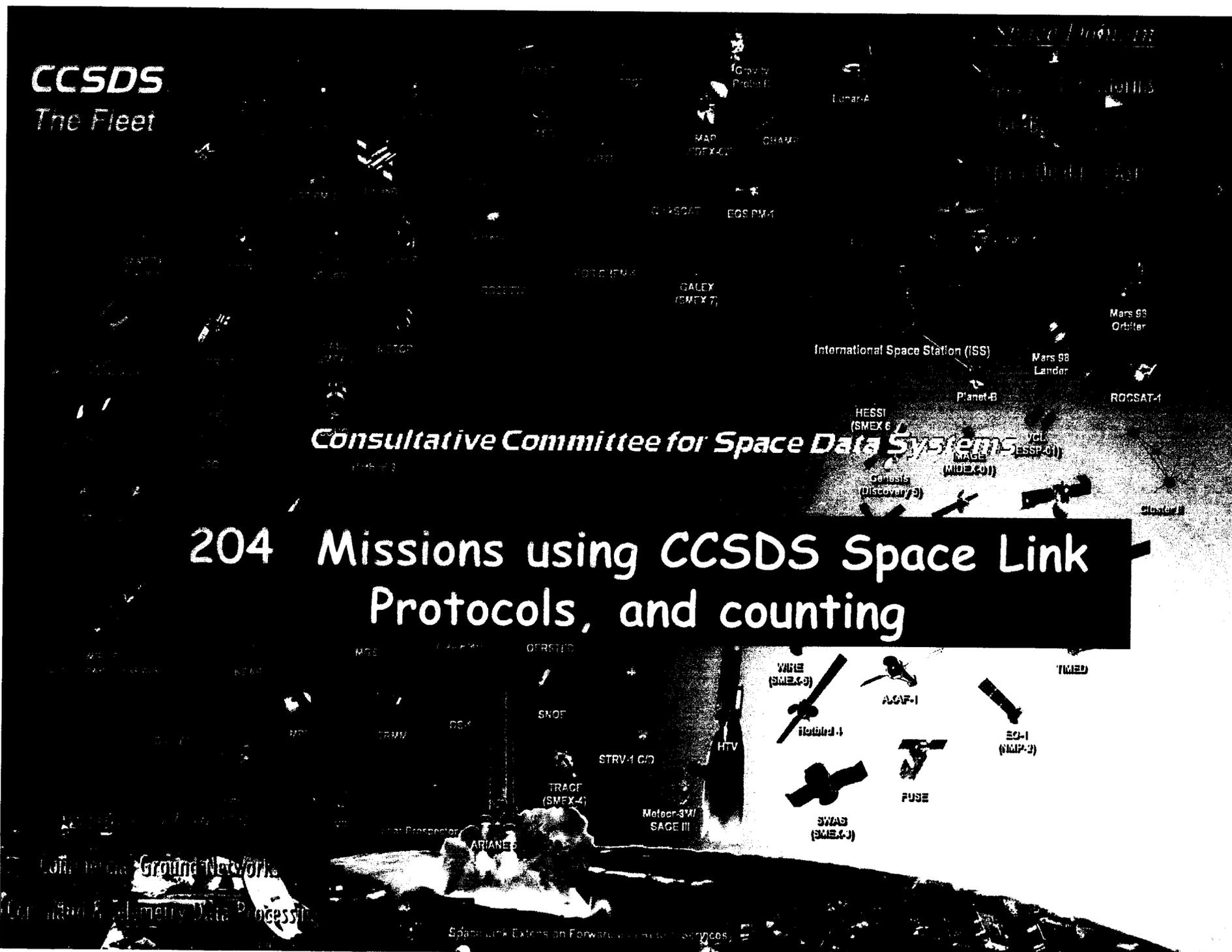
CCSDS
The Fleet

Consultative Committee for Space Data Systems

**204 Missions using CCSDS Space Link
Protocols, and counting**

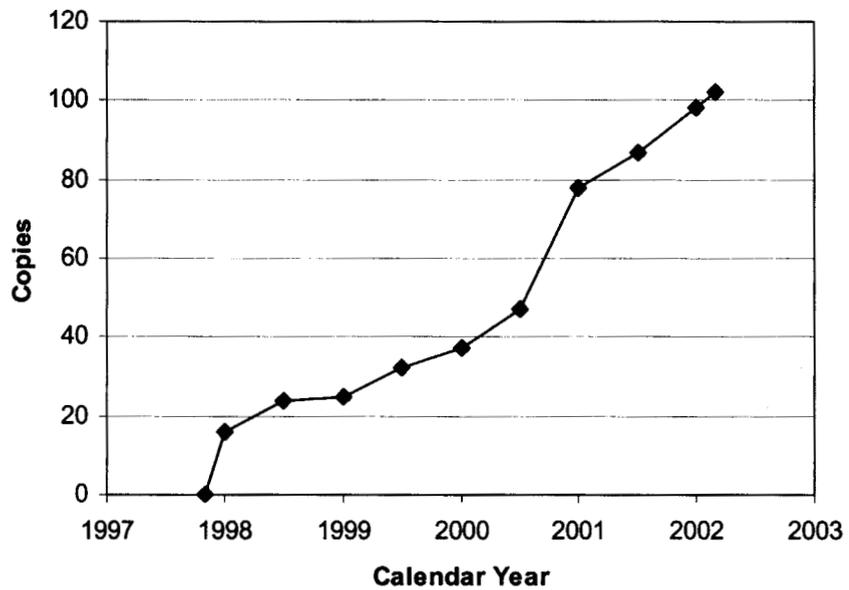
Commercial Ground Networks
Commercial Telemetry Data Processing

Space Link Extensions Forward and Return Services

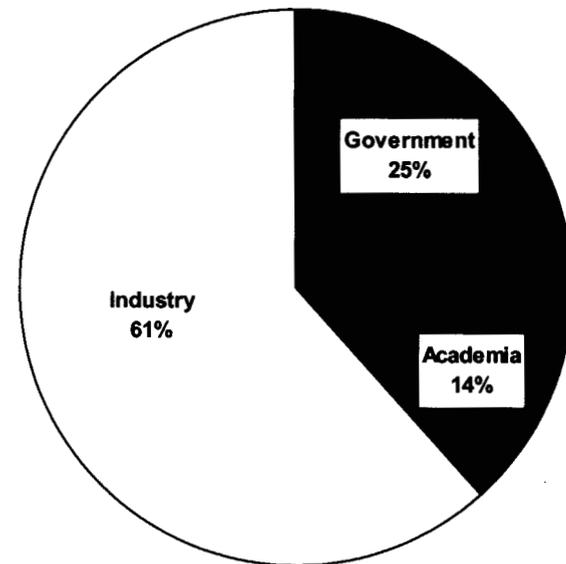


SCPS Reference Implementation Distribution

SCPS RI Distribution by Date



SCPS RI Distribution by Sector



(100 copies currently in the field
(75 copies of 1/3 now shipping))



Satellite Multimedia Trials for Schools

Project Overview

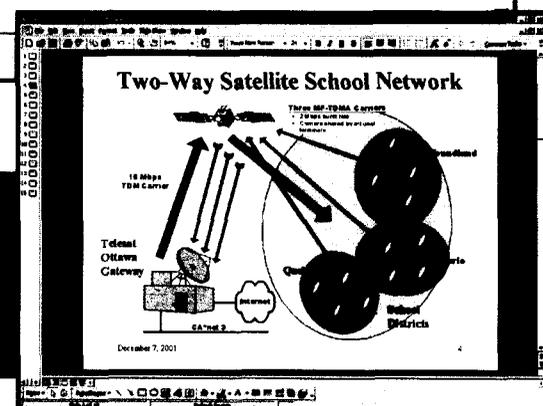
- [Participants](#)
- [Educational Component](#)
- [Project Management](#)
- [Technical Information](#)

Project Overview

The Satellite Multimedia Trials for Schools is a project that will bring high communications to a selected number of schools within the provinces of Newfoundland, Quebec, and Ontario. The project will provide a platform innovative schools to enjoy the advantages of high speed access, via the satellite Anik E2, and the CA*Net3 experimental fiber optic network. The will have connection over the Internet to the network of World Wide Web servers and to other learning institutions. It will enable the schools to interact with education centers using a variety of techniques. The system will provide the following capabilities:

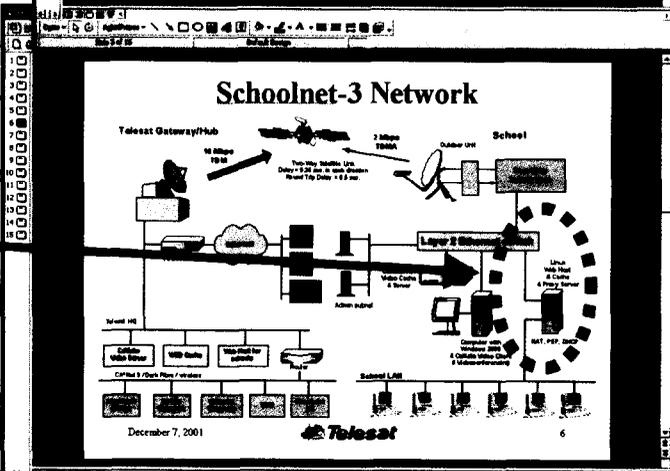
- Two-way high speed Internet access over satellite.
- Interactive video conferencing and application sharing.
- Fibre and satellite delivery of high quality educational video program storage and playback on demand.

- **Current testing of the SCPS-RI for the Canadian Public School System**
 - SCPS Gateway combined with Squid (Web cache)
 - Test supported over 1 million connections at $\lambda = 15$ connections per second
 - Deployment currently underway



Project Partners	
Telesat	Date: Project prime Implementation & maintain network infrastructure Contribution: \$1.25M capital -\$128 space segment & labour
EMIS Technologies	Supplier for edcam equipment Manage pedagogical component of trials Participate in overall project direction Contribution: \$100,000K for a cloud peripheral equipment
ESL	Key participant on pedagogical aspects Key support in network implementation Contribution: Expertise & labour
School Districts	School district representatives for each province Contribution: Expertise & labour
Video Servers	Video servers, software & peripheral equipment supplier at schools & Telesat hub Contribution: Software development labour
BELLE	Provide access to repository of multimedia learning objects & support satellite network deployment Contribution: \$150,000K from BELLE project
Ontario CCR	Participate in Ontario portion of trials & evaluation Contribution: \$60K for Ont school peripherals
CANARIEL	Expected participation in assessing a satellite access in Canadian repositories of multimedia learning objects Contribution: Funding from BELLE project & upcoming CRAG project

December 7, 2001





About XTI

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Xiphos SCPS-TP: Maximize your bandwidth.

Internet Protocols do not cope well with the high loss rates and latency of wireless and satellite communication links. Xiphos SCPS-TP is the solution, outperforming the best of other TCP stacks hands down. Derived from the most reliable IP stack in the world, Xiphos SCPS-TP delivers increased throughput, response time and efficiency through stressed communications links.

Bandwidth is expensive. Make the most of it. Transport with Xiphos SCPS-TP.

- ◆ [Introduction to the technology of SCPS-TP](#)
- ◆ [Xiphos SCPS-TP DataSheet](#)

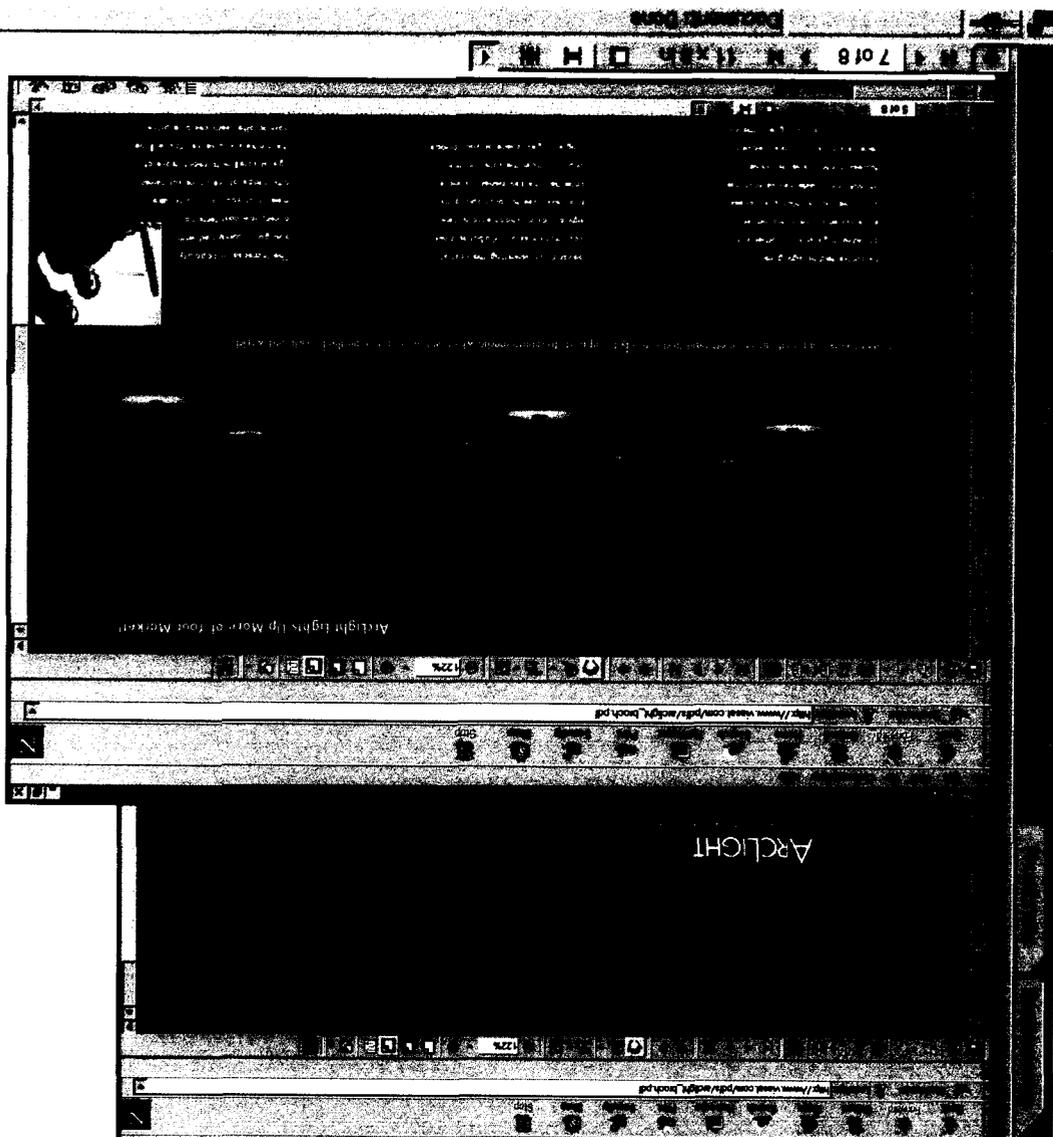
Why Xiphos SCPS-TP?

You want to transport your data quickly and efficiently.

On terrestrial networks, network congestion is most often the problem, and normal TCP/IP is optimized to deal fairly with congestion. This often isn't the case in wireless or space linked networks, where normal TCP becomes tricked into believing that the network is congested, even when it's not. To solve the problem, new algorithms have been developed and implemented that optimize transport over stressed communications links but still interoperate with TCP/IP: that's Xiphos SCPS-TP.

For example, don't shipping companies use advanced models to optimize the shipping of their parcels? Of course they do! they make the most of the available trucks, minimize cost and maximize results. It only makes sense to do the same with bandwidth.

If your communications environment has:



NETWORK

Star Topology: 32,000 routers path
Protocols: All TCP/IP, UDP based applications
TCP Acceleration: Integrated using SCPS Performance Enhancing Proxy

FORWARD CHANNEL

DVB-S Broadcast (AW, ETS 300 421)
Data Rate: 2 - 45 Mbps
Modulation: QPSK
FEC Coding: Reed Solomon with convolution rate 1/2, 2/3, 3/4, 5/6, 7/8

RETURN CHANNEL

Multi Access: Direct Sequence Spread Spectrum
User Data Rates: 32 kbps, 64 kbps, 128 kbps, 256 kbps, 512 kbps
Spreading Rate: 384 cps to 36 Mbps
Modulation: QMSK
FEC Coding: Rate 1/3 Parallel Concatenated Convolutional Turbo Code

HUB STATION

IP Encapsulation using DVB-S MPE
DVB-S compliant Forward Channel Modulator
Modular, extensible Raster Channel demods
SNMP based Network Management System with user friendly Graphical User Interface
Firmware traffic records maintained and archived; allows per packet billing

VSAT TERMINAL

Antenna: 0.9 - 1.2 m KuBand, typical
LNB: Standard TMO: 18V 400mA DC provided from DVB-S receiver
TXB: Proprietary 2W Ku TXB, or commercial standard II Band III Ku TXBs

MODULATOR

Dimensions: 343 x 305 x 79 mm (13.5" x 12.0" x 3.1")
RF Interfaces: Type F female connector
User Interfaces: 100Base-T Ethernet LAN, RJ45
Terminal Console Ports: Serial port for configuration & monitoring local equipment
RS232 via DB9F connector; operation rates of 9.6 kbps

User Network Services

DHCP Server
Network Address Translation (NAT)
Operating Temperature: +5 to +40C
AC Power: 85 to 265 VAC 50/60 Hz

OPTIONAL FEATURES

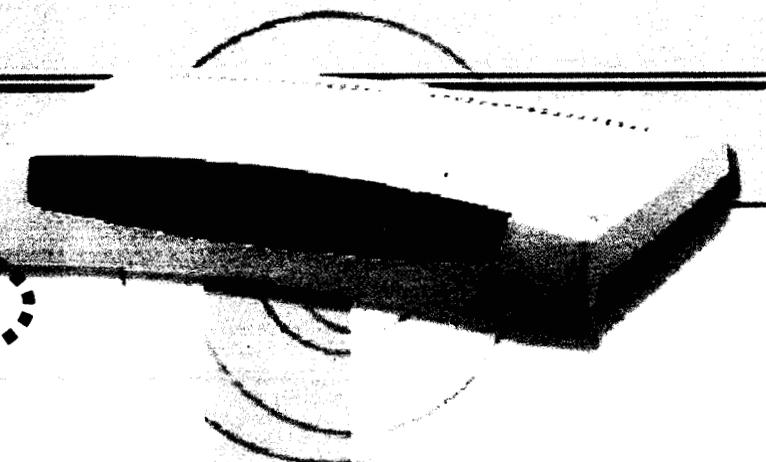
Web Caching for Hub and/or Remote
Conditional Access

NetScape
 File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location http://www.snapgear.com/datasheets/SnapGearSE_Datasheet.pdf

158%



SNAPgear

SnapGear SE — SkipWare™ Enhanced

Why SnapGear?

Security Protection from hackers through a world class firewall is only the start. Your privacy extends to your own private network of locations that are seamlessly and safely interconnected using VPN (Virtual Private Networking).

Simplicity SnapGear products take the complexity out of choosing the right product at the right place – no more hidden extras. Set up is a snap with a web-based administration tool that you'll probably only ever need once. Ask your ISP if they're using SnapGear; if so then chances are you'll only need to plug in and turn on.

Affordability With comparable features to any similar product on the market, yet usually at half the price, you're suddenly able to use the same advanced technology that's normally only available to large corporations.

Why SnapGear SE?

Introduction

Security and access to the Internet has never been simpler than with the powerful SnapGear family of home and

1 of 2 8.5x11 in Document: Done



- Overview
- White Paper
- Presentation (Partner Req.)
- Contact
- Partners

Internet-over-Satellite Performance Enhancement by Global Science & Technology, Inc.™

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Internet-over-Satellite Performance Enhancement with SkipWare™ Solutions

Global Science & Technology is the world leader in Internet-over-Satellite (IoS) performance enhancement, specializing in the implementation of SkipWare™, the industry's first commercial implementation of Space Communications Protocol Standards (SCPS) over satellite and hybrid networks.

ISPs that offer broadband satellite services. Whether your requirements include an end-to-end hardware solution, or simply the enhancement of your existing infrastructure, GST can customize the SkipWare™ solution best suited to your networking needs.

The SkipWare™ Solution
Throughput, Efficiency, Reliability, Cost-Reduction

The performance of standard IoS services can be severely degraded by the latency, high bit-error-rates and asymmetric bandwidth design typical of space-based communications. Traditional Internet transport protocols are ill-equipped to overcome these deficiencies. Long feedback loops often render a network's congestion controls ineffectual and wreck interactive end-user applications. This results in poor

Approved for our ongoing work for NASA and the Department of Defense, the SkipWare product line offers our clients a

2 of 4

- **Space Link interoperability between military and civilian spacecraft and their satellite control networks is here now using international standards with widespread flight pedigree and commercial support:**

- CCSDS Space Link protocols
- CCSDS Space Link Extension

- **“Internet-in-Space” operations are ready to go using international standards with widespread commercial support:**

- Native Internet protocols, running over CCSDS Space Links
- CCSDS-SCPS extensions of the native protocols to handle the stressed communications environment of space