



Senior Design Project in Electrical & Computer Engineering



Improving the Performance of CG TCP/IP Applications Over Mobile Satellite Links (Small Cutter)

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Sponsor: USCG R&D Center

Project Background

The Coast Guard is transitioning to a Transmission Control Protocol/Internet Protocol (TCP/IP) – based terrestrial network, termed the Coast Guard Data Network (CGDN+). There is a need to extend this network to support Coast Guard cutters and aircraft. The USCG Academy is doing research in conjunction with the R&DC to analyze and improve the performance of Coast Guard applications over commercial mobile satellite links. This project is a continuation of the project carried out by ENS Tobias Reid during his first class year at the academy.

Project Goals

- Create a model of a Small Cutter Testbed
- Test Small Business Innovative Research Contract (SBIR) developed software (Dial-on-Demand Router, e-mail proxies and web proxies) and offer feedback on it
- Determine if a commercial product, Mentant SkyX Gateway, will help improve the results.

Technical Approach

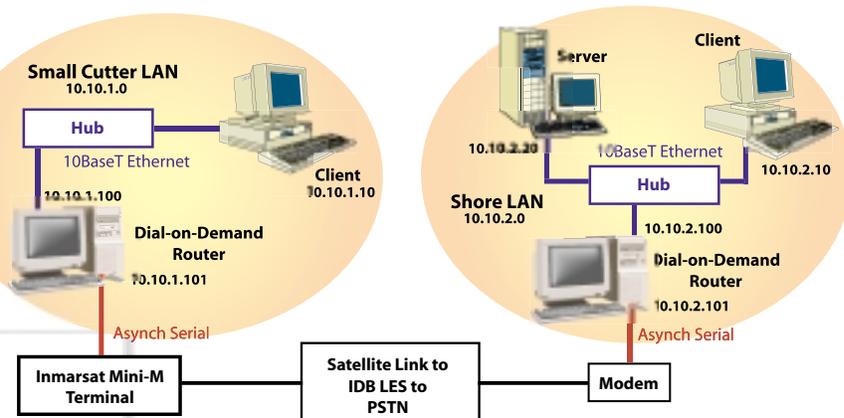
This year I plan to run tests on a possible software router and optimized TCP/IP protocol that is being developed under a Small Business Innovation Research (SBIR) contract. Phase I of the SBIR contract was completed and work on Phase II began in March 2000. This phase of the project is expected to be finished at the end of the 2000 calendar year or the start of the 2001 calendar year. Once those results can be received from the SBIR contract work, they can be integrated into our project work here.

The dial-on-demand router, e-mail proxies and web proxies created by Architecture Technology Corporation (ATC) will attack the conventional way of transmitting data. The e-mail and web proxies will reduce the amount of data being transmitted (by compression and caching multiple layers of the OSI model). Another way that the e-mail and web proxies will improve performance is by improving the efficiency of the protocols at various layers and maximizing the link utilization. The dial-on-demand router will help in the efficiency by reducing the amount of time to connect to the network.

Results

To date, only the Dial-on-Demand Router (DDR) has been tested. I just recently got the e-mail proxies and have not be able to test it due to problems that I have been experiencing with the DDR. In order to measure the improvements of using the DDR, I used a standard dial-up configuration with Windows NT RAS services and Dial-up Networking, to test the link established by the TCP/IP connection over PPP. The results were determined by timing measurements (with a stop watch) and performing multiple trials. The first three time marks are parts of the Mini-M system and not subject to optimization; the first time is for the terminal to get a channel and connect to the Land Earth Station (LES), the second time mark is when the terminal has established the connection on the PSTN, and the third is when both modems are connected. The final time is when a network connection has been established. The results are in the table to the right (times are averages and are elapsed time from the previous mark).

Small Cutter Network Test Bed



Typical Network Connect Times (sec)

To LES	To Ring	Modems Connect	Total Physical Layer	On Network	Total
6.8	11.01	10.28	28.28	22.64	50.92