



Calhoun: The NPS Institutional Archive
DSpace Repository

History of Naval Postgraduate School

Biographies

1997

Resume of Geoffrey Xie, 1997

Xie, Geoffrey

Monterey, California: Naval Postgraduate School

<http://hdl.handle.net/10945/54369>

This publication is a work of the U.S. Government as defined in Title 17, United States Code, Section 101. Copyright protection is not available for this work in the United States.

Downloaded from NPS Archive: Calhoun



Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>



Geoffrey Xie

Assistant Professor

(408) 656-2693
xie@cs.nps.navy.mil

Research Areas

Real-time networking and multimedia systems.

Research Descriptions

Network guarantees of quality of services are required for the transport of multimedia data such as digital audio and video. Specifically, end-to-end transfer delays and loss rate of a multimedia data flow must be bounded below specified values.

The objective of my research is to design networks that provide these guarantees. During the past two years, I have developed a new network architecture (called Burst Scheduling network), and a set of algorithms for providing end-to-end delay guarantees. The algorithms are highly efficient, suitable for high speed implementation.

My current focus is on the development of an application-level *guaranteed statistical service*. The service is characterized by (i) a bound on loss rate of *application-level* data units (e.g. pictures in a video application), (ii) data losses distributed fairly among flows subscribing to the service and uniformly over the duration of each flow, and (iii) a deterministic traffic model that promotes statistical multiplexing in the network. More specifically, a flow is modeled as a sequence of bursts, each of which carries the bits of an application-level data unit (ADU). The first and last packet of each burst are marked, and the first packet carries information on the ADU (including the bandwidth requirement). The traffic model enables admission control at the burst level as well as the flow level. To achieve high network utilization, overbooking is allowed in flow level admission control. Burst level admission control, on the other hand, is used to ensure that the capacity of each net-

work channel is not exceeded by bandwidths allocated to flows such that delay guarantees can be provided. The guaranteed statistical service will greatly enhance the ability of existing networks to support distributed multimedia applications such as remote teaching and video on demand.

Relevance To DoD/DoN

Real-time processing and dissemination of information is critical to many military operations such as command-and-control communications and reconnaissance missions. Military superiority in the future will depend even more on having accurate and easy-to-use information. It is necessary to upgrade existing information infrastructures to take advantage of the emerging multimedia technologies.

Recent Publications

G. Xie and S. Lam, "Delay Guarantee of Virtual Clock Server". *IEEE/ACM Transactions on Networking*, 3, 6 December 1995, pp. 683-689.

S. Lam and G. Xie, "Burst Scheduling Networks: Flow Specification and Performance Guarantees". In Proceedings of Workshop on Network and Operating Systems Support for Digital Video and Audio, Durham, NH, April 1995.

S. Lam and G. Xie, "Burst Scheduling Networks". In Proceedings of IEEE INFOCOM 1995, Boston, MA, March 1995. To appear in *Performance Evaluation*, 1997.

S. Lam and G. Xie, "Group Priority Scheduling". In Proceedings of IEEE INFOCOM 1996, San Francisco, CA, March 1996. To appear in 1997.

G. Xie and S. Lam, "An Efficient Adaptive Search Algorithm for Scheduling Real-Time Traffic". In Proceedings of IEEE International Conference on Network Protocols, Columbus, OH, October 1996.

G. Xie and S. Lam, "Real-Time Block Transfer under a Link Sharing Hierarchy". To appear in IEEE INFOCOM 1997, Kobe, Japan, April 1997.