MULTIMEDIA COMMUNICATIONS TECHNICAL COMMITTEE   MMTC

IEEE
COMMUNICATIONS
SOCIETY

E-LETTER

CONTENTS

The MultiMedia communications Technical Committee (MMTC) is a volunteer group that examines systems, applications, services and techniques in which two or more media are used in the same session. These media include, but are not restricted to, voice, video, image, music, data, and executable code. The scope of the committee includes conversational, presentational, and transactional applications and the underlying networking systems to support them.

MULTIMEDIA COMMUNICATIONS

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Joining MMTC is easy. Simply send an email to list@comsoc.org with the following string in the body of the message (NOT the subject line):
join multicomm

The mailing list, multicomm@comsoc.org is the communication channel with the MMTC. To post a message to the list, send e-mail to multicomm@comsoc.org.

You can also navigate through MMTC mailing list archive (since Feb. 2004).
http://barbarian.comsoc.org/comsoc.org/multicomm/

Future MMTC Meetings

ICC 2005, May 2005, Seul, Korea
Tuesday, 17 May – 17:30 – 19:30, Laurel/Level 2.

ICC 2005 MMTC Activities

TECHNICAL SYMPOSIUM (May 16-20, 2005)
ICC 2005: Multimedia Communications and Home Networking Symposium

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E-LETTER E-I-C
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A WORD FROM THE E-LETTER E-I-C   *Marco Roccetti*

The goal of the E-Letter is to disseminate issues that focus on opinions, initiatives, scientific achievements and perspectives of multimedia with an emphasis on the communication technologies.

With this in view, the current issue of the E-Letter features two new perspective articles.

The first article was provided by I. Ahmad, J. Kamruzzman and S. Aswathanarayaniah from the Gippsland School of Computing and IT, Monash University, Australia. In their article, titled "A Preemption Policy for Higher User Satisfaction in QoS-Enabled Networks", the authors discuss issues related to preemption policies in QoS-enabled networks.

In her perspective article, titled "Personalized Views Of Relevant Information Using A Collaborative Bookmark Management System", Antonella Carbonaro, from the Department of Computer Science, University of Bologna, Italy, discusses recommender system technology for information sharing and filtering.

We renew the invitation to everyone to become regular contributor by submitting proposals for columns, perspective articles and annotated bibliographies. Information for submissions can be found at the MMTC website:
http://www.comsoc.org/~mmc.

Enjoy this issue!

Marco Roccetti
Editor-in-Chief E-Letter

COSPONSORING / RELATED CONFERENCES AND WORKSHOPS

ICC 2005

May 16 - 20, 2005
Seoul, Korea
Today, the major trend of telecommunication networks and services is "convergence" and "seamless provision". Reflecting this trend, IEEE International Conference on Communications (ICC 2005) choses "towards the era of ubiquitous networks" as the theme of ICC 2005. Under this theme, ICC 2005 will feature the latest developments in telecommunications from a technical perspective and discuss likely trends with leading technical specialists from all over the world. At the same time, influential business figures will be invited to add business flavor to ICC 2005.

1st International Symposium on Multimedia over Wireless

June 13-15, 2005
Maui, Hawaii, USA
The 1st International Symposium on Multimedia over Wireless will be held at Maui, Hawaii in June 13-15, 2005, in conjunction with the World's Premier International Conference on Wireless Networks, Communications, and Mobile Computing 2005 (WirelessCom'05). The symposium will focus on the state-of-the-art research in various important issues related to emerging technologies and standards on video coding and transmission over wireless networks. The symposium features keynote address, technical program, and outstanding paper awards. Outstanding papers will be invited to extend to full version for a special issue of the Journal of Wireless Communications and Mobile Computing, which is scheduled to be published in early 2007. The deadline for submitting a paper to the symposium is February 15, 2005. For more information, please visit the symposium website: http://www.ece.northwestern.edu/~haohong/wirelesscom05/index.html.

ICME 2005

July 6-8, 2005
Amsterdam, The Netherlands
IEEE International Conference on Multimedia & Expo (ICME) is a major annual international conference organized with the objective of bringing together researchers, developers and practitioners from academia and industry working in all areas of multimedia. ICME serves as a forum for the dissemination of state-of-the-art research, development, and implementations of multimedia systems, technologies, and applications.

CCNC 2006

January 7 - 10, 2006
Las Vegas, Nevada, USA
IEEE Consumer Communications and Networking Conference (CCNC) will present the latest approaches and technical solutions in the areas of consumer networking, enabling technologies such as middleware and multimedia, and novel applications and services. CCNC 2006 will include a peer-reviewed program of technical sessions, technology application panels, tutorials, and poster/demo sessions.

CONFERENCE CALENDAR

CONFERENCE	LOCATION	INFORMATION
ICC 05 International Conference on Communications	May 16 - 20, 2005, Seul, Corea	http://www.icc05.org/
VTC 05 Spring The 61st IEEE Semiannual Vehicular Technology Conference	May 29 – June 1, 2005, Stockholm, Sweden	http://ewh.ieee.org/soc/vts/conf/vtsconf.html
WirelessCom'05 International Conference on Wireless Networks, Communications, and Mobile Computing	June 13-15, 2005 Maui, Hawaii, USA	http://www.ece.northwestern.edu/~haohong/wirelesscom05/index.html
ICME 05 IEEE International Conference on Multimedia and Expo	July 6 - 8, 2005, Amsterdam, Netherlands	http://www.icme2005.org/
CCNC 06 IEEE Consumer Communications and Networking Conference	January 7 - 10, 2006, Las Vegas, Nevada, USA	http://www.ieee-ccnc.org/2006/
ICC 06 International Conference on Communications	June 11 - 15, 2006, Istanbul, Turkey	http://www.icc2006.org/

MMTC INTEREST GROUPS

Based on the research interests of MMTC members, five IGs have been initiated led by experts and active researchers in each area. Detailed info about the IG charters, focus areas of each IG, and their activities are announced at
http://www.comsoc.org/~mmc/
and through the reflector. The five IGs are:

(MSIG) Media Streaming
   Interim Chair: Pascal Frossard
   Interim Vice-chair: Juan Carlos de Martin

(HNIG) Home Networking
   Interim Chair: Prof. Madjid Merabti
   Interim Vice-chair: Heather Yu

(MobIG) Mobile and Wireless Multimedia
   Interim Chair: Prof. R. Chandramouli
   Interim Vice-chair: Oliver Wu

(SecIG) Multimedia Security
   Interim Chair: Dr. Qibin Sun
   Interim Vice-chair: Suba Subbalakshmi

(QoSIG) Quality of Service
   Interim Chair: Qian Zhang
   Interim Vice-chair: Apostolis Salkintzis

Call for IG Members:

IG Membership: We encourage you to apply for IG membership. IG Membership is free. It is a great networking opportunity. It gives means to contribute to technical activities within the multimedia communications area. Information about how to join each IG will be available at the MMTC Web site. Please stay tuned.

AWARDS

MMTC Distinguished Service Award – Given to a MMTC member with exemplary service to MMTC over a sustained period of time.

Prize
Certificate and plaque.

Basis for judging
Exemplary service to MMTC over a sustained period of time.

Eligibility
- The nominee must be a MMTC member at the time of nomination.
- The nominee must have been a MMTC member for a sustained period of time.

Winner of the 2004 ComSoc MMTC Distinguished Service Award
Dr. Charles N. Judice
For his exemplary service to the Multimedia Communications Technical Committee and the multimedia communications community at large.

MMTC Best Paper Award – Given to an outstanding paper in the area of multimedia communications published in any ComSoc magazine, journal, or ComSoc sponsored conference in the previous two calendar years.

Prize
IEEE plaque signed by the ComSoc President.

Basis for judging
Any paper published in an IEEE Comsoc journal/magazine or in the proceedings of an IEEE Comsoc-sponsored conference/workshop/symposium, in the two years preceding the election.

A first round has selected the five best papers among 17 nominated papers. The second round then sorted the five best papers.

Winner of the MMTC best paper award 2004
A Cross-Layer Quality-of-Service Mapping Architecture for Video Delivery in Wireless Networks, by Wuttipong Kumwilaisak, Y. Thomas Hou, Qian Zhang, Wenwu Zhu, C.-C. Jay Kuo, and Ya-Qin Zhang, published in *IEEE JSAC*, December 2003.

E-LETTER EDITORIAL BOARD

To all MMTC members: If your postal address, telephone or fax numbers have changed, please update them with the committee secretary. You can review our current records on our web page at http://www.comsoc.org/~mmc/.
If you like to join MMTC Mailing List, the indications how to subscribe/unsubscribe are reported at http://www.comsoc.org/~mmc/membership.html.

CALL FOR PAPERS   CCNC 2006

CCNC 2006 - IEEE Consumer Communications and Networking Conference

7-10 January 2006, Las Vegas, NV, USA Harrah's Hotel & Casino, www.ieee-ccnc.org

IEEE Consumer Communications and Networking Conference, sponsored by IEEE Communications Society, is a major annual international conference organized with the objective of bringing together researchers, developers, and practitioners from academia and industry working in all areas of consumer communications and networking. CCNC 2006 will present the latest developments and technical solutions in the areas of home networking, consumer networking, enabling technologies (such as middleware), and novel applications and services. The conference will include a peer-reviewed program of technical sessions, special sessions, business application sessions, tutorials, and demonstration sessions.

Authors are invited to submit complete unpublished papers, which are not under review in any other conference or journal. Authors should submit a five-page technical paper manuscript (or a two-page demonstration summary) in double-column IEEE format including authors' names and affiliations, and a short abstract through EDAS, following the submission guidelines available on the CCNC2006 website. Only electronic submission will be accepted. Topics include, but are not limited to, the following:

Networking
- Ad-Hoc and Sensor Networks
- Body and Personal Area Networks
- Distributed Gaming Protocols
- Economics of Entertainment Networks
- Home Networks
- Interworking
- Last Mile Network Technologies
- Multimedia Distribution Protocols
- Network Architecture
- Network Management and Control
- Network Protocols
- Network Security and Privacy
- Policy Support
- QoS Support and Performance
- Residential Gateways
- Session, User and Device Mobility
- Thin Client Support
- Vehicle Networks
- Wireless Networks

Enabling Technologies
- Middleware (e.g.,Java, .Net, XML, OSGi, JTWI, JXTA, MHP/OCAP, UPnP, etc.)
- Multimedia Technologies
- Image Retrieval
- Service Composition
- Look-up Technologies
- Operating Systems for Mobile Devices
- Database Management Systems
- The Semantic Web
- Data and Program Migration
- Consumer Middleware
- Service and Device Discovery
- Interoperability
- Biometrics for Security
- Digital Rights Management
- Wearable Computers
- Pervasive Computing
- Transmission Technologies (e.g., Ultra Wideband)
- Digital TV

Novel Applications
- Networked Appliances
- Peer-to-Peer Applications and Services
- Mobile Applications
- Entertainment and Games
- Home Automation
- Medical and Health Care
- Surveillance, Home Monitoring
- Service Evaluation
- Accessibility
- Multi-Modal Applications
- e-Commerce, m-Commerce
- Location-based Services
- Personalization
- Virtual Home Environment
- Field Trials

There will be a Best Paper Award and a Best Student Paper Award for the best submitted paper and best submitted student paper.
There will be a Best Demonstration Award for the best demonstration, as judged by a special Venture Advisory Committee.
A journal special issue consisting of selected papers from this conference is being planned. Authors of selected papers will be invited to submit an extended version of their paper for the journal. Student Travel Grants will be made available.

Preliminary Schedule:
- Technical paper submission deadline and Special session proposal submission deadline: 15 June, 2005.
- Technical application panel and Tutorial proposal submission deadline: 1 September, 2005.
- Paper acceptance notification deadline: 1 September, 2005.
- Demonstration proposal submission deadline: 17 September, 2005.
- Final camera ready paper submission deadline: 14 October, 2005.

NEW IEEE/COMSOC POLICY: *all accepted CCNC 2006 technical paper presenters must register at the FULL registration rate. For authors presenting multiple papers, one FULL registration is valid for up to three papers.*

Chair: V. Michael Bove Jr., MIT Media Laboratory
Technical Program Chair: Heather Yu, Panasonic

CALL FOR PAPERS   ICC 2006

ICC 2006 – IEEE International Conference on Communications

General Information

ICC 2006 will be held in Istanbul, Turkey on 11 - 15 June 2006 under the theme of 'Bridging Continents Through Communications.' The technical program will consist of a general topic symposium, eight specific symposia, Business Applications and Executive Sessions , Tutorials, and Workshops. For the technical sessions, the ICC 2006 program committee is soliciting original papers describing state-of-the-art research and development in all areas of communications and networking. Prospective authors are invited to submit original technical papers for oral or poster presentations at ICC 2006 and publication in the Conference Proceeding. (IEEE Communications Society policy states that all accepted ICC 2006 technical presenters must register at the full or limited rate. For authors presenting multiple papers, one full or limited registration is valid up to three papers.) Proposals for Tutorials and Workshops are also invited. Scope of ICC 2006 includes, but is not limited to, the symposia topics listed below.

General Symposium

The General Symposium at ICC 2006 will include topics that are not covered under the individual symposia listed below. For further details, please contact the General Symposium co-chairs: Raouf Boutaba, (rboutaba@bbcr.uwaterloo.ca) and Guenter Schaefer, (g.schaefer@ieee.org).

Specific Symposia

In addition to the General symposium, ICC 2006 will feature eight (8) separate specific symposia as listed below. For further information, please contact one of the co-chairs of the specific symposia of interest.

- Wireless Ad Hoc and Sensor Networks
  Co- Chairs:
  Mohsen Guizani (mguizani@cs.wmich.edu)
  Hamid Aghvami (h.aghvami@kcl.ac.uk)
  Khaled B. Letaief (eekhaled@ee.ust.hk)
  Ahmed Safwat (safwat@cs.queensu.ca)
- Next Generation Mobile Networks
  Co- Chairs:
  Abbas Jamalipour (a.jamalipour@ieee.org)
  Heinrich Stüttgen (stuttgen@netlab.nec.de)
  Pascal Lorenz (lorenz@ieee.org)
- Wireless Communications

  Co- Chairs:
  Sonia Aissa (aissa@inrs-emt.uquebec.ca)
  Oguz Sunay (osunay@ku.edu.tr)
  Velio Tralli (vtralli@ing.unife.it)
- Communication Theory
  Co- Chairs:
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  Bane Vasic (vasic@ece.arizona.edu)
  Sedat Oelcer (oel@zurich.ibm.com)
- Optical Systems and Networks
  Co- Chairs:
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  Byrav Ramamurthy (byrav@cse.unl.edu)
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  Co- Chairs:
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  Refik Molva (molva@eurecom.fr)
  Carlos Becker WestphalI (westphal@lrg.ufsc.br)
- Signal Processing for Communications
  Co- Chairs:
  Tomohiko Taniguchi (tani@flab.fujitsu.co.jp)
  Said Boussakta (s.boussakta@leeds.ac.uk)
- Communications QoS, Reliability and Performance Modeling
  Co- Chairs:
  Hiromi Ueda (ueda@cs.teu.ac.jp)
  Nelson Fonseca (nfonseca@ic.unicamp.br)

Business Applications And Executive Sessions

Proposals are invited for panel sessions on the latest technical and business issues in communication and networking topics. Proposals must be submitted to the Chair: Cengiz Evci, (cengiz.evci@alcatel.fr).

Tutorials And Workshops

Proposals are invited for half or full-day tutorials and workshops in communication and networking topics. Proposals must be submitted to the Tutorials Chair: Veli Sahin, (veli@ieee.org) or the Workshops Chair: Abbas Yongacoglu, (yongacog@site.uottawa.ca).

Important Dates
- Complete Paper Manuscripts Due: 15 September 2005.
- Acceptance Notification: 31 December 2005.
- Camera-Ready Manuscripts Due: 15 February 2006.
- Proposals Due for Application Sessions, Tutorials, Workshops: 15 September 2005.

PERSPECTIVE ARTICLE   *I. Ahmad, J. Kamruzzman, S. Aswathanarayaniah*

A Preemption Policy for Higher User Satisfaction in QoS-Enabled Networks

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Abstract- **Preemption is a widely recommended technique to accommodate high priority call connections in a QoS-enabled multimedia network. Preemption technique is governed by a policy which makes the decision about which connections to preempt when resource scarcity is experienced. In this letter, a new criterion, namely, user satisfaction in context of service continuity is introduced in formulating the objective function that defines the preemption policy as an optimization problem. We propose a model for the network enterprise to calculate an estimated level of user satisfaction of the preemption enabled call connections and incorporate this information into preemption policy. Simulation results show that the proposed policy when adopted by network enterprise achieves higher user satisfaction computed on the users' end.**

Key words: **Preemption, quality of service (QoS), service continuity, user satisfaction**.

I. INTRODUCTION

For years, Quality of Service (QoS) in computer networks has been attracting extensive attention because of the increasing use of multimedia applications. Most of the multimedia applications require point to point guarantee of QoS in forms of bandwidth, end to end delay, jitter, packet loss etc. Reservation of resources from source to destination is a highly recommended technique (RSVP in IP, RSVP-TE in MPLS, ATM signaling in ATM network) to ensure point to point QoS of a multimedia call connection. Since the amount of resources is limited, contention for resources among multiple call connections is a common scenario. Differentiation of call connection is required to solve the contention and ensure connection specific quality of service. One of the widely used techniques to resolve contention for resources and ensure connection specific QoS is the preemption of less privileged calls to supply enough resources for higher priority calls when resource scarcity is experienced. Preemption technique is governed by a policy which

determines which calls to preempt under resource scarcity. For its high importance, formulating an optimal preemption policy has attracted increasing interests from researchers over a period of time.

Oliveira *et al.* [1] formulated the preemption policy as an optimization problem which was basically an organized formulation of research conducted by Peyravian *et al.* [2]. The three optimization criteria considered in their work are: i) minimizing the number of preempted connections, ii) minimizing the priority level of preempted connections, and iii) minimizing the amount of bandwidth to be preempted. This particular work provides promising results as far as the utilization of network resources is concerned. However, service continuity of call connection which is perceived by users as of high importance in a QoS-enabled multimedia network [3] has not been considered in any of the previous works. When an ongoing call is preempted , bandwidth is no longer allocated for that connection and its continuity of service is disrupted due to connection termination which leads to user dissatisfaction. In this work we propose a model to calculate estimated loss in user satisfaction resulted from disruption in service continuity. We use this model to derive information which is used as the fourth criterion for preemption policy in addition to the other three. Simulation results show that the proposed policy significantly improves user satisfaction perceived by users.

II. PROBLEM DEFINITION

Consider a new connection request $i = [b_i, y_i]$ where b_i is the bandwidth demand and y_i is the priority level of that call connection. If $\sum b_{j \in S} + b_i > C$ holds true at a link with capacity C, it indicates that some of the low priority call connections need to be preempted to accommodate the new call connection i where S is the set of existing on-going call connections. The problem of a preemption policy is thus to find a set $U \subseteq S$ such that $y_{j \in U} < y_i$, $\sum b_{j \in U} \geq \sum b_{j \in S} + b_i - C$ and elements of set U are with the attribute 'preemption enabled'.

The solution which closely fits with the problem statement was proposed by Oliviera *et al.* [1]. In their work a mathematical formulation was proposed which combined the interest of three important objectives mentioned earlier in previous section. The first objective is important to provide higher privilege to high priority connections. The second objective is equally important as higher number of preemption results in higher number of incomplete connections. After preemption, the preempted call may be tried for possible re-routing. Re-routing is highly expensive in a large high speed network and there is no guarantee that another route that satisfies the QoS of the preempted call will be available immediately after preemption. Disruption of service continuity of the preempted calls becomes highly probable in such case. The third objective is to minimize the preempted bandwidth and it guarantees the minimal wastage of resources and improves resource utilization. Mathematically the preemption policy is an optimization problem with the objective function as follows

$$F(\mathbf{z}) = \alpha(\mathbf{z}.\mathbf{y}^T) + \beta(\mathbf{z}.\mathbf{1}^T) + \gamma(\mathbf{z}.\mathbf{b}^T) \qquad (1)$$

The vector $\mathbf{z}$ is an optimization variable and it is composed of n binary variables where n is the total number of on-going preemption enabled call connections in the system. Each element $\mathbf{z}(l)$ of vector $\mathbf{z}$ is defined as

$$\mathbf{z}(l) = \begin{cases} 1 & \text{if call } l \text{ is preempted} \\ 0 & \text{otherwise} \end{cases}$$

$\mathbf{z}.\mathbf{y}^T$ represents the priority level of the preempted calls, $\mathbf{z}.\mathbf{1}^T$ represents the number of preempted calls and $\mathbf{z}.\mathbf{b}^T$ represents the total preempted bandwidth. Vector $\mathbf{y}$ and $\mathbf{b}$ indicate the priority and bandwidth of the existing call connections respectively where increasing value of y_i indicates higher priority. α, β and γ are the weights that select the level of preference for priority level, number of connections and bandwidth of preempted connections respectively. So, the solution of the problem stands as to minimize the objective function $F(\mathbf{z})$ subject to the constraint

$\mathbf{z}.\mathbf{b}^T \geq r$ where scarcity: $r = \sum b_{j \in S} + b_i - C$

Real-time use of such optimization is only feasible in small and medium size network. However, for a large size network real-time use of optimization may prove infeasible in consideration of computation and time complexity. To solve this problem Oliviera *et al.* [1] proposed a heuristic for a large size network as

$$H(l) = \alpha \, y(l) + \beta + (b(l) - r)^2 \gamma \qquad (2)$$

where $y(l)$ indicates the priority level and $b(l)$ indicates the bandwidth of the call connection l. H is calculated for each call and the calls are preempted in ascending order of H.

The above mentioned preemption policy does not consider the current level of user satisfaction of the on-going call connections for preemption decision. An effective preemption policy should achieve higher user satisfaction. This requires to model user satisfaction as an estimate-able metric and incorporates this information in the objective function.

III. PROPOSED SOLUTION

Importance of service continuity on user satisfaction is different for different multimedia applications. An application whose importance increases sharply towards the end of its completion (e.g., live broadcasting of a game or a movie in video on demand) provides more satisfaction towards the end of its duration and thus the satisfaction curve is exponential in nature. Applications like guaranteed data transfer or voice conversation have different satisfaction curve. We define the user satisfaction (gain) function as:

$$US_i = \begin{cases} e^{k\left(\frac{T_i}{D_i}-1\right)} & \text{if } T_i < D_i \\ 1 & \text{if } T_i \geq D_i \end{cases} \qquad (3)$$

where T_i is the time of data transmission before preemption and D_i is the complete data transmission time of call connection i if not placed for preemption. However, when a call connection enters into the system the network provider does not have the idea of exact value of D_i and thus the network provider can at best estimate it. In this work, we model D_i equal to mean data transmission time calculated from observed lifetime of the calls of similar type (group) to which connection i resembles the most (e.g., voice, video, or ftp type of application). Value of k is application specific and it indicates the emphasis of service continuity on user satisfaction. D_i can be
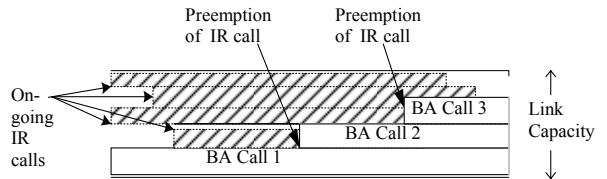

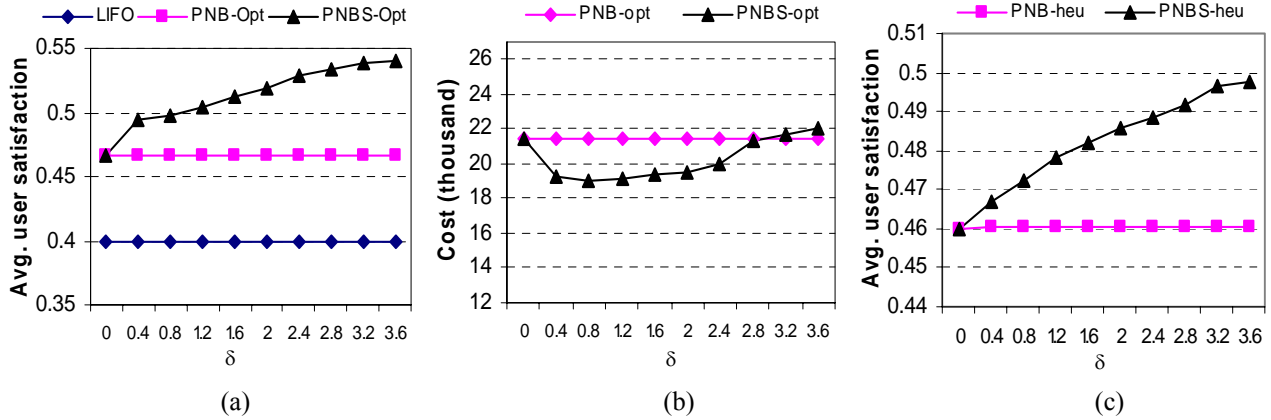Fig. 1: Preemption in BA reservation.

Fig. 2: Comparison of (a) user satisfaction (optimization) (b) objective function cost
(c) user satisfaction (heuristic) in different preemption policies.

different for different groups of applications and it can be obtained from distributions of applications in real time networks [6]. US_i denotes the estimated level of user satisfaction when calculated on network provider side (calculated based on estimated value of D_i and used in preemption policy) whereas it shows the actual level of user satisfaction when calculated on users' side (calculated based on exact value of D_i as reported in section IV). The new formulation of the problem considers the criterion of minimizing the estimated level of user dissatisfaction. We define the new objective function as

$$F(\mathbf{z}) = \alpha(\,\mathbf{z}.\mathbf{y^T}) + \beta\,(\mathbf{z}.\mathbf{1^T})\ + \gamma\,(\mathbf{z}.\mathbf{b^T}) + \delta\,(\mathbf{z}.\mathbf{d^T}) \qquad (4)$$

Where **d** is a vector that represents the level of user dissatisfaction when calls are placed for preemption. Each element d_i of **d** is given as

$$d_i = 1 - US_i$$

where US_i is estimated from Eq. 3. The complete problem is given as

Given α, β, γ, δ, **y, b, d,** Find **z** that
minimizes $F(\mathbf{z})$ subject to $\mathbf{z}.\,\mathbf{b^T} \geq r$

This is a mixed integer optimization problem. We propose a heuristic to follow the trend of this optimization. The heuristic is given by the following equation

$$H(l) = \alpha\ y(l) + \beta + (b(l) - r)^2\ (\ \gamma + \delta d(l)\ ) \qquad (5)$$

where $d(l) = 1 - US_l$

IV. SIMULATION RESULTS

Simulation of the proposed policies has been done in context of Book-Ahead (BA) reservation for multimedia traffic. Book-ahead reservation requires guarantee of resource availability in advance (e.g.,

video conferencing, distributed applications etc.). On the contrary, an Instantaneous Request (IR) call connection requires resource reservation instantly upon arrival of connection request (e.g., voice conversation, ftp etc.). A BA call enjoys higher priority over an IR call because it books resources in advance. A preemption policy plays a very important role when a BA connection becomes active and requires resources to be preempted in a scenario as shown in Fig. 1. where resources are shared between IR and BA call connections [4], [6]. A single bottleneck topology used for the simulation remains the same as in other related works [4], [6]. The capacity of each link is assumed to be 10 Mbps. IR arrivals to the core link are assumed to follow Poisson distribution with a mean arrival rate of 11 calls per minute. Arrival of BA calls is also a Poisson distribution with a mean arrival interval of 50 sec. Bandwidth demand for IR calls is assumed to be exponentially distributed with a mean of 256 kbps. Bandwidth requirement of each BA call is exponentially distribution with a mean of 1.25 Mbps. To nullify the impact of difference in mean call holding time, call duration for both BA and IR calls are determined by exponential distribution with the same mean of 300s. Results in this section are shown for BA limit =0.8 which physically limits the maximum usage for aggregate BA calls upto 80% of link capacity. We used a modified version of ANCLES simulator to conduct the simulation.

To make performance analysis of different policies, actual user satisfaction measured at users' end is reported in this section which is computed (Eq. 3) using the actual lifetime (D_i) of calls (i.e., lifetime if not preempted). We investigated three preemption

policies: i) the proposed policy PNBS (optimization with priority, number, bandwidth and user satisfaction using Eq. 4), ii) PNB policy (optimization with priority, number and bandwidth using Eq. 1) and iii) Last In First Out (LIFO) policy. It is important to mention that LIFO is another type of preemption policy where call connections are preempted in Last In First Out fashion [5]. Mixed integer optimization technique was applied for PNB and PNBS optimization using the standard LINDO API 2.0 tools.

Figure 2a shows the average level of user satisfaction achieved in three different preemption policies. Co-efficient δ (associated with the criterion of user dissatisfaction) is varied keeping α, β, γ fixed (=1.0) in order to investigate its impact on performance. Simulation result shows that PNBS-optimization achieves the highest average level of user satisfaction. Putting more emphasis on user satisfaction (i.e., by increasing δ) increases the level of user satisfaction. The improvement achieved by PNBS-optimization is higher than 7% over the LIFO policy and 3% over PNB-optimization policy for all δ>0. As the value of δ is increased the difference becomes more evident. At δ = 3.6, PNBS-optimization achieves around 14% higher satisfaction over LIFO policy and 8% higher satisfaction over PNB-optimization policy. When a new criterion is added to the objective function, relative contribution of the other three criteria to the objective function changes (Eq. 1 & 4). Observation confirms that PNBS optimization achieves slightly lower preemption rate, slightly higher average priority level of preempted calls and occasional improvement in utilization in comparison with PNB optimization. To compare the complete impact on these three parameters we compare a cost function (Eq. 1) incorporating these three parameters in both models with the co-efficients α, β, γ equal to 1. Figure 2b shows the cost function in both models which concludes that PNBS optimization achieves lower cost function than PNB optimization for most of the cases.

Results obtained from heuristic solution (Eq. 2 & 5) are shown in Fig. 2c. The figure indicates that heuristic follows the trend of optimization with increasing δ and the proposed policy consistently shows better performance.

V. CONCLUSION

In this letter, we proposed and investigated an improved preemption policy for a QoS-enabled multimedia network. The key objective was to incorporate a new criterion, customer satisfaction in decision making for preemption. Simulation results show that the proposed policy when adopted by the network enterprise outperforms existing preemption policies in terms of customer satisfaction measured at users' end and reduces call preemption rate.

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PERSPECTIVE ARTICLE

Personalized Views Of Relevant Information
Using A Collaborative Bookmark Management System

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Abstract- **The paper introduces recommender system technology for information sharing, filtering and recommendation according to the user's personal requirements and interests. It proposes a system developed within this framework and describes how to extend the technology in e-learning framework, addressing issues like trying to determine the type or the quality of the proposed information.**

Key words: **Information Filtering, User Profiling**.

I. INTRODUCTION

The vast amount of information available on the Internet has given rise to a number of techniques for locating relevant, useful or interesting information for a given user. Such systems perform tasks such as prioritizing, filtering, or sorting electronic mail or newsgroup articles and locating interesting articles in unread newsgroups; helping the user to find relevant information on the World Wide Web; notifying the user when a significant change occurs to a web site or providing access to information relevant to the user's current task.

This paper presents the main characteristics of recommender systems for information sharing, filtering and recommendation according to the user's personal requirements and interests. Thanks to the information sharing and recommendation facility, recommender systems contribute to human collaborative works: they could support group collaboration among people involved in a work process, independently of time and space distance, and learn from positive and negative experience in the group practice. These systems can find application in any context in which the collaboration between groups is a requisite, like a Web-based learning system.

The starting point is the use of statistical information extraction and natural language parsing techniques to automatically derive classificatory and metadata information from primarily textual data (web pages, Word, postscript or similar documents, etc.). While still challenging for large ontologies, text classification methods which semantically categorize an entire document are now relatively well-understood, and provide a good level of performance.

II. THE PERSONALIZED ENVIRONMENT

In order to foster the development of Web-based information access and management, it is relevant to be able to obtain a user-based view of available information. Often, today's information access tools are not able to provide the right answers for a user query but, rather, provide large supersets (e.g, in Web-search engines). Search for documents uses queries containing words or describing concepts that are of interest to the user. Most content retrieval methodologies use some type of similarity score to match a query describing the content, and then present the user with a ranked list of suggestions. These methodologies identify the IF problem (Hanani, 2001).

The basic idea is to use suitable representations of both available information sources and user's interests in order to match as accurate as possible, user information needs, as expressed in his query, and available information. The most frequently representation used in IR and text learning is based on the Vector Space Model (VSM). Since the resources of the system are Web pages, to obtain a vector representation it is necessary to apply a sequence of contextual processing to the source code of the pages. To filter information resources, according to user interests, we must have a common representation for both the users and the resources. This knowledge representation model must be expressive enough to synthetically and significantly describe the information content. The use of the VSM allows to update the user profile in accordance to consulted information resources (Salton, 1989).

The recommendation system may include a process of classification and recommendation feedback, in which the user agent learns from the user and consequently adapts itself according to the changes in his interest; this gives the agent the chance to be more accurate in the following classification and recommendation steps. Thus, a high number of users using the system would make the following agent's actions more accurate. This allows the systems to be capable of reflecting continuous ongoing changes of the practices of its member, as required by a cooperative framework.

If, by one hand, a content-based approach allows to define and maintain an accurate user profile, on the other hand it has the limitation of dealing only with textual resources. Differently, in a collaborative approach, resources are recommended based on the rating of other users of the system with similar interests. As there is no analysis of the item content, collaborative filtering systems can deal with any kind of item, not just limited to textual content. This way, users can receive items with content that is different from the one received in the past. By adopting a hybrid approach, the systems are able to effectively filter relevant resources from a wide heterogeneous environment like the Web, taking advantage of the common interests of the users and also maintaining the benefits provided by content analysis.

In this framework we have developed InLinx (Bighini, 2004); InLinx helps the user to classify domain specific information found in the Web and saved as bookmarks, to recommend these documents to other users with similar interests and to periodically notify new potential interesting documents. InLinx has been designed to answer to the common bookmark lack of immediate portability and of visibility from different locations. Moreover, we have extended the described recommender system to address issues like trying to determine the type or the quality of the information presented in distributed learning environment.

Our experimental tests produce several reasons to expect that the use of the system promotes user information management. First of all, we have tested the classification process. It achieves good results since the first uses of the system, without a formerly training due to used text-learning techniques (stop-list filtering, stemming algorithm, VSM representation and TF-IDF term weighting) and because of fixed category profile never substituted in the user prototype.

Secondly, in order to evaluate the collaborative recommendation techniques, we have considered different initial user profiles. Tests carried out have highlighted the different components which influence the selection of those who receive recommendation:

- user interest in the category of recommended resource,
- confidence level between users,
- relation between the class prototype of the recommended resource and the class prototype of other categories.

The experiments performed have shown that the system responds to the "gray sheep problem", which is common in a pure collaborative recommendation system: that is, a user with interests different from those of other users will be able to receive recommendation as well. Moreover, we can consider that in the used test environment each classification produces approximately two recommendations, showing the importance of the collaborative component of the system.

Finally, to evaluate the content-based recommendation techniques we have considered the knowledge needs of a user surfing the Web to find detailed information about a specific subject. For example, we have taken into account several issues of on line journals from the web site of the Kluwer OnLine. Our classification algorithm executes ad hoc classification as regards user prototypes, to consider that they can dynamically change over time. So, it is possible that the same document is proposed in two different categories for two different users. We have tested the system using some issues from the "Data Mining & Knowledge Discovery" journal, when users have already saved their bookmarks and the system has updated prototypes and profiles.

For a particular user, it is reasonable to think that processing a set of correctly classified relevant and inappropriate documents from a certain domain of interest, may lead to identify the set of relevant keywords for that domain at a certain time. Thus, the user domain specific sets of relevant features, called prototypes, may be used to learn how to classify documents. In particular, to consider the peculiarity of positive and negative examples, we define positive prototype for a class cj, a user ui at time t, as a finite set of unique indexing terms, chosen to be relevant for cj, up to time t. Then, we define negative prototype as a subset of the corresponding positive prototype, whereas each element can be found at least once in the set of documents classified as negative examples for class cj. Positive examples for a specific

user *ui* and for a class *cj*, are represented by the documents explicitly registered or accepted by *ui* in *cj*, while negative example are either deleted bookmarks, misclassified bookmarks or rejected bookmarks that happens to be classified into *cj*.

According to traditional IR, we must state our classification problem as a combination of Text Categorization and Relevance Feedback. As traditional methods (for example, the Rocchio algorithm) don't allow to add or replace keywords from the prototype, we felt the need to introduce an ad-hoc algorithm that take into account the possibility that the dimension of the profile vector may change over the time, in order to reflect the user's current interest.

To manage the information content recommendation we maintain a user vs. category matrix. Then, to learn the recommendation receivers, we use a matrix maintaining the user's confidence factor. Finally, to evaluate the similarity between users we have chosen the Pearson-r correlation measure. Detailed information about technical characteristics can be found in (Bighini, 2004; Andronico, 2004).

In a Web-based learning environment there is likely to be large number of educational resources (web pages, lectures, journal papers, learning objects, …) stored in many distributed and differing repositories on the Internet. Without guidance, students will probably have great difficulties in finding the reading material relevant for a particular learning task. The meta-data descriptions concerning learning object representation provide information about properties of the learning objects. However, the meta-data by itself does not provide qualitative information about different objects nor does it provide information for customized views. This problem is becoming particularly important in Web-based education where the variety of learners taking the same course is much greater.

Vice versa, the courses produced using adaptive hypermedia or intelligent tutoring system technologies are able to dynamically select the most relevant learning material from their knowledge bases for each individual student. Nevertheless, generally, these systems can't directly benefit from existing repositories of learning material (Brusilovsky, 2002).

The described system provides a contribution to this issue. In this context, standard keyword search is of very limited effectiveness. For example, it cannot filter for the type of information (tutorial, applet or demo, review questions, etc.), the level of the information (aimed at secondary school students,

graduate students, etc.), the prerequisites for understanding the information, or the quality of the information. The automatic recommendation of relevant learning objects is obtained adopting filtering criteria based on the value of selected metadata fields.

Summarizing, the key elements of the described system could be highlighted as follows. The system provides immediate portability and visibility from different user locations, enabling the access to personal bookmark repository just by using a web browser. The system assists users in finding relevant information providing personalized recommendation. The system directly benefits from existing repositories of digital documents providing access to open huge amount of information. The system reflects continuous ongoing changes of the practices of its member, as required by a cooperative framework.

One research direction we are pursuing is to adopt solutions for user and resources modelling capable of capturing not only structural but also semantics information to improve the quality of the resulting cluster descriptions. We utilize WordNet (Cognitive Science Laboratory, Princeton University, http://wordnet.princeton.edu/) and conceptual hierarchy intersection to disambiguate word senses of document terms in order to enable effective classification results.

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CALL FOR CONTRIBUTIONS

Call for Contributions per Annotated Bibliographies for
The Multimedia Communications Technical Committee
E-Letter
Editor in Chief: Marco Roccetti
IEEE Communications Society

The E-letter of the Multimedia Communications Technical Committee of the IEEE Communications Society is an electronic publication that welcomes submissions of annotated bibliographies.

A considerable barrier to entry into a new field of research is to become aware of the existing literature on the topic. The Internet and search engines -such as IEEExplore and, more recently, Google Scholar- have made access conference proceedings and journals immensely easier than it used to be.

However, speed and ease of access, by themselves, do not solve the problem of understanding the state of the art in a given field. Some form of intelligence is needed to filter the raw data represented by the very large number of available publications. Such intelligence may be acquired, in due time, by reading and attending conferences - or it may come from experts already working in the field.

To help fellow engineers and researchers to gain easier access to new fields of activities, the E-Letter of the Multimedia Communications Technical Committee (MMTC) invites multimedia experts to submit annotated bibliographies on topics of their choosing.

It is expected that the annotated bibliographies could be of various kinds – from tutorial level bibliographies on the general field of multimedia communications to bibliographies on very specialized subtopics.

If technically feasible, we will adopt an open approach to bibliographies development. Instruments such as wiki are, in fact, making very easy to build knowledge repositories in a collaborative fashion, as shown, for instance, by the astounding success of wikipedia.org. Initial contributions could, therefore, if the original author agrees, be placed on a MMTC wiki to be integrated by comments and modifications made by the community at large. The E-letter will periodically publish selected annotated bibliographies.

Possible topics for annotated bibliographies include, but are not limited to:

- Hardware and Software for Multimedia
- Home Networking for Multimedia
- Implemented Prototypes
- Mathematical Modeling and Simulation for Multimedia
- Mobile and Wireless multimedia
- Multimedia Communication Systems
- Multimedia Security
- Multimedia Design
- Multimedia Development Tools
- Multimedia Networking and Quality of Service
- Networked Multimedia Entertainment
- Quantitative and Qualitative Studies for Multimedia
- Streaming Multimedia
- Theoretical/Ergonomic Issues Regarding Multimedia Communications

Annotated bibliographies will be subject to peer review and, upon acceptance, published in an upcoming issue of the E-Letter. All authors should consider the general nature of the E-Letter's readers. Annotated bibliographies should not have been previously published and must not be submitted for publication as well.

Submission guidelines are as follows: length should be no more than 3000 words (four double column pages).

Annotated bibliographies should be submitted in pdf format by e-mail to the E-Letter Assistant Editor J.C. De Martin at demartin@polito.it.

Deadlines:
The next issue of the E-Letter will appear on August 2005. Our deadline for receiving annotated bibliographies articles is 60 days prior to the cover date.

CALL FOR CONTRIBUTIONS

Call for Perspective Articles for
The Multimedia Communications Technical Committee
E-Letter
Editor in Chief: Marco Roccetti
IEEE Communications Society

Multimedia technology, networks and services are making productive use of important innovations in technical parallel fields: from signal processing and compression to storage and switching devices; from satellite and fiber -based communications to computer graphics and animation; from mobile and wireless systems to information security. A beneficial aspect of this phenomenon is that it is pulling together an extremely diverse group of experts specializing in technical converging areas. Even though such an ever-evolving environment promotes interdisciplinary fusion, however, teachers, researchers and professionals of the discipline need access to the most current information about the concepts, issues, trends and technologies in this emerging field. The **E-Letter** of the **Multimedia Communications Technical Committee** wishes to become a fast medium that provides a comprehensive coverage of the most important definitions, concepts, issues, trends and technologies in the field of multimedia communications technology. To this aim, the **E-Letter** of the Multimedia Communications Technical Committee welcomes submissions of Perspective Articles. Perspectives are articles written from the point of view of an expert in the multimedia technology field. They should focus on a particular technology or technology-related issue and how that technology or technology-related issue is being implemented and is impacting the multimedia arena. The E-Letter is seeking perspective articles on the subject of multimedia as it applies to the broad spectrum of multimedia communications. Also manuscripts for short essays and opinions may be considered.

Possible topics include, but are not limited to:
- Hardware and Software for Multimedia
- Home Networking for Multimedia
- Implemented Prototypes
- Mathematical Modeling and Simulation for Multimedia
- Mobile and Wireless multimedia
- Multimedia Communication Systems
- Multimedia Security
- Multimedia Design
- Multimedia Development Tools
- Multimedia Networking and Quality of Service
- Networked Multimedia Entertainment
- Quantitative and Qualitative Studies for Multimedia
- Streaming Multimedia
- Theoretical/Ergonomic Issues Regarding Multimedia Communications

Selected articles will be peer-reviewed and, upon acceptance, published in an upcoming issue of the E-Letter. All authors should consider the general nature of *E-Letter's* readership. Manuscripts should not have been previously published and must not be submitted for publication elsewhere. The **basic format to follow** is:
- Introduce the technology or issue being discussed.
- Discuss the technology's current or future impact on multimedia communications.
- Discuss pros and cons of the technology/issue.
- Discuss what the author is doing regarding this technology/issue.

Other Guidelines are as follows:
- Length should be no more than 2,000 words (three double-column pages).
- Articles should contain no more than 3 Figures. Figures and tables count for 300 words.
- Articles must contain no more than six references.
- Articles should be submitted in a .pdf format by e-mail to roccetti@cs.unibo.it.

Deadlines:
The next issue of the E-Letter will appear on August 2005. Perspectives are generally scheduled far in advance. Our deadline for receiving completed articles is 60 days prior to the cover date. We may accept some material later than that, but special arrangements must be made in advance with the Editor.

CALL FOR CONTRIBUTIONS

Call for Columns for
The Multimedia Communications Technical Committee
E-Letter
Editor in Chief: Marco Roccetti
IEEE Communications Society

The **E-Letter** of the **Multimedia Communications Technical Committee** features columns written by recognized experts in all the technological fields related to multimedia communications. Columns should give to all the multimedia community partners a possibility to voice their views on the issues, challenges, and opportunities facing industry and academia in connection with the field of multimedia communications. Columns featured by the E-Letter of the Multimedia Communications Technical Committee are intended to become a fast medium that provides a comprehensive coverage of the most important issues, concepts, definitions, trends and techniques in the field. To this aim, the E-Letter is looking for a group of insightful and diligent volunteers to serve as regular (or sporadic) columnists on the 2004-2005 term. Columns will be considered on all the aspects of multimedia communications. The E-Letter offers an unparalleled opportunity for potential columnists to express thoughts and opinions to a community-wide audience provided that the following instructions are followed.

What does it mean to be a columnist for the E-Letter?
It means keeping informed about multimedia issues, as well as news and scientific headlines. It means thinking about the issues that matter to readers in the context of the multimedia communications community. It means undertaking substantial research. It means writing clearly and effectively (perhaps provocatively) to demonstrate an opinion piece that can be easily followed.

What is a column for the E-Letter?
Columns are very brief articles in form of opinions, short essays, or news written from the point of view of an expert. Even though a column is, in essence, a timely and relevant piece of opinion writing, each good E-Letter column should relate an opinion to the most relevant topics of the multimedia community. Also controversial issues can make for a great column, but only if they sound interesting for the multimedia community.

Who can be a columnist for the E-Letter?
Well known experts, skilled practitioners, professionals and researchers are welcome to submit ideas for E-Letter columns. Also contributions from Chairs or members of the various Interest Groups of the Multimedia Communications Technical Committee, as well as from any member of ComSoc, discussing issues related to the activities of their groups, are greatly appreciated. The real and final qualification is having something interesting to say about multimedia communications and its surrounding community, and a willingness to put in the necessary time and effort.

Selected columns will be evaluated by the E-Letter Editor and, upon approval, published in an upcoming issue of the E-Letter. The basic format to follow is:
- Length should be no more than 700 words in length (one double-column page).
- Columns should contain no Figures.
- Columns should contain no References.
- Columns should be submitted as plain text (ASCII) by e-mail to roccetti@cs.unibo.it.

Deadlines:
The issue of the E-Letter will appear on August 2005. Our deadline for receiving columns is 15 days prior to the cover date. We may accept some material later than that, but special arrangements must be made in advance with the Editor.