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**Reading and Writing Support on a Mac**

Did you know that the Mac Operating System OS X has a range of built-in tools to support reading and writing? Accessibility (in System Preferences) includes tools such as Speech, Word Completion and Dictation, that can help you work with literacy difficulties such as dyslexia.

**Speech**  
With Speech you can listen to what you've typed and hear it read aloud. To learn more about the Speech tool, click on the Accessibility icon in System Preferences.

**Find and more on Speech**  
Find and more on Speech in the Accessibility icon in System Preferences.

**Computer Voices**  
Voice is the spoken voice that you can use for other computer tasks. The System Preferences icon in System Preferences includes a section for Computer Voices, and you can choose from a range of voices.

**Word Completion**  
To help you remember and spell-checking words, OS X provides word completion when you type words such as Pages, TextEdit and Numbers. To learn more about word completion, click on the Accessibility icon in System Preferences.

**Dictation**  
Dictation lets you talk to your Mac instead of typing. Dictation converts your speech to text. To learn more about dictation, click on the Accessibility icon in System Preferences.

**Dictionary**  
If you are unsure about a meaning of a word you type, OS X provides a dictionary. To learn more about the dictionary, click on the Accessibility icon in System Preferences.

**Screen colour links**  
The Mac OS X interface allows you to change the background colour of the desktop. To learn more about screen colour links, click on the Accessibility icon in System Preferences.

## Network Layer Performance in Peer-to-Peer File Sharing Systems

Raffaele Bolla, Roberto Bruschi, Michele Sciuto  
Dept of Communication, Computer and System Sciences,  
University of Genoa, Italy  
Email: raffaele.bolla, roberto.bruschi, michele.sciuto@unige.it

Krys Pawlikowski  
Dept of Computer Science and Software Engineering,  
University of Canterbury, New Zealand  
Email: krys.pawlikowski@canterbury.ac.nz

**Abstract**—Nowadays P2P applications dominate many networks. However, despite of their diffusion, the analysis of teletraffic generated by these applications in real-time environment remains an open issue. In this paper we look at analytical and simulation models, which can be used for quantifying volumes of P2P teletraffic at the network layer, to ease still existing difficulties associated with monitoring such teletraffic. We present an event-driven simulator, able to simulate P2P teletraffic both at the application and network layers in large overlay networks (we have successfully tested it in networks used by up to 500,000 peers). The simulation model was developed for studying the impact that P2P systems have on the network layer performance. We studied also the application layer dynamics by looking at time evolution of file-downloading processes and at the offered load generated in such networks. We report the results of several simulation scenarios, in which we focused on the consequences such teletraffic has on the Internet access link of an enterprise network.

**Index Terms**—File-sharing applications; Peer-to-Peer modeling; Network layer; Traffic simulation; Internet traffic.

### I. INTRODUCTION

P2P applications still represent today one of the most source of traffic in the Internet. Their large diffusion is testified by many measurement studies, which reveal that such a diffusion is not restrained to home broadband Internet accesses, but also involves enterprise networks [1] - [3] as well as networks of industries and commercial companies [4]. The ability to quantify the impact of P2P traffic on the network is fundamental to a number of network operations, including traffic engineering, capacity planning, quality of service, forecasting for long-term provisioning, etc. The difficulties in estimating P2P traffic volumes lie in the nature of such protocols, which are specifically designed with the aim of hiding their presence in the network [5]. Despite the important efforts of the research community in this direction (see [6] - [8]) P2P traffic detection and classification are still open issues. However, the present issues in measuring and estimating P2P traffic can be faced with traffic models. With this respect, we can cite again [2] and [3], where simulation results are presented, with the intention of studying the gains potentially derived from traffic locality in P2P systems. Many other modeling and simulation works look at P2P overlay networks, combined with the difficulties of simulating the large size overlay networks of real systems [9] - [14]. An interesting approach is the one presented in [9], where a framework for

P2P simulation environment, on top of existing packet-level network simulators, has been developed; the underlying layers seem to be considered in detail, even though this approach focuses on the packet level, which could not clearly scale to the size of a real P2P network. In [14] a survey of several P2P simulators revealed the lack of simulators, which could really be used for planning purposes. Well known scalable simulators are PlanetSim, Neurogrid and PeerSim, but they have different aims with respect to our work. In PlanetSim [11], developers can work at two main levels: creating and testing new overlay algorithms like Chord or Pastry, or creating and testing new services (DHT, CAST, DOLR, etc.) on top of existing overlays. Neurogrid [12] can simulate many nodes (more than 300,000), but it is specifically developed for the study of application layer [13], not being developed for dealing with network layer traffic. PeerSim can simulate more than 1,000,000 nodes, it results very scalable and accurate for evaluating new P2P protocols at the application layer; however it has not been developed for studying the impact of traffic on the network layer. It is clear that scalability and network layer analysis are not well supported features of existing P2P simulators.

With this problem in mind, we have built an event driven P2P simulation model, able to represent both the application and the network layers and that can be used for simulating large overlay networks (we have successfully tested it with up to 500,000 peers). We focused our attention on the unstructured and decentralized Gnutella overlay network, which still represents an important point of reference in the P2P community. Many recent works on Gnutella network have stimulating our interest ([15], [16]), revealing that the fully decentralized paradigm of Gnutella still represents a reference architecture. As with all decentralized networks, the Gnutella network, such as the most recent Kad network [17], requires no official or common servers. As such, it cannot be disabled by shutting down a given subset of key nodes. Our model has the aim of studying the impact that such P2P systems have on the network layer performance. We start from the application layer, modeling the dynamics of peers, ultrapeers and files in the overlay network and we focus our attention on the results of file queries. We consider a positive query as a file transfer, and then we derive the number of file downloads and the average offered load generated in the network. We do not model the elastic behavior of network traffic and the

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UNIVERSITAT POLITÈCNICA DE CATALUNYA

Departament de Llenguatges i Sistemes Informàtics  
Ph.D. Program: Artificial Intelligence

### Peer-to-Peer Bartering: Swapping Amongst Self-interested Agents


David Cabanillas

Advisors: Steven Willmott

Barcelona, February 2009

Grade One

## Barter vs. Money



**Overview**  
Students share the book *Shop is a Shop* by Nancy Shaw, to learn about choice, making decisions, trade, and the barter system. They complete worksheets on comparing barter to the use of money in economic trade and using money in problem-solving situations.

**Prerequisite Skills**  
Students should be able to recognize and count money amounts using dimes, nickels, and pennies.

**Lesson Objectives**  
Students will be able to:

- Describe the barter system
- Compare barter with the exchange of goods for money
- Determine if a given number of dimes, nickels, and pennies is enough to pay for a specified item

**Materials List**

1. Book: *Shop is a Shop*, by Nancy Shaw (Houghton Mifflin, 1991)
2. Four tokens—two of one color and two of another
3. Play money coins: pennies, nickels, and dimes (NOTE: There should be enough pennies so that each student in the small groups has 42)
4. One small cup for each student to hold the coins
5. Several small objects (toys, game pieces, markers, and crayons, etc.) that will be used for the small group activity: "Shopping"
6. Blank stickers or price tags
7. Handouts:
  - Barter or Money? coloring sheet
  - Using Money worksheet

**Content Standards**  
The activities in this lesson correlate to national standards in economics, math, and language arts. See the end of this lesson for content standards information.

**Vocabulary**  
barter  
choice  
choose  
cost  
decision making  
exchange  
money  
trade

Quick One: Barter vs. Money 1

