LAMPIRAN
Electronic documents are more easily copied and redistributed than paper documents. This is a major impediment to electronic publishing. Illegal redistribution can be discouraged by placing unique marks in each copy and registering the copy with the original recipient. If an illegal copy is discovered, the original recipient can be identified. In this work we describe several invisible techniques for encoding information in text documents. We also describe a marking system, for electronic publishing, that is scalable to large numbers of users. Therefore, our first application of marking is on text. Our objective is to insert marks that do not visibly alter the document. On June 16, 1993 I was at a breakfast meeting with a program director from the National Science foundation. He stated that electronic publishing was one of the most promising applications of communications but that its use might be limited because electronic documents are too easy to copy and redistribute. He said that he had not been able to identify technical work that might solve this problem, and asked me if I knew of any techniques. I did not, but decided to look for a solution.

On returning to Bell Labs I described the problem to Jack Brassil, Abhijit Choudhury, Steven Low, Larry O’Gorman, Sanjoy Paul, and Henning Schulzrinne. The ideas came quickly. They included marking copies of the documents, so that each copy is unique, and registering the copies, (If an illegal copy of a document is recovered, the original recipient is identified.), making it necessary for a recipient to give away personal information, for instance his credit card number, with the document, (It’s unlikely that one would give his credit card number to anyone who is willing to receive illegal documents.) and, using encryption to make the copy that a recipient can distribute much larger than the copy that the publisher distributes. (For instance, the recipient may obtain an encrypted, Latex version of the document, but the program that decrypts the document converts the Latex to a bit map.) We have not addressed the problem of retrieving illegal documents. Most published documents are redominantly text. Therefore, our first application of marking is on text. We found that small movements of words or lines, are practically invisible, and are easily implemented in the postscript version of the document. The first internal report on marking documents was issued on November 3, 1993. Jack Brassil demonstrated that our technique is easily implemented by marking and registering each copy of that report. We challenged the recipients to copy, fax, or otherwise distort the document and then to return it to us for identification. In every case, we identified the original recipient.

As a final demonstration that marking is practical, we arranged to distribute a special issue of the IEEE Journal on Selected Areas in Communications about the Internet, over the Internet. Fortunately, as we were planning this demonstration, the MOSAIC software for browsing the WEB became available. The WEB eliminated the logistics of distributing client side software and operating on a wide variety of computer platforms. We have not addressed the problem of retrieving illegal documents. Most published documents are redominantly text. Therefore, our first application of marking is on text.
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