

# ESSAYS

## THE GLOBAL LEGAL INFORMATION NETWORK (“GLIN”)

NABIL R. ADAM\*  
BURTON I. EDELSON\*\*  
TAREK A. EL-GHAZAWI\*\*\*  
MILTON HALEM\*\*\*\*  
KONSTANTINOS KALPAKIS\*\*\*\*\*  
NICK J. KOZURA\*\*\*\*\*  
RUBENS MEDINA\*\*\*\*\*  
YELENA YESHA\*\*\*\*\*

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\* Professor of Computers & Information Systems and Director of the Center for Information Management, Integration, and Connectivity at *Rutgers University*. M.S., M. Phil., and Ph.D., *Columbia University*.

\*\* Research Professor of Electrical Engineering and Computer Science at *George Washington University*.

\*\*\* Ph.D., *New Mexico State University*.

\*\*\*\* Chief of the Earth and Space Data Computing Division at NASA's Goddard Space Flight Center. B.A., *City College of New York*; Ph.D., *Courant Institute of Mathematical Sciences, New York University*.

\*\*\*\*\* Assistant Professor at the Computer Science and Electrical Engineering Department of *University of Maryland Baltimore County*. Ph.D., *University of Maryland Baltimore County*; M.S., *University of Maryland Baltimore County*; Diploma degree in Computer Engineering and Informatics, *University of Patras, Greece*.

\*\*\*\*\* Head of the Information Technology Office at the Law Library of Congress.

\*\*\*\*\* Law Librarian of Congress.

\*\*\*\*\* Professor, Department of Computer Science and Electrical Engineering, *University of Maryland Baltimore County*. Ph.D., *Ohio State University*; M.S., *Ohio State University*; B.S., *York University, Toronto, Canada*.

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## INTRODUCTION

The current globalization of the marketplace generates a greater need for cultures to learn more about one another so that decisions regarding international transactions or associations are based on trustworthy information. Additionally, many nations feel a sense of commonality not only with their immediate neighbors but also with distant trading or cultural partners. These expanding bonds help fuel the growth of common markets and greater cultural ties. Information, particularly legal information, is an essential element of these international ties because critical issues surrounding such relationships are resolved using this information. Legal researchers no longer can rely solely on the laws of a single nation to solve a legal problem; they must be able to access the laws of several nations.

Fortunately, information technology has made possible faster, more accurate searches of larger and more current volumes of information. The result has been broader researching capabilities in the area of multinational comparative legal studies. Additionally, legal researchers appear to be expanding their language capabilities, as reflected in the increasing number of networked electronic files on the laws of other nations. This technology may find application to worldwide databases within our lifetimes due to the great progress that has been made in machine translation.<sup>1</sup>

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1. Computer processor speed doubles approximately every 18 months. See Patrick Marshall, *How Fast Can Chips Go? No One Knows the Limit*, SEATTLE TIMES, Apr. 14, 1996, at N3. Actual computer performance has increased 25,000 times over the past 25 years. See *id.*

The Law Library of Congress ("Law Library") originally undertook the Global Legal Information Network ("GLIN")<sup>2</sup> as part of its responsibility to provide the United States Congress, the United States Supreme Court, and the executive agencies with, among other things, information regarding foreign, international, and comparative law.<sup>3</sup> GLIN emerged from the Law Library's long-standing experience in manually sorting, arranging, and indexing primary sources of law. In this manual system, resources (such as incomplete runs of foreign publications) and circumstances (such as the delay of mail delivery) limited the number of countries included in the network and the records' currentness and completeness. Access to new information technologies has given the Law Library the means to address these limitations through GLIN. Lawyers, scientists, and academics are cooperating to develop GLIN into a truly global, technically sound, and reliable legal information network.<sup>4</sup>

This Essay outlines GLIN's capabilities and discusses some of the technical challenges yet to be addressed. Part I presents the goals and vision of GLIN. Part II describes GLIN's structure and makeup. Part III discusses the present scope and current capabilities of the GLIN system, and Part IV addresses the technical challenges that face GLIN.

## I. GLIN GOALS AND VISION

GLIN is a legal information system that can aid developing legislation by providing each member country with a research tool that enables it to assess the effectiveness of its laws. By providing a variety of legal information, GLIN can enhance and expedite business transactions and international collaboration in numerous areas among member countries. Furthermore, with the expected growth in membership,<sup>5</sup> GLIN can assist international and regional organizations in resolving disputes or in forming commercial alliances. Its goal is that by the year 2000 GLIN will: (1) provide the security necessary to authenticate legal data as well as its producer, requester,

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2. See Law Library of Congress, *The Glin Welcoming Page* (last modified Apr. 8, 1996) <<http://lcweb2.loc.gov:8081/glin/glin.html>> (on file with *The American University Law Review*).

3. See Statement of James H. Billington, the Librarian of Congress, Before the Subcomm. on the Legislative Branch of the Senate Comm. on Appropriations, 104th Cong. (July 10, 1996) (Fiscal 1997 Budget Request), available in LEXIS, Legis Library, Cngtst File.

4. Lawyers and staff from the Law Library, experts from the Information Technology Services of the Library, and technical staff from the NASA Goddard Space Flight Center, the United Nations, the World Bank, George Washington University, Rutgers University, and the University of Maryland in Baltimore County are involved in the project.

5. See *infra* Part III.

sender, and receiver; (2) provide sufficiently high bandwidth capabilities<sup>6</sup> to ensure that the database may be used interactively as a digital legal library from anywhere in the world; (3) operate on a technology infrastructure that provides access to any country wishing to join the network; (4) train member countries in the use of the network; and (5) develop international regional training centers.

## II. LEGAL INFORMATION

GLIN is an international, non-commercial, cooperative network of government agencies from around the world that is committed to contributing to a shared electronic database of legal information generated by member governments, according to agreed upon standards and procedures. In addition to a member nation's government agencies, other non-commercial entities, such as educational institutions, may join GLIN as associate members. Any nation with an internationally recognized government is encouraged to join the GLIN network regardless of its location, culture, or language.

Within the context of GLIN, legal information encompasses constitutions, statutes, and legislative history—including parliamentary or congressional debates, agency regulations, ordinances, court decisions, selected scholarly writings, and other relevant materials. These categories of legal information are ranked in a hierarchical structure, often referred to as Hans Kelsen's Pyramid. In this pyramid, constitutions are placed at the top because they have supremacy over all other sources of law. International treaties, codes, statutes, regulations, and ordinances are placed in successive descending layers toward the base. Sources of law, such as municipal ordinances, are at the base of the pyramid. Some sources may share the same rank, but the grouping of sources sharing the same rank may vary slightly from one legal system to another. Typically, international treaties, codes, and statutes share the same rank. In common-law systems, judicial decisions are ranked according to their relationship with a specific source of law, such as a constitution or a statute. In civil-law jurisdictions, however, cases are assigned a lower rank and are placed among the secondary sources.

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6. Bandwidth describes the capacity and speed of the links between computing devices. See ROY TENNANT ET AL., *CROSSING THE INTERNET THRESHOLD: AN INSTRUCTIONAL HANDBOOK* 23 (2d ed. 1994). Bandwidth is measured by megabits per second ("mbps"); the higher the number, the better the connection. See Rob Pegoraro, *The FFWD Directory of Internet Service*, WASH. POST, Sept. 25, 1996, FFWD Mag., at 3. A T-1 line is the slowest industry connection, carrying data at 1.5 mbps. See *id.* A T-3 line is faster, at 45 mbps. See *id.*

In order for statutes, regulations, and judicial decisions to be useful, they must be complete and chronological. GLIN therefore will contain the full series of these documents, rather than certain selected laws. On the other hand, scholarly writing is considered a secondary source, so pieces will be taken from specialized periodical sources such as law reviews. The file will contain only certain articles to avoid duplication and redundancy. The selection of these pieces will be accomplished by the contributing national teams.

There are no exceptions concerning either the topic or the time span of the source. GLIN, therefore, is all-encompassing with respect to its subject matter and complete with respect to its chronological coverage.

The authenticity of both the primary and the secondary sources is fundamental to GLIN because the reliability of these texts is of primary concern to GLIN users. To this end, GLIN has developed and established standards to protect and preserve the official versions of these texts. GLIN also ensures that the statutes, regulations, and judicial decisions are current, complete, and sequential.

### III. PRESENT SCOPE AND CAPABILITY OF GLIN

The GLIN project began in 1993 with the broad goals of creating a database of international law documents and of making this database available to member countries from around the world. Such a collection can be used to facilitate international cooperation and joint ventures by making relevant laws and regulations mutually accessible.

At present, GLIN maintains a database that consists of abstracts and index terms relating to statutes and regulations that have been extracted from official sources in roughly thirty countries in the Americas, Europe, and Africa. The goal is to develop GLIN into a global system that includes a much larger number of countries with access to the full texts of the primary and secondary sources listed in Part II of this Essay. To maintain and increase GLIN's holdings, legal experts from either the contributing country or the GLIN staff review each new item and generate an abstract and a list of keywords. This summary, or abstract, then is used to facilitate in searching GLIN.<sup>7</sup> Maintaining the quality of the written summaries and keyword assignments is a major concern of the GLIN staff, especially as the

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7. See Law Library of Congress, *Law Library of Congress Global Legal Information Network* (visited Sept. 15, 1996) <<http://www.cweb2.loc.gov.8081/glin/law/query.html>> (on file with *The American University Law Review*).

contributions of member countries increase. The concept of inviting national lawmaking bodies to participate in a cooperative electronic network has emerged from a strong interest in reliable legal information, as expressed by various governments and the global business community. Brazil and Mexico were the first two nations to express an interest in such a project.<sup>8</sup> They were invited to participate with the Law Library ("GLINCentral")<sup>9</sup> in the initial efforts to test the basic concepts and elements of the GLIN project<sup>10</sup> as the first GLINstations that formed the cornerstone of GLIN.

Based on the results and experiences of these countries' work, the Law Library launched a testbed. GLINCentral established a GLINStation, which featured hardware, software, and personnel, as well as a codified body of specifications and procedural standards.<sup>11</sup> The GLIN staff used the new aspects of the GLINStation to identify authentic sources, to select, analyze, and abstract the legal texts, to build a thesaurus for the validation of descriptors, to capture and digitize texts, to input, transmit, and receive data, to organize and index the data, and to search for and retrieve the information.

The first target of GLINCentral has been to establish GLINStations in the participating countries. Training of their designated staff is ongoing at GLINCentral. Current member countries of GLIN include Argentina, Brazil, Hungary, Republic of Korea, Kuwait, Lithuania, Mauritania, Mexico, Poland, Romania, and Ukraine. A number of other countries have expressed interest in joining and their membership is being negotiated. These countries include Albania, Egypt, Israel, Nicaragua, Paraguay, Sweden, Tunisia, and Uruguay. A set of principles designed to govern the rights and responsibilities of the members has been drafted, and its approval by member nations is in progress.<sup>12</sup>

Most of the member countries are acquiring the recommended hardware, software, and telecommunications capabilities, and GLINCentral has trained their respective staffs that now are engaged

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8. High officials of both governments requested participation in the early stages of GLIN.

9. GLINCentral refers to the team of the Law Library of Congress dedicated to planning, designing, coordinating, and managing the network. Its responsibilities include training, research, and development.

10. See *Acuerdo Preliminar para la Participación de México en la Red Internacional de Información Legal* (on file with *The American University Law Review*).

11. Specifications and procedural standards are outlined in the GLIN legal and technical training manuals available in GLINCentral files. An on-line training program including these materials is in development.

12. "The Global Legal Information Network (GLIN): Guiding Principles" signed by Project Directors of member nations is available in GLINCentral files.

in complying with basic organizational and information-processing routines.

GLINCentral has the following capabilities in operational mode: an established model of standards and procedures for the analysis of legal texts;<sup>13</sup> a formulation of the corresponding abstracts; and construction of a thesaurus. The member countries will design their own training curricula for their legal and technical personnel. Transmission and reception of digital data among the member countries is conducted via the GLINCentral Internet node. Data storage and controlled access to the data occurs at the GLINCentral server located at the Library of Congress.

#### IV. TECHNICAL CHALLENGES

The volume of material GLIN staffers are attempting to gather and index is considerable due to the number of nations and the wide range of legal subjects involved. Creating a system that will access this wealth of information is a complex task that will be of little value if the information's accuracy and currentness cannot be ensured. At present, accuracy and currentness in a global context is obtained through digitization<sup>14</sup> and networking.<sup>15</sup> Accuracy is secured by accessing the official standard sources of publication. Currentness requires that amendments, repeals, and new laws be obtained in a timely fashion.

The Law Library has considerable experience in effectively managing the accuracy and currentness of legal information; it has developed a basic testbed for acquiring, processing, and retrieving digitized texts for GLIN. Additional technological support, however, still is needed to achieve acceptable capabilities. For instance, advanced, digital library technologies must be sought and integrated into GLIN so that the management and search of this global, legal database may be accomplished with adequate flexibility, efficiency, and user-friendliness.

To address the host of technical challenges facing GLIN, a two-tiered approach, entitled "Upgrade and Enhance" has been developed. Using this long-term plan for improving the GLIN system,

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13. Standards and procedures for the analysis of legal text are outlined in the GLIN legal training manuals available in GLINCentral files. An online training program including this manual is in development.

14. "Digitization" is the process of converting data such as text and images to codes that are suitable for processing by computers and that can be transferred electronically.

15. "Networking" is the process of employing telecommunications to connect computers that are within close proximity to one another (local area networks) or that are far away from one another (wide area networks).

the system has been augmented with compatible state-of-the-art technologies in communications, database management, and data acquisition.<sup>16</sup> Below is a brief discussion of how a variety of technical challenges will be overcome.

### A. *Information Management*

#### 1. *Database technology*

Database technology is an information management issue that is crucial to data storage and management. The storage system required for an undertaking the size of GLIN must be capable of storing a large amount of data in a variety of formats and of simultaneously accessing data with a minimum amount of delay. Although the current version of GLIN deals with text-only documents, future versions are expected to access audio and video data, as well as text. Text-only documents, such as ASCII, LaTeX, HTML, SGML, or PostScript, are the easiest to store in either a file system or in a document database. Digital audio and video data pose more difficult storage problems because they require significantly more storage space and delivery time.

Database management systems ("DBMS")<sup>17</sup> have the tools necessary to uphold the consistency and accessibility of data. These tools include the persistence of data, concurrent access, backup in the event of a failure, and the restoration and recovery from a failure. Relational database management systems ("RDBMS")<sup>18</sup> represent a

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16. A long-term plan for enhancing the system also has been established. This plan calls for addressing several technological challenges in such areas as information management, user interface, security, and authenticity, as well as accessibility and connectivity. A brief discussion of a few of these technical challenges is presented in Part IV.A.

17. See Ed Kear, *Database is Group of Information for a Purpose*, CAP. DIST. BUS. REV., Oct. 7, 1996, available in 1996 WL 11471644 (describing DBMS as storage system collecting information for particular purpose based on model that associates or relates entries in particular fashion).

18. See *SQL Solutions, Inc. v. Oracle Corp.*, No. C-91-1079 MHP, 1991 WL 626458, at \*1 (N.D. Cal. Dec. 18, 1991) (defining RDBMS as type of software system that "assist[s] in the storage, maintenance, and retrieval of database information").

mature technology with many solid, commercially available systems, such as Oracle,<sup>19</sup> Sybase,<sup>20</sup> DB2,<sup>21</sup> and Informix.<sup>22</sup>

Object-oriented database systems ("OODBS")<sup>23</sup> slowly are gaining acceptance in commercial markets.<sup>24</sup> OODBSs present less of an impedance mismatch when modeling, storing, and working with real-world objects such as images or maps. Such real-world objects are too complex both to represent using relational tables and to query using SQL ("Standard Query Language") type language. OODBSs, on the other hand, provide complex data structures and powerful concepts such as abstract data types, inheritance, and data encapsulation that are well suited to representing and manipulating complex objects such as images and video. The benefits of employing OODBSs when upgrading GLIN to incorporate audio and visual data are evident. Meta-data, as well as the actual content, can be stored in a single database management system. We currently are in the process of evaluating various database technology options.

## 2. Classification, indexing, and retrieval

Classification and indexing schemes are used to collect related documents into groups that will be familiar to the GLIN user. Once the documents are properly classified and indexed, search and retrieval tasks are much easier. The tremendous amount of information that potentially will enter GLIN is a complicating factor in indexing and classifying these documents. Given the vast amount of information that remains to be indexed and the variation of human

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19. See Oracle, *Oracle Corporation Home Page* (visited Jan. 28, 1997) <<http://www.oracle.com>> (on file with *The American University Law Review*) (stating that Oracle is a major manufacturer of networking hardware and software and database systems).

20. See Sybase, Inc., *Sybase, Inc.* (last modified Nov. 10, 1996) <<http://www.sybase.com>> (on file with *The American University Law Review*) (stating that Sybase specializes in creating software platforms that allows its customers to "create, integrate and communicate information assets").

21. See IBM, *DB2 Family* (last modified Oct. 30, 1996) <<http://www.software.ibm.com/data/db2>> (on file with *The American University Law Review*) (stating that DB2 is relational database product manufactured by IBM providing "industrial strength database management").

22. See Informix, *Informix at a Glance* (visited Nov. 10, 1996) <<http://www.informix.com/informix/corpinfo/backgrnd/overview/execover.htm>> (on file with *The American University Law Review*) (stating that Informix offers cutting-edge database technology).

23. Object-oriented database systems are distinct from structured programming in that they contain both data and procedures and they operate as self-sufficient components that do not require additional procedures or data to perform their specific task. See James Y. Song, *Searching for a Link Between Software Patent and Object-Oriented Programming*, 76 J. PAT. & TRADEMARK OFF. SOC'Y 687, 687 (1994). In essence, this system views computer programs as a collection of largely autonomous components called objects, each of which is responsible for a specific task. See *id.*

24. See Robert Mills & Lisa Kempfer, *PDM Comes on Strong*, COMPUTER-AIDED ENG'G, May 1, 1996, available in 1996 WL 9012824.

perception, it is clear that manual methods of classification will be unsuitable for all but the most trivial cases.

As the number of member nations and incoming laws increases, the task of maintaining the quality of the written summaries and index terms will become a major concern. Assuring the quality of GLIN summaries can be addressed in a number of ways. For instance, creating parallel paths through the review and summarization process can provide checks and balances. A manual summarization process, however, may become necessary. A software system that can generate GLIN abstracts and index terms directly from the source law documents ultimately is envisioned. By employing information extraction and message understanding techniques in this novel fashion, facts and concepts in text documents will be extracted and made available as index terms and for automatic summary generator scripts. Personnel from the originating country who have been trained by the GLIN staff then would check these automatically generated summaries for accuracy.

Reaching this point of automation will not happen in the near future, however, but will be attained using an incremental approach. Initially, the system will generate the appropriate index terms for a law, available as an abstract in English text. Next, it will expand to indexing a full English text. After the full English text is implemented, our system will generate the appropriate index terms and an English language abstract for a law. Ultimately, the system will generate a similar output for a foreign language in full text. Each step in this approach requires the performance of a deeper level of analysis. A prototype implementation of this software is currently underway.

### 3. *Standards*

Among the most significant information management issues is the task of establishing standards. In the area of document description in GLIN, for example, Standard Generalized Markup Language ("SGML")<sup>25</sup> is an attractive standard because it has a dual-purpose language suitable for both paper and electronic publishing. Further, various search engines can use its markups to enhance retrieval

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25. See Erik Naggum, *Comp. Text. SGML—Frequently Asked Questions* (visited Oct. 15, 1996) <<http://ruff.cs.umbc.edu:1080/courses/491/html/SGML.html>> at 1.2 (on file with *The American University Law Review*) (defining SGML as textual markup language that describes how information will appear independent of how information is processed). SGML is non-proprietary and not confined to any particular hardware or software system. See *id.* at 1.5.

performance. In addition to SGML, there is a need to support formats for digitized text, such as plain ASCII, Postscript, and TIFF.

#### 4. *Currentness and temporal evolution*

Because the texts of statutes and regulations often change, GLIN must be equipped with a version management component. Such a component should possess the capabilities necessary to manage amendments to existing documents. With this component, GLIN users would be able to examine the evolution of a given document. Data versioning techniques that enable users to track the history of such revisions will be employed in GLIN in the future.

#### 5. *User interface*

The term "user interface" represents the information that GLIN holds and the mechanisms used to search, browse, and retrieve such information. Graphical user interfaces ("GUI"), such as X-Windows, Microsoft Windows, and the Macintosh interface, are the current status quo. The user interface must incorporate a wide variety of techniques to produce rich interaction between users and the information they seek. Below are some of the elements of a rich user interface that will be included in future versions of GLIN.

##### a. *Locator service*

With the finder box, the user will type a set of circumstances and contexts in a series of sentences and the finder will locate all related documents and will present them to the user in a ranked order.

##### b. *Navigator service*

The navigator service will follow citation links within the legal text and will construct a visual map for the user, thus allowing interactive management. The user can save and forward the maps to others so that all users may share in one another's research.

##### c. *Note taker service*

The note taker service is a useful feature that will allow users to add margin notes to the text. Subsequent users will be able to access the text and the margin notes of prior users. In this way users will be able to identify texts that others have been accessing as well as others' notes on a particular subject. This feature of GLIN can be viewed as an abbreviated form of forum discussions and electronic meeting rooms. The fact that the notes and thoughts of users are tied to the legal text makes the notes contextual and relevant. Only users who

are reading a certain text will see these notes; all other users will not be subjected to irrelevant information.

*d. Collaborator service*

The collaborator service will allow visual maps of navigation and notes to be made available to colleagues, thereby permitting users to collaborate on areas of mutual interest. A user will be able to forward all of his or her notes and navigation links regarding a certain topic to a collaborator.

*e. Discusser service*

With the discusser service, users can posit queries regarding a text they have accessed. The queries then are sent to virtual discussion rooms, where users accessing the same document can respond.

*f. Analyzer service*

Analyzer service provides users with statistical analysis capabilities. One such capability is frequency data that can provide the user with information such as how many laws are passed per country in any given time period. The service also can provide the correlation between country X passing a law and its neighboring countries passing similar laws. For example, the service can analyze a scenario in which X passes a stricter import/export law and other countries respond by passing legislation either to counteract X's action (e.g., by providing trade incentives) or to reduce trade with the "unfriendly" country.

*6. Security and authenticity*

Because legal information is sensitive to interpretation, the information stored in GLIN must be authentic. Maintaining authenticity, however, is a challenging task because it requires fidelity of acquisition, data format, and system security.<sup>26</sup> Technological guidelines must be established so that GLIN offers secured access to authentic information and maintains readable texts and flexible viewing.

One possible approach to ensuring the authenticity of both the original documents and users' notes is to implement electronic signatures based on public key cryptography.<sup>27</sup> For user authentica-

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26. Authenticity is a basic element of reliability when legal sources are involved; therefore, authenticity is a GLIN standard.

27. See generally BRUCE SCHNEIER, APPLIED CRYPTOGRAPHY: PROTOCOLS, ALGORITHMS AND SOURCE CODE IN C (2d ed. 1996) (providing discussion of public key cryptography); Robin Whittle, *Cryptography for Encryption, Digital Signatures and Authentication* (Dec. 19, 1996)

tion, cryptographic techniques such as smart cards<sup>28</sup> and electronic wallets<sup>29</sup> could be an option. Issues regarding export controls and use of cryptography by various participating countries remain unresolved.<sup>30</sup>

### 7. Accessibility

A user should be able to access GLIN through virtually any terminal, from the plain VT-100-type terminals<sup>31</sup> to sophisticated terminals with advanced graphics capabilities, such as a home computer. To maximize the use of GLIN, access should be made available in a variety of manners, including through use of a touch-tone phone, teletype, fax, an old generation PC with a slow modem, and an advanced workstation with a high speed connection to the Internet. Special attention will be required to ensure that performance bottlenecks do not occur when multiple users are accessing GLIN. This problem will be intensified only when images are added to the library of encoded text. For GLIN to achieve significant growth and to be of maximum value to its users, avoiding bottlenecks is of the utmost importance.

### 8. Connectivity

Connectivity creates another set of issues for GLIN. Specifically, some countries that are interested in becoming member nations are not connected to the Internet. This is particularly relevant in the case of several developing countries in Latin America, South America,

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<<http://www.ozemail.com.au/~firstpr/crypto>> (on file with *The American University Law Review*) (providing tutorial on encryption for public key cryptography, discussing government regulation of cryptography, and compiling bibliography of cryptography references).

28. See *PC-Security: New Security Product for PCs and Networks Uses Smart Cards*, EDGE: WORK-GROUP COMPUTING REP., Mar. 29, 1995, available in LEXIS, News Library, IAC Newsletter Database File (stating that smart card is hardware that allows user to enter system by placing card in reader and typing in password). The smart card contains information about the user in an encrypted form. See *id.* The information contained on the smart card will define the user's rights in relation to the system's resources and file management. See *id.*

29. An "electronic wallet" is a file that holds credit card numbers in an encrypted form. When a consumer purchases something, the credit card number is retrieved from his wallet and sent (in encrypted form) to the merchant for payment.

The good news with respect to an electronic wallet is that everything is encrypted from start to finish. The bad news is that the wallet can become corrupted. In addition, the wallet must "live" on a specific PC, and not all operating systems/hardware platforms are supported.

30. See Charles L. Evans, Comment, *U.S. Export Control of Encryption Software: Efforts to Prevent National Security Threats to U.S. Software Industry's Ability to Compete in Foreign Markets*, 19 N.C. J. INT'L L. & COM. REG. 469, 469-79 (1994) (explaining that U.S. law forbids export of encryption schemes over certain minimal strength).

31. VT-100 is a terminal emulation mode whereby a computer can access a remote network and will act as if it were a terminal connected to the target computer system. See Greg R. Notess, *On the Nets: Telnet, the Forgotten Internet Tool*, ONLINE, July 17, 1996, available in 1996 WL 8447855.

Africa, and Asia.<sup>32</sup> Providing connectivity to such countries is a major goal and a technical challenge.

One approach for increasing connectivity is to use technology developed for Fidonet.<sup>33</sup> Fidonet is a point-to-point, store-and-forward wide area network that uses modems and dial-up phone lines to operate. It provides low-cost connectivity among individuals,<sup>34</sup> by trying to minimize modem time. The primary function of Fidonet is forwarding news and exchanging e-mail messages. Gateways also connect Fidonet networks with the Internet. Software implementations are available to port Fidonet on a variety of PCs and other systems. As of December 1995, there were approximately 35,000 Fidonet nodes around the world,<sup>35</sup> more than seventy-five percent of them in North America and Europe and less than ten percent in Asia, Africa, and Latin America. Fidonet is especially popular among amateur system operators like computer Bulletin Board System ("BBS") operators.<sup>36</sup> GLIN should support a variety of transport protocols such as X.25, TCP/IP, Windows Socket, API, Winsock, BITNET, UUCP, HTTP, Mobile IP, SLIP, and PPP. GLIN also should support protocols for packet radio communications (low bandwidth), telephone only communications (touch-tone phone and speech/text translators), teletype, and fax.

Currently, the use of satellite communications to augment the bandwidth available and to support countries that do not have Internet access is being explored. NASA's Goddard Space Flight Center has extensive experience in using the Advanced Communica-

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32. See Naydu Yaniz, *Internet Access and Developing Countries* (last modified May 3, 1995) <<http://www.info.usaid.gov:80/ittd/sumproc/enotes1.html>> (on file with *The American University Law Review*); Raul Zambrano, *The UNDP Sustainable Development Network* (visited Jan. 28, 1997) <<http://www.asis.org/Bulletin/Feb-95/intnat.html>> (on file with *The American University Law Review*).

33. See *The World Wide Web Fidonet Resource*, (visited Sept. 15, 1996) <[http://www.scms.rgu.ac.uk/students/cs\\_yr94/lk/fido.html](http://www.scms.rgu.ac.uk/students/cs_yr94/lk/fido.html)> (on file with *The American University Law Review*) (explaining that Fidonet is international network of systems used to carry e-mail and messages).

34. See Andrew Grosso, *The National Information Infrastructure*, 41 FED. B. NEWS & J. 481, 481 (1994) (explaining that Fidonet links bulletin boards across globe by use of local telephone lines).

35. See *Here Fido*, THE IRISH TIMES, Dec. 11, 1995, Computimes Insert, at 18, available in LEXIS, News Library, Curnws File.

36. See *Computer Sting Reels in Hackers*, THE COM. APPEAL, Sept. 12, 1995, available in 1995 WL 9363192.

tions Technology Satellites ("ACTS")<sup>37</sup> for distributed information processing, which will be useful for implementing ACTS in the GLIN.

ACTS can operate at a high data rate of up to 622 megabits per second. ACTS terminals have been used in GLIN demonstrations and such experimentation will be expanded in future GLIN activities to help identify adequate communications solutions for member countries that do not have sufficient communication infrastructure in place, but who desire to have the full benefit of accessing GLIN at high rates. It is anticipated that solutions demonstrated through the ACTS satellite experiments will be implemented for full operation using international satellite communications carriers.

### CONCLUSION

This Essay described details related to the GLIN project that began in 1993. The broad goal of GLIN is to create a knowledge base of international law and to make this knowledge base available to member countries from around the world. GLIN represents a unique attempt to contribute to the creation of an environment in which international transactions and interactions are based on trustworthy information and to expand bonds among member countries that will help fuel growth of common markets and create greater cultural ties.

Although the goals of GLIN can be achieved, several technical challenges to move GLIN from its current position to a state-of-the-art system that is well suited for the twenty-first century must be met.

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37. See Leonard A. Haug, *Technology Topics: Data Exchange*, ABA BANKING J., Sept. 1994, at 88. NASA's ACTS Program was intended to help U.S. industry in the field of satellite communications by "developing advanced technologies and providing them in actual user trials." Richard Gedney, *ACTS: New Services for Communications*, SATELLITE COMM., Sept. 1994, at 1. Technical staff from NASA's Goddard Space Flight Center are involved in the GLIN project. See *supra* note 4.

