August 5, 1996

Mr. George Heal, Chair
Mr. Jim Vander Noot, Chair - Pilot
GISB - Future Technology Task Force
1100 Louisiana, Suite 4925
Houston, Texas 77002

Dear Messrs. Heal and Vander Noot:

Pacific Gas and Electric Company (PG&E) would like to extend its thanks to the Future Technology Task Force (FTTF) in the effort put forth in exploring the use of the Internet and World Wide Web (WWW) technologies as a means of exchanging critical pipeline information. While the particular methods being suggested are workable, we are concerned that not enough attention has been given to other alternatives.

The attached document contains the following:

- Why the Internet technology may have road blocks for the implementation of the FTTF proposed solution.
- Illustrate the transactional flow and analysis of the proposed GISB FTTF technical architecture for the exchange of EDI data over the Internet.
- Issues and concerns surrounding the business and technical areas of the FTTF proposal.
- Alternative solutions PG&E feels should be explored.
- Appendix of articles relating to the issue of EDI over the Internet.

Please review this document and attached appendices. Hard copies of the appendices will be sent by mail. PG&E would be more than happy to discuss these and other alternatives in detail.

If you have any questions or comments, please contact Ryan Goldman at (415) 973-4484.

Sincerely,

ROB GRIMM
Manager - Gas System Operations
RRGoldman (223-4484)

Attachments

cc: Rae McQuade - GISB Executive Director
FTTF Members

SUMMARY

The GISB Future Technologies Task Force (FTTF) was formed to develop a specification that allows all gas industry participants to exchange EDI datasets via the Internet. Participation in the FTTF is voluntary and the FTTF's members have a wide range of experience with Internet and electronic commerce issues. Any architecture proposed by the FTTF and ratified by GISB represents the minimum functionality that an organization must support in order to be FERC compliant. Each organization that wishes to comply with GISB standards will therefore be required to develop and deploy this standard system.

A preliminary report by the FTTF to the Executive Committee (June 7, 1996) describes the proposed suite of protocols and standards through which EDI datasets are to be exchanged. A copy of the preliminary report is attached to this memorandum (see **Appendix A**). Section 3.1 of the FTTF report illustrates the flow of a transaction using the proposed system. However, this diagram is incomplete and does not show the full transaction set and full requirements from the client site.

It is PG&E's understanding that no existing solutions for exchanging EDI datasets over the Internet were considered by the FTTF. It appears some of the existing solutions and standards were rejected by the FTTF, due to the assumption that they would be "picking the winners". Furthermore, upon deciding to develop its own proprietary solution, only one approach was selected for testing, rather than two or three. Therefore, no competitive analysis of proposed solutions can be performed. PG&E feels a packaged solution would cost the gas industry less than the custom solution proposed by the FTTF. However, without a major change in direction by the FTTF, such solutions will not be discovered since there are no alternatives under consideration for pilot testing.

PG&E believes that the proposed technical solution, if recommended in its current form, represents an unreasonable burden on less sophisticated gas industry trading partners. The recommended system requires the implementation of an immature and untested series of programs, which must be developed independently by each trading partner. Furthermore, the infrastructure requirements of this technology all but exclude small marketers from participating in Internet electronic commerce. Before such a system is even recommended to the Executive Committee, we would urge that a more detailed analysis, including potential costing and more client and end-use customer participation be completed.

Reason Why the Internet May Cause Road Blocks For The FTTF.

When the business case for the Internet is examined, there are traditionally two major reasons for considering the use of Internet technology.

> **Cost Reduction** - The Internet usually represents a flat-fee cost for data transmission. Other methods, such as the use of an EDI VAN (Value Added Network) can have costs that increase as the amount of data transmitted increases. For small businesses, this cost reduction comes from the use of a dial-up Internet account that carries a low monthly cost. However, implementation of the FTTF solution requires a complex architecture and a full-time connection to the Internet, making cost reduction impossible for most trading partners.
>
> **Extension of Reach** - The Internet is also used to increase the availability of product and service offerings to new and existing customers. The increased cost and complexity of the FTTF proposal will exclude potential trading partners instead of extending electronic access to new markets. Additionally, the rejection of packaged software solutions over untested proprietary solutions may force some large trading partners to reject the FTTF proposal out of hand. Due to these factors, PG&E predicts the proposed use of the Internet will not improve the ease of use or availability of product and service offerings to customers.

It is unclear to PG&E at this point why efforts are being made to use the Internet as a transport of such vital business information. As of February, 1996, the Gartner Group (**see Appendix B**) only recommends the Internet in the following types of business transactions:

1. Applications that do not require an immediate response.
2. EDI exchanges of less than 10 megabytes.
3. Applications that are not mission critical.
4. Applications that do not transfer confidential information.
5. EDI system that can be isolated from main processing systems.

The proposed use of the Internet by the FTTF violates several of these attributes, yet no attempt has been made to justify the effort made to mandate Internet use by GISB. If the proposed solution either reduced cost or allowed more trading partners to participate in an electronic marketplace, then the use of the Internet might be justified. However, in our view, the proposed solution offers neither benefit and the purpose of the Internet initiative should be reevaluated. The Transaction Flow and Issues & Concerns sections will help illustrate our point.

Transaction Flow of TFFT Pilot's Proposed Recommendation "EDI over the Internet"

The basic functionality of the system is to send an EDI data file to the trading partner (pipeline) and receive an immediate acknowledgment of receipt. A second acknowledgment is later returned by the pipeline to the sending party that shows whether or not the transaction was validated and accepted by the internal system of the pipeline. Since the data transmission protocol selected was HTTP, the proposed system requires that all trading partners maintain a web server that is attached to the Internet full-time (or contract with a service provider who will maintain a server for them). Custom software must be written and maintained to automate the sending and receiving of EDI datasets.

The diagram on the next page shows the step-by-step flow of data from the sender to the recipient during this process. Both a graphic representation and a block diagram have been included to clarify each step in the process.

After reviewing the full transaction data flow, we have concluded that unless a third-party service bureau is used, the following technologies must be implemented at each trading partner site:

1. Internet connectivity that must include at a minimum
    a. A 24 hr Internet connection
    b. A static Internet IP address
    c. An Internet domain (i.e. PGE.COM)
    c. A web server

2. A firewall to protect the internal corporate network of the trading partner from attacks from the Internet, while allowing transactions to flow both to and from the Internet.

3. An EDI translator that can translate both incoming and outgoing transactions from the internal application of the trading partner to an EDI X12 data file format.

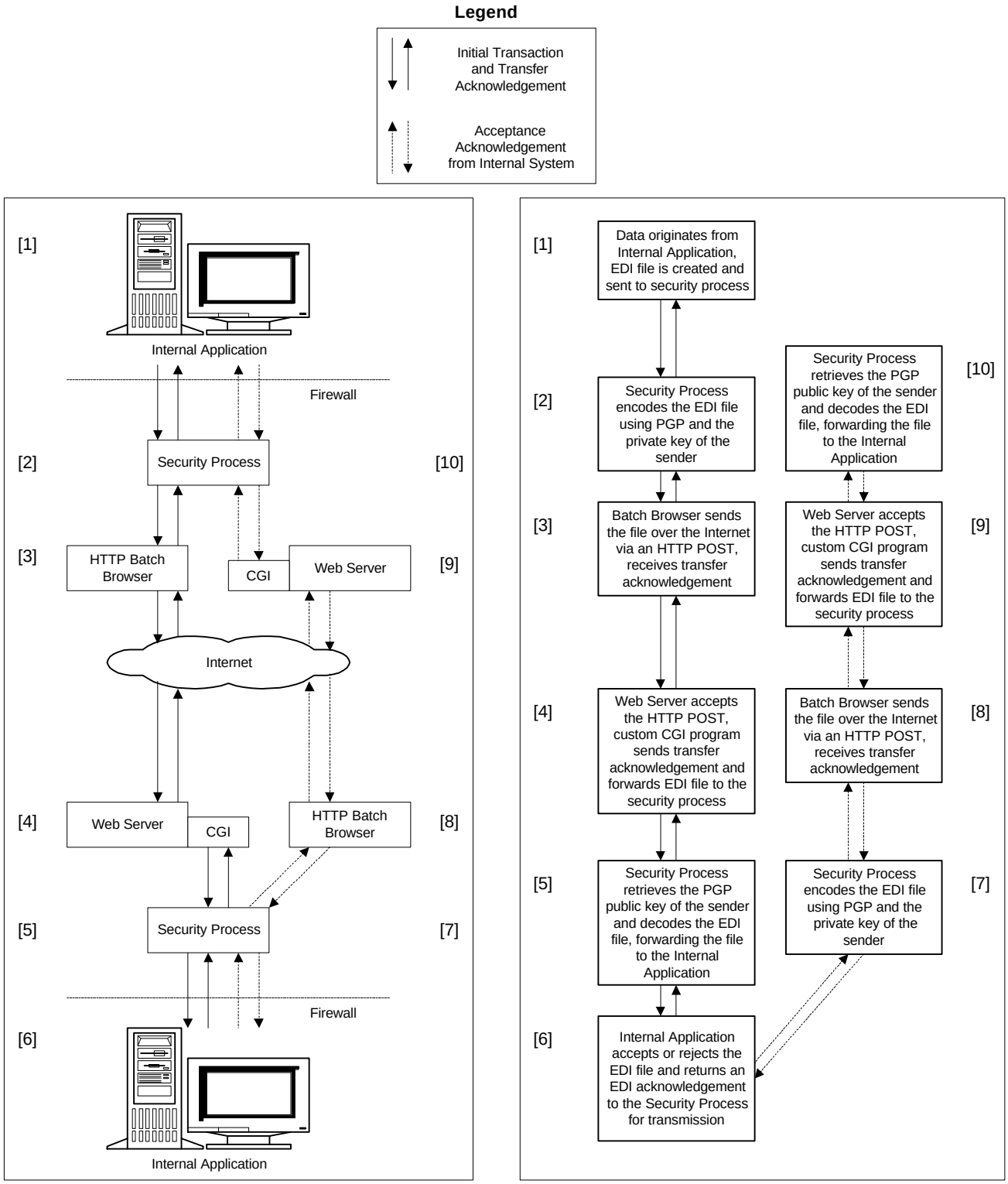
4. A security process that will encode an outbound EDI X12 data file and decode an incoming EDI X12 data file using the public domain PGP software. This security process will also need to maintain an up-to-date database of public keys for all trading partners.

5. A batch browser to initiate communications with trading partners (must be developed - not available off the shelf).

Any company wishing to implement GISB's proposal in-house (not utilizing a third party service provider), would have to develop and maintain all five features listed above. According to the **Gartner Group (see Attachment B- Part 3, Fig. 7, October 1995)**, the cost of a full-time web server is in the range of $104K to $285K with an annual maintenance cost of between $49K and $110K. Clearly, this design effectively mandates use of a third-party service provider by smaller participants who do not have the resources to build and maintain such complex systems. To further complicate matters, no such service bureau exists (although many providers are planning to offer such services).

GISB Future Technology Task Force's Proposed EDI over Internet Solution

Single Business Transaction Data Flow



Issues & Concerns

The technical design proposed by the FTTF raises several technical and business issues that need to be addressed. The issues that have been identified by PG&E are as follows:

1. Non-standard technology base - The design proposed by the FTTF uses a new and unique approach to the transmission of EDI data files over the Internet. The EDI industry has already addressed this issue and has completed testing of a system based on the use of SMTP and encryption for the secure transmission of EDI data. However, SMTP was summarily rejected by the FTTF although software products exist to manage the entire transmission process. In fact, in an analysis done by the **National Information Infrastructure Testbed**, the use of SMTP mail as an EDI transport was validated. A copy of the summary report is attached (**see Appendix C**).

2. Lack of extensive testing - The tight timeframe required for a recommendation from the FTTF has led to a design that has not been adequately tested for possible security breaches or other points of failure. We have received warning from our internal data security unit that they could not recommend implementation of any system that has not undergone significant independent testing. The adoption of the proposed solution would mandate that gas industry participants open up their existing systems to the Internet through a mandated yet immature and unproven technology.

3. Extensive Internet infrastructure requirements - The FTTF solution requires that every trading partner either use a third-party service provider (which does not currently exist) or implement and maintain a full-time Internet connection. Use of World Wide Web technology does not guarantee that a particular trading partner (i.e. a marketer) can use America Online or Compuserve (two of the largest Internet Service Providers) to communicate with all other trading partners using the proposed FTTF architecture. The connectivity requirement may prevent many marketers from engaging in the use of this technology at all. If the cost of Internet connectivity or any third-party service exceeds the cost of an existing EDI VAN service, it could be argued that the use of the Internet will increase the overall cost and potential security risks of doing business via EDI.

4. Rejection of Packaged Software Solutions - The FTTF has chosen to take a position of rejecting any currently available technology that can be purchased in favor of public domain and home-grown protocols and services. Available standards and products such as EDI/SMTP and HTTP/SSL have been rejected with little, if any, discussion. The build vs. buy decision is an important one, and yet has been overlooked in the current proceedings. Currently, there is no means of evaluating the economic feasibility of the current solution, since there is no packaged alternative being considered.

5. Security Issues - There are several security issues that need to be addressed. The current proposed system requires the maintenance of a user-id and password as well as a public and private encryption key for each pair of trading partners. The user-id and

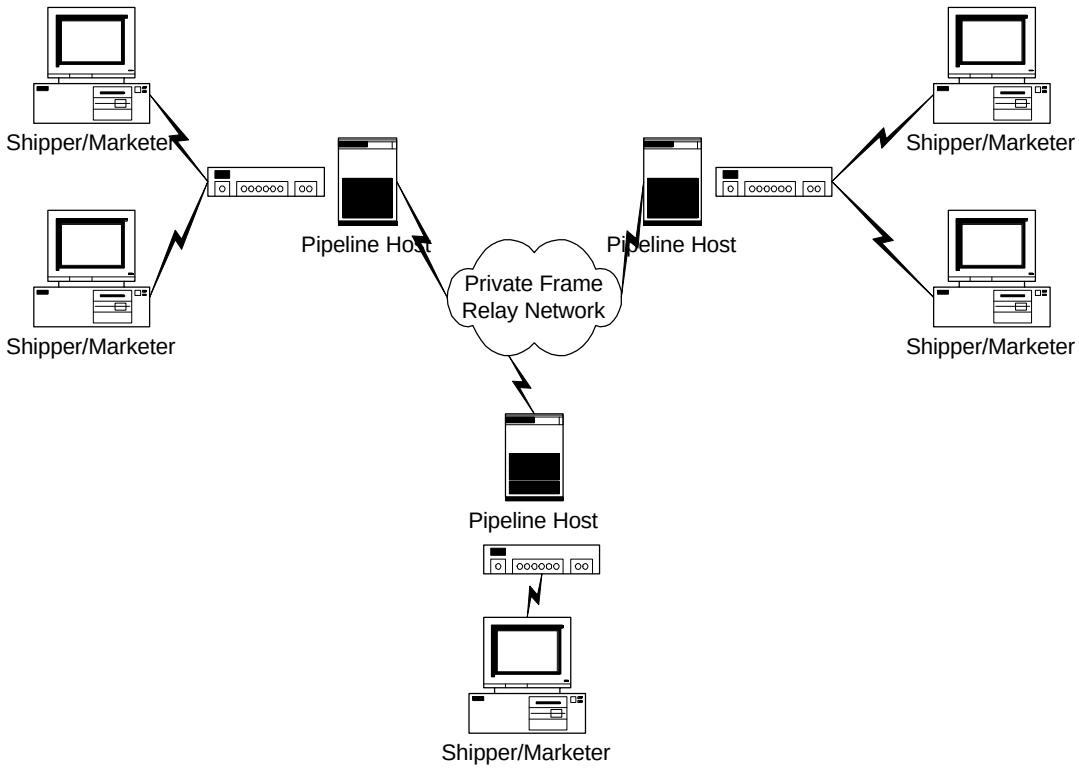
password are transmitted without effective encryption, yet are required for access to trading partners' systems. In the test case, three out of four sites use non-standard web server access ports, forcing trading partners to open up firewall access in order to transmit and receive to these ports. Finally, PGP encryption is used to validate the sender of data as well as to encode/decode the data even though an effective means of key management and authentication has not been found. In summary, the proposed solution poses several significant risks to the internal network of anyone mandated to adopt it.

Alternative Solutions

The following are some alternative solutions that PG&E believes should be explored, or at least considered. The fact that no alternatives are being considered at this time to the FTTF HTTP technology is a great concern. Without a comparative analysis between several alternatives, there is no way to be certain that the technology recommended to the Executive Committee meets the business needs in the best possible fashion. PG&E therefore proposes that the following alternatives be considered by the FTTF prior to a final report being made to the GISB Executive Committee.

Alternative #1 - Private Network

As previously mentioned, the reasons for the mandate of Internet usage are unknown. If the goals of the FTTF are to increase standardized electronic access to as many trading partners as possible, PG&E would like to propose that a private network be formed between all GISB pipelines, with each pipeline offering dial-up access to the entire network. This private network could be based on Internet technologies, including TCP/IP, SMTP, and HTTP. Given that the infrastructure for such a network may largely exist within each pipeline, this may prove to be the most secure, cost-effective solution. The diagram below shows one potential Private Network architecture:



Alternative #1 - Private Network - Con't

This architecture has the following attributes:

1. All participants are known, outside attack is unlikely
2. The network is inherently secure due to #1
3. There is guaranteed bandwidth, unlike the Internet
4. There is true wide-area access, maintained by the pipelines themselves
5. The network can be made fault-tolerant with dial-backup and redundant technology
6. The network uses the existing infrastructure of the pipelines to allow for industry-specific data transmission (little incremental cost)

Alternative #2 - EDI/Internet using SMTP Email

This alternative is the way that most of the EDI translator vendors are approaching Internet access. When SMTP mail is used without Internet routing, a direct connection is made between the client software and the SMTP server. This would satisfy the need for a direct connection between client and server software for the initial EDI file transfer. Also, the use of this protocol would allow the use of packaged software rather than a requirement to develop a custom software solution. Attached is a case study of a similar project that was successfully completed between **Bank of America and Lawrence Livermore Laboratories. (see Appendix D)**

Alternative #3 - HTTP with required immediate response

If HTTP is to be used, by mandating a quick validation, a normal browser could be used and the extensive Internet infrastructure would not be required. This option would follow the proposed technology solution, but would eliminate the need for a second acknowledgment to be sent by the pipeline.

Alternative #4 - HTTP with non-HTTP Acknowledgment

The existing proposal could be modified in that the critical second acknowledgment and validation could be sent via SMTP E-mail, automated fax, posting to an interactive web page, or other means. By eliminating the need for the second message from the pipeline to use HTTP as a transport protocol, most of the costly infrastructure is eliminated, opening the application up to more users.

Conclusion

PG&E believes that alternative solutions exist. The alternatives must be considered before the industry is mandated to use a specific solution. The implementation of any alternative that does not meet the needs nor falls within the capabilities of all members of GISB will be difficult to implement. Care must be taken to identify the business drivers of this initiative, understand the resultant requirements, and judge as many alternatives as possible in order to assure the best solution. PG&E is ready and willing to discuss these and any other alternatives in detail.

APPENDIX

-A- Recommendations from the Future Technology Task Force to the Executive Committee Meeting on June 14, 1996.

-B- Gartner Group - Part 2: "Choosing an Appropriate System", February 1996
- Part 3: "The Business Value of Electronic Commerce using the Internet", October 1995

Note: PG&E was granted permission from the Gartner Group to make reproduction and distribution to GISB members.

-C- National Information Infrastructure Testbed - "Electronic Data Interchange (EDI) over the Internet", March 1996

-D- Bank of America and Lawrence Livermore National Laboratory White Paper - "Financial EDI over the Internet"

-E- Pacific Gas and Electric Memorandum to GISB's Future Technology Task Force: June 3, 1996