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1 – VERSION HISTORY

2.0 12/31/2003

[DRAFT This is the third draft version of the initial release of the Internet Electronic Transport (ET) standard]

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2 – INTRODUCTION

The North American Energy Standards Board (NAESB) is a voluntary non-profit organization comprised of members from all aspects of the greater gas and electric industries. The NAESB mission is to take the lead in developing and implementing standards across the industry to simplify and expand electronic communication, and to streamline business practices. The vision of NAESB is a seamless North American marketplace for energy, as recognized by its customers, the business community, industry participants and regulatory bodies.

NAESB Internet Electronic Transport (Internet ET) Standards are used by the Wholesale Gas Quadrant (WGQ), Retail Electric Quadrant (REQ), and the Retail Gas Quadrant (RGQ) for the electronic transport of transactions and other information payloads between trading partners.

NAESB recognizes that as the energy industry evolves and uses NAESB standards, additional and amended NAESB standards will be necessary. Any industry participant seeking additional or amended standards (including principles, definitions, standards, data elements, process descriptions, technical implementation instructions) should submit a request detailing the change to the NAESB office so that the appropriate process may take place to amend the standards.

TAB 1 Version Notes

Contains notes about this version, and, if appropriate, a brief summary of changes from the immediately preceding version.

TAB 2 Introduction

Provides a background statement about NAESB's Mission and the underlying concepts behind the design and use of this guide.

TAB 3 Executive Summary

Provides a brief outline of the industry business situation which is the basis for development of this guide.

TAB 4 Business Process & Practices

Provides a brief overview of the business process and the NAESB-approved principles, definitions and standards related to the business process covered by this guide.

TAB 5 Related Standards

Provides a reference to any related standards.

TAB 6 Technical Implementation – Internet Electronic Transport (Internet ET)

Provides an overview of the business process for Internet ET.

Data Dictionary

Provides definition of the standard data elements and the usage requirements for each element.

Batch Flow Diagram

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Sending Electronic Packages

Provides instructions to develop mechanisms for sending of NAESB standard format data files.

Receiving Electronic Packages

Provides instructions to develop mechanisms for receiving of NAESB standard format data files.

Security

Provides guidelines for data privacy, data integrity, authentication and non-repudiation of inbound and outbound packages.

Other Considerations

Provides information regarding error notification and testing. Includes a reference guide and examples for repudiation and validation.

TAB 7 Testing Guidelines

Provides guidelines for testing the Internet ET standards.

TAB 8 Appendices

Table 1 – Internet ET Error Codes

Appendix A – Reference Guide

Appendix B – Internet ET FAQ

Appendix C – Sample Technical Exchange Worksheet (TEW)

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3 – EXECUTIVE SUMMARY

The North American Energy Standards Board (NAESB) Wholesale Gas Quadrant (WGQ), Retail Electric Quadrant (REQ), and Retail Gas Quadrant (RGQ) have developed standards for electronic commerce over the Internet. The Internet Electronic Transport (Internet ET) standards enable the rapid, reliable, and safe transportation of electronic information between NAESB trading partners.

This document is a high-level guide to implementing various technologies necessary to communicate transactions and other electronic data using standard protocols. As such, this guide is not intended to be a comprehensive, in-depth manual. Where possible, this guide points to more in-depth material. The Reference section provides locations on the Internet to obtain more information as well as recommended books and periodicals.

Comment:

BUSINESS REASONS FOR USING INTERNET ET

Energy companies need to exchange information and data with other energy companies. Internet ET enables this with the following advantages:

Security. Internet ET incorporates the PAIN security principles of Privacy, Authenticity, Integrity and Non-repudiation.

Standardized Process. Internet ET standardizes how packages are exchanged, regardless of the business process, the trading partner, or the energy quadrant.

Audit Trail. Internet ET gives both Sender and Receiver a detailed audit trail, enabling better controls and less errors.

Error Notification. Internet ET prescribes how errors are to be handled, and provides a foundation for efficient and quick resolution to errors.

Minimum technology requirements. Internet ET is built on low-cost technology and readily-available Web browser and open source technology.

Interactive and Batch Capabilities. Internet ET provides mechanisms for both fully-automated and manual-assisted business processes.

Any Payloads. Internet ET can deliver any kind of payload, whether it is EDI, flatfiles, XML, documents, etc.

Software Standards. The Internet ET standards increase the likelihood that software vendors will provide Commercial Off-The-Shelf (COTS) software packages.

OVERVIEW OF ELECTRONIC TRANSPORT LIFE CYCLE

In the Internet ET life-cycle, the party sending data, the “Sender”, creates an electronic package by encrypting the data payload and applying appropriate header ‘envelope’ information such as ‘to’ and ‘from’. This electronic package is submitted to the trading partner’s SSL Web server as an HTTP Request using the POST method.

The receiving party, the “Receiver”, receives and decrypts the package, then forwards the

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payload data to back-office processes. A receipt is sent from the Receiver to the Sender with timestamps and any error notices. The Receiver back-office systems process the data according to NAESB Quadrant-specific Electronic Delivery Mechanisms (QEDM), Trading Partner Agreements, and related documents. If the Receiver decrypts in a separate process, the Receiver may send an Error Notification package to the Sender to identify errors found during decryption.

Trading partners can be either the Sender or Receiver depending on what information and data needs to be exchanged.

The Internet ET standards focus on the transport of the electronic package and not the contents of the package. Each business process may define different contents, and the Internet ET is designed to work with any type of contents (e.g. EDI, flat files, etc).

The following are Internet ET life-cycle scenarios:

1. **Success.** The Successful scenario is when the electronic package was delivered with no errors, and the Sender has received a Receipt from the Receiver.
2. **Invalid Package Response.** The Invalid Package Response scenario is when the Receiver was unable to disassemble the electronic package, and has sent an HTTP Response to the Sender notifying them of package errors.
3. **Invalid Package Error Notification.** The Invalid Package Error Notification scenario is when a Receiver detects an error in the package AFTER the Response is sent. This scenario exists when a Receiver has implemented processes where the decryption occurs after the Response is sent. Decryption errors are communicated to the Sender via an HTTP Request using the Internet ET Error Notification format.

Errors detected after successful decryption (e.g. format errors, EDI errors, etc) are beyond the scope of the Internet ET, and can be found in the QEDM standards.

Parties implementing Internet ET should become familiar with the following components of the Internet ET:

- Communications Protocols
- Sending Secure Electronic Packages
- Receiving Secure Electronic Packages
- Security

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KEY ASSUMPTIONS

This document makes the following assumptions:

- **Platform Independence.** An Internet ET implementation can communicate with all trading partners in the energy industry, regardless what hardware, operating system and programming languages trading partners use.
- **Open Standards.** NAESB has adopted open standard technologies to provide flexibility and scalability.

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- **Payload Content Independence.** Internet ET standards focus on the transport of the electronic package, and not the contents of the package. Each business process may define different contents. Internet ET is designed to work with any type of content (e.g. EDI, flat files, etc). The Internet ET's main function is to get the package from point X to point Y reliably with privacy, authentication, integrity, and non-repudiation.
- **Importance of the Technical Exchange Worksheet (TEW).** Internet ET relies on the exchange of technical information between trading partners to establish and maintain reliable Internet ET production. This worksheet is intended to establish communications between two parties. Additional requirements and information may be required. Refer to your quadrant-specific EDM (QEDM). A sample TEW is included in Appendix ??GMB. The TEW may be a part of a TPA.
- **Testing With Internet ET Trading Partners.** Since the Internet ET is not platform-specific, testing with other trading partners on a variety of platforms is very important in ensuring that each Internet ET application is compatible with a range of platforms used by various trading partners. Testing should ensure receipt of the package, proper decryption, and appropriate receipts were sent.
- **Lack of Internet Quality of Service (QoS).** Implementers of Internet ET should be aware that the Internet lacks QoS. Internet transfer of low-priority files (e.g. song MP3's) have equal access to Internet bandwidth as high-priority files (e.g. Nominations). Business processes that have firm or tight timing requirements should be constructed to properly mitigate the risk associated with the lack of guaranteed QoS on the Internet.

Further Information

Please see the NAESB home page at <http://www.naesb.org/> for additional useful information on the implementation of Internet ET.

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4 – BUSINESS PROCESS AND PRACTICES

A. OVERVIEW

Role of Internet Electronic Transport (ET) in NAESB WGQ, REQ, and RGQ Quadrants

Business processes defined by NAESB quadrants require the exchange of transactions and transaction data. The Internet ET, in concert with Quadrant-specific Electronic Delivery Mechanisms (QEDMs), enables NAESB parties to securely and reliably exchange transactions over the Internet. Internet ET electronic 'packages' are created using the standards defined in this document.

Version 2.0[??MS to write motion], of the Internet ET standard incorporates all electronic transport technical specifications of the NAESB WGQ EDM Version 1.7, including mutually-agreeable[??MJ; Glossary Sub; consistent use of this term across quadrants] business practices to protect the sender of a document with non-repudiation and with digitally-signed Error Notifications.

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Roles in Internet ET

In the Internet ET life-cycle, one party sends a package, and the other party receives the package. The sender is also referred to as the Client and the receiver as the Server.

NAESB business processes often require that parties act in both the Sender and Receiver roles. For example, once the Receiver of a payload file of Nominations has successfully processed the payload, they switch to the Sender role to send an acknowledgement back to the original Sender. Internet ET implementations may need to implement both Sender and Receiver capabilities.

The standards adopted for Internet ET should be adhered to by the trading parties as minimum standards. A trading party may offer additional functions or features as options but should not require their use. Such additional features or functions are termed "mutually agreed to". If both trading partners agree on the inclusion, the additional feature requirements will be met. If either trading party does not agree to the inclusion of additional features, then the partners must allow for transmission and receipt of data using the minimum standards.

To establish an Internet ET trading partnership with another company, a company needs to exchange technical information about their Internet ET implementation. This may include:

- contact information
- public keys, including key exchange and update policies
- test URLs
- production URLs, including alternative paths if available
- Common Code Identifiers (e.g. DUNS number)
- Use of 'time-c-qualifier' if in REQ or RGQ

This may be exchanged using a Technical Exchange Worksheet (TEW). A sample TEW is in Appendix ??GMB. In some cases, this information may be exchanged with a Trading Partner Agreement.

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Implementation Approaches

The NAESB Internet ET can be constructed using any IT deployment model, including in-house development, using consulting/development help from a third-party, using Commercial Off-The-Shelf (COTS) software, or using an outsourced solution with a third-party. The best solution for each organization must be determined based on the assessment of specific needs and the resources available to that organization.

All parties should fully investigate the ramifications of implementing electronic commerce using the Internet. This includes ensuring that all customer data, internal data, and applications are secured from intruders or other parties not authorized for access.

Participation in electronic commerce over the Internet involves hardware, software, and technical expertise. Hardware requirements may include a server to receive incoming Internet ET packages and a firewall to block intruder access. Software includes operating software for the servers, including the firewall, programming languages which support Internet technologies, and encryption/decryption software to provide security during the transfer. Technical expertise may be involved in the development and maintenance of server applications to process incoming files as well as applications to initiate communication with the server of your trading partner.

Third-party providers offer a variety of services from a full “turn key” solution to assistance where you require it, including programming, system configuration, system administration and private communication links. Criteria for selecting an outsourced Internet ET service provider should consider their ability and experience with Internet ET standards for HTTP Request and Response validation and processing.

Internet ET Network Connections

Trading partners should maintain redundant connections to the public Internet for Internet ET sites. These redundant connections should be topographically diverse paths to minimize the probability of a single point of failure. Three possible approaches to redundant connections are:

1. Maintain multiple ISPs and multiple points of connectivity, each of which was identified by the same URL making the process of redundancy transparent to the sender.
2. Maintain different Internet connectivity URLs (presumably on topographically different ISPs). For this to result in communication redundancy, the sender should know of the existence of the secondary URL and have programming in place that will automatically switch batch-browser transmissions to the secondary URL when the primary URL is unavailable.
3. Maintain multiple connections to the same ISP. This involves only one URL but the presumption would be that the ISP would provide alternate diverse paths for the URL.

Servers may maintain multiple URLs and, if such have been disclosed, the sender should attempt to use these during primary URL outages. The redundant public Internet connections can be through a single ISP or multiple ISPs. If multiple URLs are provided for Internet ET access, the following conditions should be met:

- The information provided by each URL should be exactly the same, although the “trans-id” sequences may differ.
- The trading partners should be informed of both URLs and their availability.
- The URLs should be identified as primary and secondary if either:

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There is a TSP connection speed difference between the URLs (The faster connection listed as primary)	OR	One URL is only available when the other is down (primary URL being the most available)
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- The URLs should be listed as primary and alternate if:

The URLs have the same TSP connection speed	AND	The URLs are customarily available simultaneously
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In the context of communication redundancy, a URL is considered available if all the TCP/IP facilities are properly functioning up to and including the HTTP service. This includes firewalls, DNS servers, routers, hubs, LANs, etc. between your HTTP server and your Internet Service Provider's point of presence.

In this context redundancy refers to normal operations redundancy, not to disaster recovery contingencies. Disaster recovery contingencies are not addressed in NAESB Internet ET standards.

Private network connections to access NAESB Internet ET sites may be at any point on a party's firewall boundary at the party's discretion on a non-discriminatory basis. The specific type and speed of their connection should be mutually agreed. It is at the discretion of the party how multiple private network connections should be managed.

TCP Communications

NAESB Internet ET Principle 4.1.x37 and NAESB Internet ET Standard 4.3.x70 restrict the TCP ports used as a standard for Internet ET communications. The use of NAESB standard TCP ports may require modifications in the Sender's and Receiver's firewalls to allow for communications with various trading partners. Internet ET implementations. Parties should indicate to their trading partners which specific TCP ports are required to be opened to conduct electronic communication.

Internet ET allows the following TCP Ports (not UDP ports)

- HTTP HTTPS 80, 443, 5713, 6112, 6304, 6874, 7403
- TCP Optional 8001-8020**

**The reservation of 20 optional ports provides for additional security and for implementations such as load balancing. Parties should minimize the number of ports used for Internet ET.

Communication Protocols

HTTP POST - HTTP POST is the standard method for transporting Internet ET packages to trading partners. The POST method allows the upload of complete datasets without special encoding.

MIME "multi-part" - Internet ET packages are created using the "multi-part" content type.

Sending Secure Internet ET Packages

Internet ET supports both interactive and batch browsers. Interactive web browsers provide for low-cost access to Internet ET capabilities. A batch browser allows organizations to maximize

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their level of automation. The batch browser can be an event-driven mechanism used to push Internet ET packages to your trading partners in real-time or near real-time, while providing better audit trails.

Receiving Internet ET Packages

Receiving Internet ET packages and transaction payloads requires a Receiving Program. The Receiving Program:

- Parses the Internet ET package parameters and files to determine if the appropriate parameters were transmitted
- Saves a log including a time stamp for the package
- Stores the payload file
- Sends the Receipt as an HTTP Response to the Client with the timestamp and other required Receipt elements

In some cases the Receiving program decrypts the file prior to sending the Receipt. In this scenario decryption errors would be communicated in the Receipt. Some trading partners decrypt after sending the Receipt. Decryption errors detected after the Receipt is sent are communicated to trading partners using Internet ET Error Notification standards. Parties should notify trading partners of how decryption errors will be communicated.

If trading partners mutually agree to use signed Receipts, then the application would additionally attach a digital signature to the Receipt.

After the Receiving program performs its functions without errors, the payload file is forwarded to other processes including security, translation, and back-office systems.

Security

NAESB Internet ET establishes several security measures as standards to ensure a minimum level of confidence in conducting business over the Internet, and to provide uniformity in the implementation of security. Four security concepts, often referred to by the acronym PAIN, are vital to protecting Internet ET packages:

- Data Privacy
- Authentication
- Data Integrity
- Non-repudiation

Data Privacy and Encryption

Privacy is the assurance to an entity that no one can read a particular piece of data except the receiver(s) explicitly intended. Data privacy is accomplished by encrypting payload files. Internet ET allows encryption using:

PGP 6.5 or higher, with RSA keys. Previous versions of PGP are not compatible with OpenPGP	OR	OpenPGP, defined by IETF RFC 2440. OpenPGP can be used on a mutually-agreed basis
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Internet ET uses 128-bit SSL to protect username and password.

Authentication

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Authentication is the assurance to one entity that another entity is who he/she/it claims to be. Basic authentication is the required standard to prevent intruders from connecting to Internet ET Web sites. Internet ET uses 128-bit SSL-protected usernames and passwords to establish authentication. ~~Optional techniques such as firewall security enable further authentication.~~ ~~[??GPDbase64-encoding]~~

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Integrity

Integrity is the assurance to an entity that data has not been altered, intentionally or unintentionally, between there and here, or between then and now. Data Integrity is established via PGP/OpenPGP encryption, and via the “content-length” HTTP header field.

Non-Repudiation

Non-repudiation is the assurance to an entity that a party cannot deny having engaged in the transaction, or having sent the electronic message. It is like a Notary seal. The Sender of a file includes in the Internet ET package a digital signature that is created using their Private key. The Receiver knows the Sender is legitimate by decoding the digital signature using the Sender's Public key.

B. GENERAL STANDARDS

Principles:

- 0.1.1 An entity is a person or organization with sufficient legal standing to enter into a contract or arrangement with another such person or organization (as such legal standing may be determined by those parties) for the purpose of conducting and/or coordinating energy transactions.
- 0.1.2 There should be a unique entity common code for each entity name and there should be a unique entity name for each entity common code.

Standards:

- 0.3.1 Entity common codes should be “legal entities”, that is, Ultimate Location, Headquarters Location, and/or Single Location (in Dun & Bradstreet Corporation (“D&B”) terms). However, in the following situations, a Branch Location (in D&B terms) can also be an entity common code:
 - 1. when contracting party provides a D-U-N-S®¹ Number at the Branch Location level;
 - OR
 - 2. to accommodate accounting for an entity that is identified at the Branch Location level.

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¹ D-U-N-S® is a registered trademark of Dun & Bradstreet, Inc.

C. INTERNET ELECTRONIC TRANSPORT RELATED STANDARDS

Principles:

- 4.1.1 [Deleted]
- 4.1.2 The Internet Electronic Transport (ET) does not pick winners, rather it should create an environment where the marketplace can dictate a winner or winners.
- 4.1.3 The solutions should be cost effective, simple and economical.
- 4.1.4 The solutions should provide for a seamless marketplace for energy.
- 4.1.5 [Deleted]
- 4.1.6 Parties should interface with third-party vendors according to NAESB Internet ET standards.
- 4.1.7 Electronic communications between parties to the transaction should be done on a non-discriminatory basis, whether through an agent or directly with any party to the transaction.
- 4.1.8 [Deleted]
- 4.1.9 [Not applicable to ET]
- 4.1.10 [Not applicable to ET]
- 4.1.11 [Deleted]
- 4.1.12 Protocols and tools that parties elect to support should be “Internet-compatible”.
- 4.1.13 [Not applicable to ET]
- 4.1.14 The industry should use standard policies and guidelines for testing.
- 4.1.15 The NAESB Internet ET should not set standards for site-level security. Individual organization security standards should be relied upon.
- 4.1.16 [Not applicable to ET]
- 4.1.17 [Not applicable to ET]
- 4.1.18 [Not applicable to ET]
- 4.1.19 [Not applicable to ET]
- 4.1.20 [Not applicable to ET]
- 4.1.21 [Not applicable to ET]
- 4.1.22 [Not applicable to ET]
- 4.1.23 [Not applicable to ET]
- 4.1.24 [Not applicable to ET]
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- 4.1.29 [Not applicable to ET]
- 4.1.30 [Not applicable to ET]
- 4.1.31 [Not applicable to ET]
- 4.1.32 [Not applicable to ET]
- 4.1.33 [Not applicable to ET]
- 4.1.34 [Not applicable to ET]
- 4.1.35 [Not applicable to ET]
- 4.1.36 Trading partners should maintain redundant connections to the public Internet for NAESB Internet ET Web sites. These redundant connections should be topographically diverse (duality of) paths to minimize the probability of a single point of failure.
- 4.1.37 Internet ET implementations should minimize the number of outbound ports required to be opened on the client-side firewall.
- 4.1.38 [Not applicable to ET]
- 4.1.39 Trading Partners should mutually select and use a version of the NAESB Internet ET standards under which to operate, unless specified otherwise by government agencies. Trading Partners should also mutually agree to adopt later versions of the NAESB Internet ET standards, as needed, unless specified otherwise by government agencies.

Definitions:

- 4.2.1 [Not applicable to ET]
- 4.2.2 [Not applicable to ET]
- 4.2.3 [Not applicable to ET]
- 4.2.4 [Not applicable to ET]
- 4.2.5 [Not applicable to ET]
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- 4.2.17 [Not applicable to ET]
- 4.2.18 [Not applicable to ET]
- 4.2.19 [Not applicable to ET]
- 4.2.20 Testing electronic packages between trading partners includes testing of:
1. Connectivity;
 2. Encryption/Decryption;
 3. Digital signatures where appropriate
- 4.2.x21 “Failover” defines a scenario a prescribed process is executed when a NAESB Internet ET Client fails to establish a connection to the target NAESB Internet ET Server.
- 4.2.x22 “Trading Partner” is a party that enters into an agreement with another party to transact business electronically using the Internet ET standard.
- 4.2.x23 “Originating party” is any party originating/creating the package . This could also include a third-party.
- 4.2.x24 “Third-Party” is any organization that a trading party uses to provide services to comply with the required elements of the Internet ET.
- 4.2.x25 “Receiving Party” is any party that hosts (either in-house or outsourced) an Internet ET compliant server capable of receiving Internet ET packages.
- 4.2.x26 “Trading Partner Agreement”, or “TPA” is a legal agreement between trading parties. The TPA often dictates service level agreements and problem remediation processes. The TPA may include technical exchange information such as URLs, etc.
- 4.2.xx “Batch Browser”. A Browser that can be run with little or no manual operation or intervention. See “Browser”
- 4.2.xx “Browser”. A software program capable of generating HTTP Requests, including HTTP POST requests.
- 4.2.xx “Client”. The computer hardware and software used by the Sender to transmit an Electronic Package to the Receiver’s Server. A Client can be fully-automated or manual.
- 4.2.xx “COTS”. Commercial Off-The-Shelf; software that can be purchased that requires little or no customization.
- 4.2.xx “Electronic Package”. A data stream sent via HTTP POST that contains envelope header information and Payload File(s). The Payload Files are encrypted using defined Internet ET encryption techniques.
- 4.2.xx “Error Notification”. Errors that are trapped after the Internet ET Receipt is sent are communicated via an Error Notification package from the Receiver of the original data to the Sender.
- 4.2.xx “HTTP Request”. The stream of data sent from the Client to the Server that includes header information and payload data.
- 4.2.xx “HTTP Response”. The stream of data sent from the Server to the Client in response to an HTTP Request.
- 4.2.xx “HTTP Server”. A computer capable of receiving HTTP Requests and responding with HTTP Responses.
- 4.2.xx “IETF”. Internet Engineering Task Force; a body of technical experts that set

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standards, known as Requests for Comments (RFC) for the Internet.

- 4.2.xx “Interactive Browser”. A Browser that requires manual operation or intervention. See “Browser”.
- 4.2.xx “Internet EDM”. The GISB and NAESB WGQ standards up to and including Version 1.7. The “Internet ET” and “QEDM” standards were derived from these EDM standards.
- 4.2.xx “Internet Electronic Transport”, or “Internet ET”. The NAESB standards for the secure transport of electronic information between trading partners.
- 4.2.xx “Package”. See “Electronic Package.”
- 4.2.xx “Payload Files”. The data contents inside of an electronic package. NAESB Internet ET is content-independent.
- 4.2.xx “Protocol Failure”. A **protocol failure** occurs any time a sending party's NAESB-EDM server cannot connect to the receiving party's NAESB EDM server. For example, if a server tries to connect to a server and fails, or tries to post a file and fails, this is a protocol failure.
- 4.2.xx “Exchange Failure”. An **exchange failure** is when a sending party's NAESB EDM server has had continual protocol failures over a thirty-minute period. Each party is required to try at least 3 times over the thirty-minute minimum/two-hour maximum period before flagging an exchange failure.
- 4.2.xx “QEDM”. Quadrant-specific Electronic Delivery Mechanism; the set of standards for each NAESB quadrant that define the business policies, practices and processes for that quadrant related to the use of the Internet ET. The QEDM excludes electronic transport practices and standards. The QEDMs were derived from the Internet EDM from GISB and NAESB WGQ.
- 4.2.xx “Quadrant-Specific Electronic Delivery Mechanism”. See “QEDM”.
- 4.2.xx “Receipt”. The HTTP Response sent from the Receiver to the Sender that includes a timestamp and OK/error status.
- 4.2.xx “Receiver”. The party that receives an electronic package.
- 4.2.xx “Secure Electronic Package”. See “Electronic Package”
- 4.2.xx “Sender”. The party that sends an Electronic Package.
- 4.2.xx “Server”. The computer hardware and software used by the Receiver to receive an Electronic Package from the Sender's Client. The Server is an HTTP/Web Server.
- 4.2.xx “Web Browser”. See “Browser”
- 4.2.xx “Web Server”. See “HTTP Server”.
- 4.2.xx “QoS”. Quality of Service; term used to define what level of network bandwidth is guaranteed or assured; the Internet does not offer guaranteed quality of service.
- 4.2.xx “Technical Exchange Worksheet” or “TEW”. A worksheet used to communicate important information related to the technical implementation of Internet ET; includes information such as URLs, contacts and key policies.
- 4.2.xx “TCP”. Transmission Control Protocol; IETF RFCs 793, 1122, 1323
See “<http://www.itprc.com/tcpipfaq/default.htm>”
- 4.2.xx “RSA”. A mathematical algorithm for encryption developed by Rivest/Shamir/Adleman.

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See <http://world.std.com/~franl/crypto/rsa-guts.html>.

4.2.xx “SSL”. Secure Sockets Layer; a privacy technique that uses encryption to hide information from electronic observers on the Internet.

See “<http://developer.netscape.com/docs/manuals/security/sslin/contents.htm>”

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4.2.xx “PGP”. Pretty Good Privacy; software used to create public and private keys for privacy and digital signature applications; see “<http://www.uk.pgp.net/pgpnet/pgp-faq/>”

4.2.xx “HTTP”. Hypertext transport protocol; Assumes version HTTP/1.1; IETF RFCs 2616, 2069. See “<http://www.w3.org/Protocols/Specs.html>”

4.2.xx “Content-type”. An HTTP header that defines what kind of content is being sent to the browser.

4.2.xx “TP”. Trading partner; any company sending data to or receiving data from another company using Internet ET.

4.2.xx “MIME”. Multipurpose Internet Mail Extensions; IETF RFCs 2045, 2046, 2047, 2048, 2049; See <http://www.fags.org/rfcs/rfc2045.html>

4.2.xx “Mutually-agreeable”. Use NAESB-wide standard; practice that is implemented only when both parties agree.

4.2.xx “Conditional”. Use NAESB-wide standard; practice required given a certain condition of another data element.

4.2.xx “Business Practice Conditional”. Use NAESB-wide standard; practice required that is not conditional on data elements in a transaction.

Standards:

4.3.x1 All parties sending and receiving data should accept a TCP/IP connection.

4.3.x2 [Not applicable to ET]

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4.3.x3 [Not applicable to ET]

4.3.4 Trading partners should retain audit trail data for at least 24 months. This data retention requirement does not otherwise modify statutory, regulatory, or contractual record retention requirements.

4.3.5 [Not applicable to ET]

4.3.6 [Not applicable to ET]

4.3.7 At a minimum, the designated site should be accessible via the public Internet. This specifically does not preclude location of the designated site on a private intranet as long as the designated site is accessible via the public Internet.

4.3.8 The minimum acceptable protocol should be HTTP. All sending and receiving parties should be capable of sending and receiving the HTTP versions supported by NAESB Internet ET.

4.3.9 There is a time stamp (“time-c”) that designates the time that a file is received at the designated site. The receiving party should generate a timestamp upon the successful receipt of a complete file and send an immediate response to the sending party. The timestamp should be generated by the Receiving program of the receiving party, prior to further processing by the Receiving program.

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4.3.10 The timestamp should be included in the HTTP Response back to the sender of the

original HTTP package. The server clock generating the timestamp should be synchronized with the National Institute of Standards and Technology (NIST) time in order to mitigate discrepancies between the clocks of the sender and receiver.

4.3.x11 The HTTP Response should be sent to the sending Internet Protocol (IP) address.

4.3.12 At a minimum, one designated site for receipt should be identified for each trading partner. That site should be identified by a specific Uniform Resource Locator (URL). This does not preclude multiple designated sites being mutually agreed to between trading partners.

4.3.13 The Sender should make three attempts to complete a unit of work. A unit of work consists of one complete HTTP POST transaction as defined in the technical specification of the HTTP protocol (IETF RFC 1945). The roles of sender and receiver are also defined in that document.

4.3.xx A failure to complete a unit of work is a protocol failure.

4.3.xx Three protocol failures within a 30-minute timeframe is an exchange failure.

4.3.14 The roles of sender and receiver are defined in the following table. The entire table defines a unit of work:

Client (Sender)	Server (Receiver)	Receiving Program (Receiver)
	Listen for Connect	
Connect	Accept Connection	
Write HTTP Request	Read HTTP Request	Start of Receipt
Write HTTP Request	Read HTTP Request	
EOF (send)	Read HTTP Request	End of Receipt
Read HTTP Response	Write HTTP Response	
Received		
EOF HTTP Response		

4.3.15 Trading partners should implement all security features (privacy, secure authentication, integrity, and non-repudiation) using a file-based approach via a commercially-available implementation of PGP 6.5 or greater (or compatible with PGP 6.5) or, on a mutually agreed basis, an OpenPGP compatible product.

4.3.xx Trading partners should implement basic authentication.

4.3.xx Encryption keys should be self-certified. The exchange of keys should be done in a secure manner such as via postal mail. Key policies, including key exchange policies should be communicated to trading partners.

4.3.xx Encryption keys should have a limited lifetime whose duration is determined by the key's owner. A key's end of life is expressed in the expiration date field contained in each public key. A lifetime of one year or less is recommended.

4.3.16 [Not applicable to ET]

4.3.17 [Not applicable to ET]

4.3.18 [Not applicable to ET]

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- 4.3.19 [Not applicable to ET]
- 4.3.20 [Not applicable to ET]
- 4.3.21 [Not applicable to ET]
- 4.3.22 [Not applicable to ET]
- 4.3.23 [Not applicable to ET]
- 4.3.24 [Not applicable to ET]
- 4.3.25 [Not applicable to ET]
- 4.3.26 [Not applicable to ET]
- 4.3.27 [Not applicable to ET]
- 4.3.28 [Not applicable to ET]
- 4.3.30 [Not applicable to ET]
- 4.3.31 [Not applicable to ET]
- 4.3.32 [Not applicable to ET]
- 4.3.33 [Not applicable to ET]
- 4.3.34 [Not applicable to ET]
- 4.3.35 [Not applicable to ET]
- 4.3.36 Internet protocols should be used for accessing all industry business functions.
- 4.3.37 Web browser interface should use Internet compatible common browser software.
- 4.3.38 [Not applicable to ET]
- 4.3.39 [Not applicable to ET]
- 4.3.40 [Not applicable to ET]
- 4.3.41 [Not applicable to ET]
- 4.3.42 [Not applicable to ET]
- 4.3.43 [Not applicable to ET]
- 4.3.44 [Not applicable to ET]
- 4.3.45 [Not applicable to ET]
- 4.3.46 [Not applicable to ET]
- 4.3.47 [Not applicable to ET]
- 4.3.48 [Not applicable to ET]
- 4.3.49 [Not applicable to ET]
- 4.3.50 [Not applicable to ET]
- 4.3.51 [Not applicable to ET]
- 4.3.52 [Not applicable to ET]
- 4.3.53 [Not applicable to ET]

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- 4.3.54 [Not applicable to ET]
- 4.3.55 [Not applicable to ET]
- 4.3.x56 The industry should use common codes for legal entities when using Internet ET.
- 4.3.57 [Not applicable to ET]
- 4.3.58 [Not applicable to ET]
- 4.3.59 [Not applicable to ET]
- 4.3.60 [Not applicable to ET]
- 4.3.61 [Not applicable to ET]
- 4.3.62 [Not applicable to ET]
- 4.3.63 [Not applicable to ET]
- 4.3.64 Private network connections to NAESB Internet ET servers, which include all NAESB Internet ET standardized Internet communication, may be at any point on a party's firewall boundary at the party's discretion on a non-discriminatory access basis. The specific type and speed of these connections should be mutually agreed. It is at the discretion of each party on how multiple private network connections should be managed, so long as such management is done on a non-discriminatory access basis.
- 4.3.65 [Not applicable to ET]
- 4.3.66 [Not applicable to ET]
- 4.3.67 [Not applicable to ET]
- 4.3.68 [Not applicable to ET]
- 4.3.69 [Not applicable to ET]
- 4.3.x70 Parties should be limited to the NAESB Internet ET approved list of available TCP ports for Internet ET implementations.
- 4.3.71 Internet ET implementations should not require any inbound ports to be opened on the client-side firewall.
- 4.3.72 [Not applicable to ET]
- 4.3.73 [Not applicable to ET]
- 4.3.74 [Not applicable to ET]
- 4.3.75 [Not applicable to ET]
- 4.3.76 [Not applicable to ET]
- 4.3.77 [Deleted]
- 4.3.78 [Not Applicable to ET]
- 4.3.79 [Not Applicable to ET]
- 4.3.80 [Not Applicable to ET]
- 4.3.81 [Not Applicable to ET]
- 4.3.82 [Not Applicable to ET]
- 4.3.83 [Not Applicable to ET]

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- 4.3.84 [Not Applicable to ET]
- 4.3.85 [Not Applicable to ET]
- 4.3.86 [Not Applicable to ET]
- 4.3.87 [Not Applicable to ET]
- 4.3.88 For Internet ET, 128-bit Secure Socket Layer (SSL) encryption should be used.

D. Interpretations

NAESB has adopted the following interpretations of standards that relate to Internet ET implementation:

- 7.3.24 [Not applicable to ET]
- 7.3.35 [Not applicable to ET]

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5 – RELATED STANDARDS

Common Codes

Internet ET uses the D-U-N-S® Number as the common company identifier for the HTTP Request and Response data dictionary 'to' and 'from' HTTP header elements. The D-U-N-S® Number is a 9-digit number assigned to companies by the Dun & Bradstreet Corporation (D&B). The D-U-N-S+4® Number is a 10- to 13-digit number, where characters 10 through 13 are arbitrarily assigned by the owner of the D-U-N-S® Number.

For Internet ET Common Code purposes, an entity will use one and only one D-U-N-S® Number. Entity common codes should be "legal entities," that is, Ultimate Location, Headquarters Location, and/or Single Location (in D&B terms). However, in the following situations, a Branch Location (in D&B terms) can also be an entity common code:

1. When the contracting party provides a D-U-N-S® Number at the Branch Location level.
2. To accommodate accounting for an entity that is identified at the Branch Location level.

Since D&B offers customers the option of carrying more than one D-U-N-S® Number per entity, please refer to NAESB's Web Page at www.naesb.org for directions on determining the one and only one D-U-N-S® Number constituting the NAESB Internet ET Entity Common Code.

Party Roles

Various types of parties are involved in NAESB business processes and the use of Internet ET, including distribution companies, end-users, regulatory entities, service providers, and suppliers. See the ??[pending work from Glossary subcommittee].

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6 – TECHNICAL IMPLEMENTATION - INTERNET ET

INTERNET ET TECHNOLOGIES

The NAESB Internet ET uses the following technologies and components to securely and reliably transport electronic packages to trading partners:

- PGP and OpenPGP Encryption and Digital signatures
- TCP/IP and HTTP POST. Internet ET uses a specifically-structured HTTP POST to transport payload data from one trading partner to the other.
- Mime multi-part encoding. Internet ET package structure requires that each section of the package be encoded.
- A “Browser”, running at the Sender’s site as Client software. This software is referred to in this document as “Client”.
- A “Server” running at the Receiver’s site, usually on a dedicated computer. This is a Web or HTTP server, and is referred to in this document as “Server”.

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ELECTRONIC TRANSPORT LIFE CYCLE

The life cycle of an Electronic Package using Internet ET is described below:

Sender		Receiver
- Collects payload data to be sent - Encrypts payload - Prepares digital signature if necessary		
- Uses browser to create Electronic Package multipart HTTP Request with header data elements and payload. - Uses HTTP POST to send the electronic package to the Receiver	↓	
		- Receives the HTTP Request on their Web/HTTP Server - Validates Sender information from HTTP Request Header data elements and payload **Decrypts payload file - Prepares Receipt - Checks digital signatures if necessary
	↙	Sends Receipt with either "OK" or error message
- Updates logs - If errors, correct errors then repeat process		**Decrypts payload file
	↙	If errors in decryption, sends Error Notification to Sender
- Receives Error Notification - Updates logs - correct errors then repeat process		- Updates logs - If no errors, Receiver processes contents of payload

**Parties may choose to decrypt file before or after Receipt is sent to Sender.

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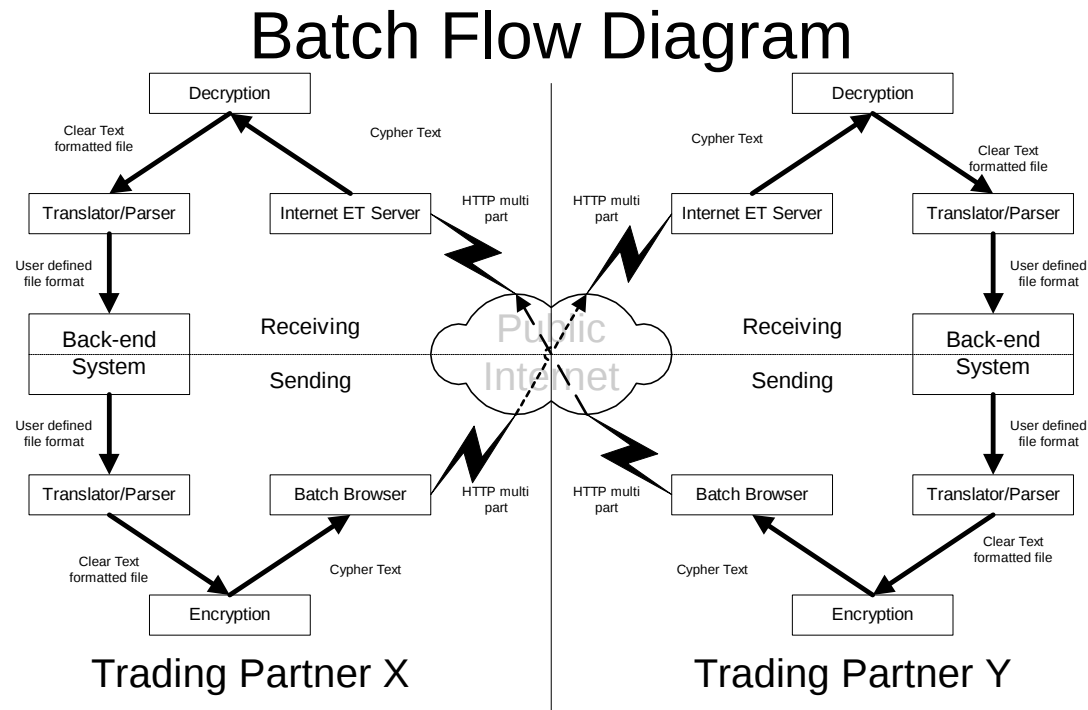
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Batch Flow Diagram

The flow of data to and from trading partners in an automated environment is diagrammed below.



ANATOMY OF AN INTERNET ET PACKAGE

An Internet ET package consists of the following sections:

- **Envelope header.** This section contains the envelope information needed to communicate who the Sender and Receiver are, as well as other envelope information.
- **Payload.** This section contains the payload file. Internet ET allows for only one payload file per package.
- **Digital Signatures.** If used, the package should contain a section that is the digital signature.

ENVELOPE DATA DICTIONARY

The data dictionary on the next page details standard data elements, each with element name and description.

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Data Dictionary for Internet ET

Business Name	Definition	Format	Usage*	Condition
from**	the party sending the transaction	Common Code Identifier format	in Request; M	used in file transmittal; displayed in HTTP Response; and, used in posting back decryption-related errors
input-data	the filename for the transaction data set transmitted	including drive letter and directory name with filename if needed	in Request; M	used in file transmittal of any transaction data sets; and, used for posting back all transaction value pairs for a transmittal that had decryption-related errors.
input-format	descriptor of the data format used for the file transmitted	as defined by QEDM	in Request; M	NAESB standard format indicator used in file transmittal
receipt-disposition-to	the party to receive receipts, the value should be the same as the "from"	Common Code Identifier format	in Request; M	used in file transmittal and in posting error notifications
receipt-report-type	type of receipt type being requested by sender	gisb-acknowledgement-receipt	in Request; M	used in file transmittal and in posting error notifications
receipt-security-selection	used to request signed receipts	signed-receipt-protocol=required,pgp-signature;signed-receipt-micalg=required,md5	in Request; MA	used in file transmittal and in posting error notifications
refnum	used by the party to assign a unique message identifier for tracing purposes	maximum 40 character integer value	in Request; MA	May be used by sender to send tracking information to a recipient. Use of this data element is by mutually agreed. This data element is conceptually similar to a Message-ID filed within RFC 822.
request-status	status describing success or failure of transmission at recipient Server	ok; EEDM###:error description; WEDM###:warning description. see Table A, "Internet EDM Standard Error Codes and Messages"	in Response; M	"ok" is returned if all is fine with processing; error messages/warnings and their related descriptions are returned if problems were encountered in processing.
server-id	uniquely identifies the Server processing the transaction	domainname or hostname.domainname; no embedded spaces allowed	in Response; M	displayed in the HTTP Response and posted back for any decryption-related errors

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Business Name	Definition	Format	Usage*	Condition
time-c	the time file transfer is complete at the Server	yyyymmddhhmmss	in Response; M	displayed in the HTTP Response and posted back for any decryption-related errors; refer to QEDM for quadrant-specific use
time-c-qualifier	delta from UTC (ref ISO 8601)	-ZZ; +ZZ	in Response; MA	displayed in the HTTP Response and posted back for any decryption-related errors; refer to QEDM for quadrant-specific use
to **	the party the transaction was sent to	Common Code Identifier format	in Request; M	used in file transmittal and displayed in HTTP Response and posted back for any decryption-related errors
transaction-set	name of the document type being sent	8 character code; refer to NAESB REQ Implementation Guide, Related Standards Tab, Hypertext Transfer Protocol (HTTP) section, HTTP transaction-set Code Values table.	in Request; MA	used in file transmittal
trans-id	sequential number assigned to the transaction by the Server upon processing before being passed to the decryption process	integer up to 15 characters in length	in Response; M	displayed in the HTTP Response and posted back for any decryption-related errors
version	the NAESB Internet ET version being used by the sender	numeric, decimal notation (e.g. 1.6)	in Request; M	used in file transmittal and in posting error notifications

*The **Usage** column defines whether the element appears in the HTTP Request (Client-generated) or the HTTP Response (Server-generated), the order in which the element appears in the data stream, and whether the field is Mandatory (M) or Mutually-Agreed-To (MA).

** Common Code Identifier

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SENDING INTERNET ET PACKAGES

General Flow

The following is an example of the steps necessary to send an Internet ET package:

1. Open HTTP connection
2. Check connection status. If in error, re-queue package according to Internet ET standards. This check should be performed here and throughout the following processes.
3. Post, including a) Authentication, b) Send multipart form, c) Receive HTTP Response data
4. Check connection status. If in error re-queue package according to Internet ET standards
5. Check HTTP status code (200 is good, less than 300 may be acceptable). If status is not successful re-queue package according to Internet ET standards
6. Close connection - wait for other end to close in a reasonable time
7. Parse HTTP Response data elements
8. If request-status ok, then log success
9. If request-status error, then log error
10. If no valid request-status re-queue package according to Internet ET standards
11. Remove package from sending queue when successful or when failed completely

If trading partners agree to implement signed receipts, then the sending party must include the "receipt-security-selection" data element in the posted data. The receiving party must digitally sign the "gisb-acknowledgement-receipt" and encapsulate the "gisb-acknowledgement-receipt" and digital signature body parts within a MIME envelope with a "content-type" of application/pgp-signature.

Using an Interactive Browser for Internet ET

Electronic packages can be uploaded to a trading partner using an interactive browser secured using SSL 128-bit encryption. Sending electronic packages via an interactive browser is ideal for a small volume of package transfers, or as a back-up method to any batch or automated process.

To use an interactive browser to upload data, an HTML document must be created with an HTML <FORM> element that allows the Sender to type in any necessary data elements, such as "to", "from", "input-format", and the name of the file to be uploaded. When the user submits the form, an HTTP POST is sent to the Server with the package, which includes the uploaded file and the required data elements.

The following example is an HTML document with a form that specifies the POST method and contains the required data elements. This type of HTML form could be used with any browser that supports multipart POST with a file upload.

EXAMPLE: HTML DOCUMENT WITH A FORM FOR MULTIPART POST USING AN INTERACTIVE BROWSER:

```
<HTML><HEAD><TITLE>NAESB Internet ET Package Upload</TITLE>
<H1><CENTER>NAESB Internet ET Package Upload</CENTER></H1>
</HEAD>
<BODY><HR>
<FORM ENCTYPE="multipart/form-data" ACTION="http://www.target.server/cgi-bin/upload.exe"
```

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```

METHOD="POST">
Enter Common Code Identifier for From and To:
From: <INPUT TYPE="text" NAME="from" SIZE=20 VALUE=""><br>
To: <INPUT TYPE="text" NAME="to" SIZE=20 VALUE=""><br>
NAESB Internet ET Version: <INPUT TYPE="text" NAME="version" SIZE=5 VALUE="1.6"><br>
Deliver Receipt To: <INPUT TYPE="text" NAME="report-disposition-to" SIZE=20 VALUE=""><br>
Receipt Type: <INPUT TYPE="text" NAME="receipt-report-type" SIZE=30
VALUE="gisb-acknowledgement-receipt"><br>

IF requesting signed receipts also include: Receipt Type: <INPUT TYPE="text" NAME="receipt-security-selection"
SIZE=30 VALUE="signed-receipt-protocol=required, pgp-signature; signed-receipt-micalg=required, md5"><br>

Format of this file: <INPUT TYPE="text" NAME="input-format" SIZE=6 VALUE="X12"><br>
Send this file: <INPUT NAME="input-data" TYPE="FILE"><br>
<INPUT TYPE="submit" VALUE="Send File"><br>
</FORM></BODY></HTML>

```

The important characteristics of the form within the HTML document are:

- ENCTYPE= specifies the encoding type. The "multipart/form-data" encoding type is identified as the standard encoding methodology.
- ACTION= specifies the URL that will receive the uploaded data. The TEW or TPA identifies the URLs for both parties.
- METHOD= specifies the HTTP protocol method. "POST" has been defined as the Internet ET standard method.
- <INPUT ...>. HTML INPUT elements include the required data elements such as "from", "to", and "input-format". Refer to the data dictionary for the complete list of required data elements.

When a user selects the "Send File" button, the interactive browser will take the values entered in the input fields and reformat them into a data stream, formatted according to the encoding type. The file identified for upload is opened and its contents are included in the data stream. The data stream is then sent to the URL specified by "**ACTION=**", which indicates a Server Receiving script or program written to receive the package.

Using a Batch Browser for Internet ET

A batch browser is used by companies that want to automate their transport processes and/or prefer to minimize human involvement. A batch browser is initiated by a program or a script.

A batch browser can be created via custom programming. A batch browser is coded to perform the same formatting as an interactive browser, formatting a data stream that conforms to the HTTP and Internet ET protocols. A batch browser must be coded as a "TCP sockets" program. See the section "Writing a Batch Browser".

Authentication

??[GPD to research] Prior to NAESB WGQ EDM v1.6, userids and passwords had to be encoded using base64-encoded tools. NAESB WGQ EDM v1.6 requires use of SSL to encrypt this information. As a result, base64 encoding is no longer necessary.

HTTP basic authentication includes a "userid" and "password". Interactive browsers include a basic authentication feature that automatically prompts for "userid" and "password". In a batch

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browser, the authentication must be specifically coded. The “userid” and “password” are to be base64-encoded within the document header. Base64-encoding utilities are readily available on the Internet as either public domain software or commercial libraries.

Server Response

The Server will send a “gisb-acknowledgement-receipt” as an HTTP Response to the Client before dropping the Client’s connection. If the transacting parties agree to use signed receipts, then the Server applies a digital signature to the “gisb-acknowledgement-receipt” and encapsulates the entire package in a MIME envelope of “content-type: application/pgp-signature”.

The “gisb-acknowledgement-receipt” returned from the Server contains the “time-c” and the “time-c-qualifier” (where applicable) Receipt timestamps that are recorded when the final byte from the package upload is received and stored. This Receipt timestamp is the official timestamp regarding transaction turnaround deadlines as defined in Internet ET and QEDM standards. This timestamp and all other pertinent package transmittal information should be logged by the receiver when the posted package is stored on the Server, and logged by the Client. Likewise, any errors or warnings should be logged at both the Client and Server.

Sender HTTP Request Data Elements

The HTTP Request will provide all required data elements in the ORDER DEFINED BELOW. Any “mutually-agreed-upon” data elements will follow the required data elements in the data stream. Refer to the section “Data Dictionary for Internet ET” for descriptions of these data elements.

Required Data Elements, Listed in the Required Order:

1. from
2. to
3. version
4. receipt-disposition-to
5. receipt-report-type
6. input-format
7. input-data

Mutually Agreed Upon Data Elements

- transaction-set
- receipt-security-selection

??BKW: check deleted descriptions against data dictionary

Writing a Batch Browser

A batch browser Client needs to simulate the actions of an interactive browser Client. As stated earlier, the interactive browser Client will take the HTML form, reformat the information according to the HTTP protocol, then send the data stream to the Server. The reformatting adds a header and places field delimiters around the data items.

A batch browser needs to produce the same kind of data stream and, therefore, writing a batch browser requires some specific knowledge of the HTTP protocol.

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EXAMPLE: A TYPICAL HEADER SENT TO THE SERVER

```
POST /cgi-bin/AS2dispatcher HTTP/1.1
Referer: http://www.get.a.life/upl.htm
Connection: Keep-Alive
User-Agent: brow v0.1 XYZ Corp.
Host: localhost
Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*
content-type: multipart/form-data; boundary=-----87453838942833
Content-Length: 5379
```

POST Line - In the example above, the first line indicates the POST method was used and identifies which Receiving program to call:

```
POST /cgi-bin/AS2dispatcher HTTP/1.1
```

Content Type - The “content-type” line indicates that the encoding method is multipart, and identifies the character string used as the boundary.

```
content-type: multipart/form-data; boundary=-----87453838942833
```

Boundary String - The “boundary=” identifies the string that will appear between each field as a delimiter. In this example, the boundary is comprised of 27 hyphen characters followed by a number.

```
content-type: multipart/form-data; boundary=-----87453838942833
```

The boundary can be ANY character string that you choose. The string used CANNOT OCCUR ANYWHERE ELSE IN THE PACKAGE BEING SENT. This is usually accomplished by using either the system clock or a random number so that even if by some remote chance the string appears in the document it would not appear in any re-transmission of the file. It is strongly recommended that a relatively long string be used as a boundary.

The boundary string, when used as a separator, REQUIRES TWO HYPHEN CHARACTERS APPENDED TO THE FRONT of the string. The LAST boundary required in the form is TWO HYPHEN CHARACTERS APPENDED TO THE BACK of the separator boundary, used to indicate to the Server program that this is the end of the data.

```
-----87453838942833--
```

Content Length - The “content-length” value should match the number of bytes contained in the entity body including the characters in the boundary lines, variable content, blank lines, etc. “content-length” indicates to the Server how much data are going to come after this point. In the example above, the content length is:

```
Content-Length: 5379
```

Envelope / Required Data Elements. The envelope information for the package (“to”, “from”, etc) is included in a series of boundaries that include the “content-disposition” and “name=” qualifiers, followed by the data element value. The example below includes the “from” field as “123456789” and the “to” field as “234567890”.

```
-----87453838942833
content-disposition: form-data; name="from"

123456789
-----87453838942833
content-disposition: form-data; name="to"

234567890
```

The “content-disposition” identifier defines that “form-data” is contained in the element. The

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"name=" identifier defines the name of the data element. These data element names must match the name specified by Internet ET Data Dictionary. The "name=" identifier is not completely relevant since the fields should be present in the correct order, but this field should be checked to verify the validity of the form content.

The actual data value of the field is always preceded by a blank line. This is typically used as a marker for the Server program to indicate that a data value will follow. For example, note the blank line preceding "X12" in the example. In most programming libraries and commercial products the starting delimiter is "\r\n\r\n" (C notation).

```
-----87453838942833
content-disposition: form-data; name="version"

1.64
-----87453838942833
content-disposition: form-data; name="receipt-disposition-to"

123456789)
-----87453838942833
content-disposition: form-data; name="receipt-report-type"

gisb-acknowledgement-receipt
-----87453838942833
content-disposition: form-data; name="input-format"

x12
```

Payload. The content or 'payload' (EDI, etc) is encrypted and included in its own boundary section.

The data field containing the Internet ET payload file has two extra identifiers. The "filename=" element indicates the name of the file sent from the sender/client computer. In the example the name of the file is "c:\temp\smallnom.bin".

```
content-disposition: form-data; name="input-data"; filename="c:\temp\smallnom.bin"
```

The "content-type" element indicates the type of the data being transmitted according to accepted Internet standards.

```
content-type: multipart/encrypted; boundary=--boundary2--200309090001; protocol="application/pgp-encrypted"
```

Note that encrypted files can be multipart also, which means they will have their own boundary string.

```
-----87453838942833
content-disposition: form-data; name="input-data"; filename="c:\temp\smallnom.bin"
content-type: multipart/encrypted; boundary=--boundary2--200309090001; protocol="application/pgp-encrypted"

----boundary2--200309090001
content-type: application/pgp-encrypted

Version: 1

----boundary2--200309090001
content-type: application/octet-stream

-----BEGIN PGP MESSAGE-----
Version: PGP 6.5

hQCMaZRG1pEOIOvdAQP+JMr0m/9+8yOL60Z9Vr6fFV81FCExB/o0xmwiMkiwYsHsz0e8sb7ErC340MrNA/dw3taGMjmI
+CXyRF/PLEdg1NZE1ZCtNeL4YdiHAMLWwODGIQxhSucz8rMSgQ5mZzcOJwBdWLW70efgsu/9UljUJjYc1uZ6C03eFQv/4
3fkB+alATgydxX4g8QK664ad+Jo/XUICSmWBL66fqJR1KLeLf4wTaqGy174Aq48Wpwwg1Eh785zC03UAW0qg0ugMt86dPe
```

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```

yd91e2JigqwDYEf/DYEKD0J9BGiGpS/uAupNKj8Ocp2IWClxKOGUbxpVNOntqWHS/GntegvDE/7/ewCxDxsnmQS95pOI1
41QZ1RqbeNaqx2Dq/ra9g65HNchOCzjul5Vi8HHf6Yhg2WnROe+npByyCue6rihggNVOJwj0Cvzpb4JE+gMDf3q4ISUb1Fv7
/+SSFHDDnhdC5YTpqf1Bc3B07hiLmtTXqNit31EbX9UVEIObzSa9ZhxbC6/eSl7Nuf5ZTDsh9nrk+QQJ6FeC9W4cqXLj7IZyS
aRO8Vtff+4ktqeuHusT4kSpnk027aw4O/5jomUkfb22CAe4=
=Oiuo
-----END PGP MESSAGE-----
-----boundary2--200309090001--

```

Boundary String Terminators - Each multipart stream must be terminated with the boundary string terminator. After the contents of the last data field, the boundary string and the required two-hyphen terminator indicate the end of the multipart encrypted payload:

```
-----boundary2--200309090001--
```

A second boundary terminator string indicates the end of the package:

```
-----87453838942833--
```

Examples

EXAMPLE: AN X12 EDI DATA STREAM BEFORE ENCRYPTION:

```

content-type: application/EDI-X12

ISA~00~ ~01~AAA6300300~14~1234567890000 ~14~2345678900000
... more data from the X12 file...
IEA~1~000003616

```

EXAMPLE: THE SAME X12 EDI ENCRYPTED WITH PGP

```

content-type: multipart/encrypted; boundary=--boundary2--200309090001; protocol="application/pgp-encrypted"
-----boundary2--200309090001
content-type: application/pgp-encrypted
Version: 1
-----boundary2--200309090001
content-type: application/octet-stream
-----BEGIN PGP MESSAGE-----
Version: PGP 6.5
hQCMAzRG1pEOIOvdAQP+JMr0m/9+8yOL60Z9Vr6fFV81FCExB/o0xmwiMkiwYsHsz0e8sb7Er340MrNA/dw3taGMjmI+
CXYRF/PLEdg1NZE1ZCtNeL4YdIHAMLWwODG!QxhSucz8rMSgQ5mZzcOJwBdWLW70efgsu/9UljuJjYc1uZ6C03eFQv/43f
kB+alATgydxX4g8QK664ad+Jo/XUICSmWBL66fqJR1KLeL4wTaqGy174Aq48Wpwwg1Eh785zC03UAW0qg0ugMt86dPeyd
91e2JigqwDYEf/DYEKD0J9BGiGpS/uAupNKj8Ocp2IWClxKOGUbxpVNOntqWHS/GntegvDE/7/ewCxDxsnmQS95pOI141
QZ1RQbeNaqx2Dq/ra9g65HNchOCzjul5Vi8HHf6Yhg2WnROe+npByyCue6rihggNVOJwj0Cvzpb4JE+gMDf3q4ISUb1Fv7/
+SSFHDDnhdC5YTpqf1Bc3B07hiLmtTXqNit31EbX9.UVEIObzSa9ZhxbC6/eSl7Nuf5ZTDsh9nrk+QQJ6FeC9W4cqXLj7IZyS
aRO8Vtff+4ktqeuHusT4kSpnk027aw4O/5jomUkfb22CAe4=
=Oiuo
-----END PGP MESSAGE-----
-----boundary2--200309090001--

```

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EXAMPLE: A COMPLETE ELECTRONIC PACKAGE DATA STREAM

```

POST /cgi-bin/AS2dispatcher HTTP/1.1
Referer: http://www.get.a.life/upl.htm
Connection: Keep-Alive
User-Agent: brow v0.1 XYZ Corp.
Host: localhost
Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*
content-type: multipart/form-data; boundary=-----87453838942833
Content-Length: 5379

-----87453838942833
content-disposition: form-data; name="from"

123456789
-----87453838942833
content-disposition: form-data; name="to"

234567890
-----87453838942833
content-disposition: form-data; name="version"

1.46
-----87453838942833
content-disposition: form-data; name="receipt-disposition-to"

123456789
-----87453838942833
content-disposition: form-data; name="receipt-report-type"

gisb-acknowledgement-receipt
-----87453838942833
content-disposition: form-data; name="input-format"

X12
-----87453838942833
content-disposition: form-data; name="input-data"; filename="c:\temp\smallnom.bin"
content-type: multipart/encrypted; boundary=--boundary2--200309090001; protocol="application/pgp-encrypted"

----boundary2--200309090001
content-type: application/pgp-encrypted

Version: 1

----boundary2--200309090001
content-type: application/octet-stream

-----BEGIN PGP MESSAGE-----
Version: PGP 6.5

hQCMaZRG1pEOIOvdAQP+JMr0m/9+8yOL60Z9Vr6fFV81FCExB/o0xmwiMkiwYsHsz0e8sb7ErC340MrNA/dw3taGMjmI
+CYRF/PLEdg1NZE1ZCtNeL4YdIHAMLWwODGIQxhSucz8rMSgQ5mZzcOJwBdWLW70efgsu/9UljUJjYc1uZ6C03eFQv/4
3fkB+alATtydxX4g8QK664ad+Jo/XUICSmWBL66fqJR1KLeLf4wTaqGy174Aq48Wpwwg1Eh785zC03UAW0qg0ugMt86dPe
yd91e2JigqwDYEf/DYEKD0J9BGiGpS/uAupNKj8Ocp2IWCLxKOGUbxpVNOntqWHS/GntegvDE/7/ewCxDxsnmQS95pOI1
41QZ1RqbeNaqx2Dq/ra9g65HNchOCzjul5Vi8HHf6Yhg2WnROe+npByyCue6rihqgNVOJwj0cVzpb4JE+gMDf3q4ISUb1Fv7
/+SSFHDDdnhdC5YTpqf1Bc3B07hiLmtTXqNit31EbX9UVEIObzSa9ZhxbC6/eSl7Nuf5ZTDsh9nrk+QQJ6FeC9W4cqXLj7IZyS
aRO8Vtff+4ktqeuHusT4kSpnk027aw4O/5jomUkfb22CAe4=
=Oiuo
-----END PGP MESSAGE-----
----boundary2--200309090001--
-----87453838942833--

```

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RECEIVING INTERNET ET PACKAGES

General Flow

The following is an example of the steps necessary to receive an Internet ET package:

1. Parse multi-part form
2. Validate HTTP Request data elements
3. If HTTP Request data elements in error, return appropriate Internet ET standard error code in the HTTP Response data elements
4. Save data
5. Create “gisb-acknowledgement-receipt”
6. If using signed receipts, produce a digital signature over the “gisb-acknowledgement-receipt” created in step 5.
7. Encapsulate the “gisb-acknowledgement-receipt” and digital signature body parts in a “Content-Type” of “multipart/signed envelope”
8. Return HTTP Response with the “gisb-acknowledgement-receipt” object back to Client
9. Close connection
10. Log final results
11. Route data file to the next process based upon “input-format”

Overview of Web Server Receiving Programs

The Web Server receives the POST and calls the appropriate Receiving script or program to:

- parse the incoming HTTP Request
- create the receipt timestamp using the current date and time
- create an HTML Response to the Client

An Internet ET Receiving program may be implemented using a variety of technologies and techniques, including Active Server Pages (ASP), Common Gateway Interface (CGI), Java Server Pages (JSP), Java Servlets, and Personal Home Pages (PHP). The Internet ET is supported by most commercially available Web/HTTP servers.

The Receiving Program and Process

The Receiving program must be able to parse the multi-part form. It accomplishes this by finding the boundary string in the “content-type” header and scanning for its occurrences further within the uploaded stream. Upon finding these boundary strings, the program must next determine the “content-disposition” for each data element. This allows detection of the required text elements as well as the Internet ET payload file.

The Receiving program only stores the payload file and is not concerned with the content of the payload file, which is encrypted. It will use the “content-length” to determine how much data to expect in the body of the package.

A Receiving process requires an executable program or module that is called by the Server when it is identified by a POST operation.

When the Server receives a POST it will first read the header and populate environment variables before calling the Receiving program. Most HTTP servers read header variables and populate environment variables. Check your HTTP server documentation for more information.

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EXAMPLE: A SAMPLE HTTP POST HEADER

```
POST /cgi-bin/AS2dispatcher HTTP/1.1
Referer: http://www.get.a.life/upl.htm
Connection: Keep-Alive
User-Agent: brow v0.1 XYZ Corp.
Host: localhost
Accept: image/gif, image/x-bitmap, image/jpeg, image/pjpeg, */*
content-type: multipart/form-data; boundary=-----87453838942833
Content-Length: 5379
```

After reading the HTTP header information, the Server will buffer the remaining data transmitted and call the Receiving program specified in the POST statement. Do not assume that the Receiving program is called as soon as the header is read, which can impact your receipt timestamp. The more common implementations buffer the entire transmission before calling the program. Check your server implementation if this characteristic is important to you.

The Receiving program will have the following data stream available, and will have most of the header data available in environment variables.

EXAMPLE: DATA STREAM AVAILABLE TO RECEIVING PROGRAM

```
-----87453838942833
content-disposition: form-data; name="from"
123456789
-----87453838942833
content-disposition: form-data; name="to"
234567890
-----87453838942833
content-disposition: form-data; name="version"
1.64
-----87453838942833
content-disposition: form-data; name="receipt-disposition-to"
123456789
-----87453838942833
content-disposition: form-data; name="receipt-report-type"
gisb-acknowledgement-receipt
-----87453838942833
content-disposition: form-data; name="input-format"
X12
-----87453838942833
content-disposition: form-data; name="input-data"; filename="c:\temp\smallnom.bin"
content-type: multipart/encrypted; boundary=--boundary2--200309090001; protocol="application/pgp-encrypted"
----boundary2--200309090001
content-type: application/pgp-encrypted
Version: 1
----boundary2--200309090001
content-type: application/octet-stream
-----BEGIN PGP MESSAGE-----
Version: PGP 6.5
hQCMaZRG1pEOIOvdAQP+JMr0m/9+8yOL60Z9Vr6fFV81FCExB/o0xmwiMkiwYsHsz0e8sb7ErC340MrNA/dw3taGMjmI
+CXRYRF/PLEdg1NZE1ZCtNeL4YdiHAMLWwODGIQxhSucz8rMSgQ5mZzcOJwBdWLW70efgsu/9UljUJjYc1uZ6C03eFQv/4
3fkB+alATgydxX4g8QK664ad+Jo/XUICSmWBL66fqJR1KLeL4wTaqGy174Aq48Wpwwg1Eh785zC03UAW0qg0ugMt86dPe
yd91e2JigqwDYEf/DYEKD0J9BGiGpS/uAupNKj8Ocp2IWCIXKOGUbxpVNOntqWHS/GntegvDE/7/ewCxXsnmQS95pOI1
41QZ1RQbeN.aqx2Dq/ra9g65HNchOCzjul5Vi8HHf6Yhg2WnROe+npByyCue6rihqqNVOJwj0cVzpb4JE+gMDf3q4ISUu1Fv
7/+SSFHDdnhdC5YTpqf1Bc3B07hiLmtTXqNit31EbX9UVEIObzSa9ZhbC6/eSl7Nuf5ZTDsh9nrk+QQJ6FeC9W4cqXLj7IZy
SaRO8Vtff+4ktqehYusT4kSpnk027aw4O/5jomUkfb22CAe4=
=Oiuo
-----END PGP MESSAGE-----
----boundary2--200309090001--
-----87453838942833--
```

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This Receiving program should check for basic validity in the environment variables and the data stream, then . parse the variables/data from the format. Data validations should include:

- The "REQUEST_METHOD" environment variable is "POST"
- The "CONTENT_TYPE" environment variable should be "multipart/form-data" and the boundary, which cannot appear anywhere in the transaction being sent
- The input stream should support binary mode to accommodate encrypted files
- Each data element should be preceded by the boundary with the required two hyphen characters appearing before it
- Each data element should contain the correct name on the "content-disposition" line
- Each data element should have a blank line ("\\n\\n" in C+ notation) before the start of the data
- All tag values in the HTTP header should be evaluated in a case insensitive manner
- Improperly formatted input. Finding the end of the stream using both "content-length" and the boundary string terminator end mark is a good method to detect improperly formatted input.

Acknowledgement Receipt: "gisb-acknowledgement-receipt"

The Acknowledgement Receipt ("Receipt") is critical to non-repudiation and business process timing. Immediately after the Receiving program decrypts and saves the data, the Receiving program should record the time and construct a "gisb-acknowledgement-receipt". This Receipt is sent from the Receiving program to the Client prior to closing the HTTP connection.

The Receipt is a MIME-formatted text stream that includes the HTTP Response data elements (time-c, time-c-qualifier for REQ/RGQ, request-status, server-id, trans-id) in a 'multipart/report' MIME envelope.

If signed Receipts are used, the "gisb-acknowledgement-receipt" including the 'multipart/report' envelope, is digitally signed, producing an 'application/pgp-encrypted' body part. Both the 'multipart/report' "gisb-acknowledgement-receipt" and the 'application/pgp-signature' body parts are placed in a 'multipart/signed' envelope and the entire package is returned to the Sender.

The Receipt name "gisb-acknowledgement-receipt" retains the "gisb-" prefix to assure compatibility with legacy GISB EDM implementations. The name is only used in the "report-type" data element for the MIME part.

Additional Receiving Program Functions

- All data element names of the HTTP Request and Response fields will be in lower case. Note that the Internet ET standard format file contained in the Request and Response may follow a different standard.
- Carriage returns and line feeds will be ignored in all files.
- A field delimiter of "*" will be used in the HTTP Response. Please refrain from displaying a "*" anywhere else in the response so as not to confuse programs that need to parse on this basis.
- No spaces should surround the equal sign or the field delimiter.
- The required data elements must appear first in the HTTP Response and in the order specified. Additional information can be included after the required elements at the server's discretion.
- The first occurrence of the field name within the response will contain the value.
- If an HTML response is given, all data must be presented in a user-readable fashion.

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For example, if the required machine-readable fields are embedded in comments, another representation of these fields must be presented to the user.

Receiving Process URL Implementation Guidelines

??LS: got some work here?? Internet ET standard 4.3.12 (OPEN ISSUE 007) states:

"As a minimum, with a trading partner agreement, one designated site for receipt should be identified for each trading partner. That site should be identified by a specific Uniform Resource Locator (URL). This does not preclude multiple designated sites being mutually agreed to between trading partners." (OPEN ISSUE 008)

Each company must offer at least one URL to accept files using Internet ET. Companies can offer multiple URLs. Though companies are free to construct a Web site with multiple "single-purpose" URLs (e.g. nominations.xyzcorp.com; enrollments.xyzcorp.com) NAESB recommends the use of one "general-purpose" URL.

The Receiving program may initiate error notifications after the "gisb-acknowledgement-receipt" is sent (e.g. file decryption errors). Error notifications posted to the Sender would be directed to the Sender's general-purpose URL.

All URLs that will be required for use in the Internet ET process must be agreed to and defined in a Technical Exchange Worksheet (TEW) or a Trading Partner Agreement (TPA).

HTTP Response "gisb-acknowledgement-receipt" Data Elements

Required HTTP Response Data Elements (listed in the required order)	
WGQ	REQ/RGQ
time-c	time-c
request-status	time-c-qualifier
server-id	request-status
trans-id	server-id
	trans-id

Examples of HTTP Response Required Data Elements:

EXAMPLE: RESPONSE, SUCCESSFUL, MULTIPART FORMAT:

```
content-type: multipart/report; report-type="gisb-acknowledgement-receipt"; boundary="GISB7867"

--GISB7867
content-type: text/html

<HTML> <HEAD> <TITLE>Acknowledgement Receipt Success</TITLE> </HEAD> <BODY> <P>
time-c=19960619082855*
request-status=ok*
server-id=coolhost*
trans-id=234423897*
</P> </BODY> </HTML>
--GISB7867
content-type: text/plain

time-c=19960619082855*
request-status=ok*
server-id=coolhost*
```

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```
trans-id=234423897*
--GISB7867--
```

EXAMPLE: RESPONSE, SUCCESSFUL, MULTIPART FORMAT, TIME-C-QUALIFER FOR TIME ZONE:

```
content-type: multipart/report; report-type="gisb-acknowledgement-receipt"; boundary="GISB7867"

--GISB7867
content-type: text/html

<HTML><HEAD><TITLE>Acknowledgement Receipt Success</TITLE></HEAD> <BODY><P>
time-c=19960619082855*
time-c-qualifier=-05*
request-status=ok*
server-id=coolhost*
trans-id=234423897*
time-c-qualifer=-0400
</P> </BODY></HTML>
--GISB7867
content-type: text/plain

time-c=19960619082855*
time-c-qualifier=-05*
request-status=ok*
server-id=coolhost*
trans-id=234423897*
time-c-qualifer=-0400
--GISB7867--
```

EXAMPLE: RESPONSE, ERROR, MULTIPART FORMAT:

```
content-type: multipart/report; report-type="gisb-acknowledgement-receipt"; boundary="GISB7866"

--GISB7866
content-type: text/html

<HTML><HEAD><TITLE>Acknowledgement Receipt Error</TITLE></HEAD> <BODY><P>
time-c=19960619082855*
request-status=EEDM106: Invalid To Common Code Identifier*
server-id=coolhost*
trans-id=234423897*
</P> </BODY></HTML>
--GISB7866
content-type: text/plain

time-c=19960619082855*
request-status=EEDM106: Invalid To Common Code Identifier*
server-id=coolhost*
trans-id=234423897*
--GISB7866--
```

EXAMPLE: RESPONSE, WARNING, MULTIPART FORMAT:

```
content-type: multipart/report; report-type="gisb-acknowledgement-receipt"; boundary="GISB7866"

--GISB7866
content-type: text/html

<HTML><HEAD><TITLE>Acknowledgement Receipt Warning</TITLE></HEAD> <BODY><P>
time-c=19960619082855*
request-status=WEDM100: Transaction Set Sent, Not Mutually Agreed*
server-id=coolhost*
trans-id=234423897*
```

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```

</P> </BODY></HTML>
--GISB7866
content-type: text/plain

time-c=19960619082855*
request-status= WEDM100: Transaction Set Sent, Not Mutually Agreed *
server-id=coolhost*
trans-id=234423897*
--GISB7866--

```

EXAMPLE: RESPONSE, SUCCESSFUL, SIGNED RECEIPT:

```

content-type: multipart/signed; micalg=pgp-md5; protocol="application/pgp-signature";
boundary=--boundary2--200309090001

----boundary2--200309090001

content-type: multipart/report; report-type="gisb-acknowledgement-receipt"; boundary="GISBB7867"

--GISB7867
content-type: text/html

<HTML> <HEAD> <TITLE>Acknowledgement Receipt Success</TITLE> </HEAD> <BODY> <P>

time-c=19960619082855*
request-status=ok*
server-id=coolhost*
trans-id=234423897*

</P> </BODY> </HTML>

--GISB7867
content-type: text/plain.
time-c=19960619082855*
request-status=ok*
server-id=coolhost*
trans-id=234423897*
--GISB7867--
-----boundary2--200309090001
content-type: application/pgp-signature

-----BEGIN PGP MESSAGE-----

Version: 2.6.26.5

iQCVAwUBMJrRF2N9oWBghPDJAE9UQQAtI7LuRVndBjrk4EqYBIb3h5QXIX/LC//JV5bNvkZIGPIcEmI5iFd9boEgvpHt
IREEqLQRkYN0BActFBZmh9GC3C041WGquMbrbxc+nIs1TIKIA08rVi9ig/2Yh7LFrK5Ein57U/W72vgSxLhe/zhdfoIT9BrnH
OxEa44b+EI=
=ndaj

-----END PGP MESSAGE-----

----boundary2--200309090001--

```

EXAMPLE: RESPONSE, SUCCESSFUL:

```

HTML format (this example is for a successful transmittal): <html> <head> <title> Upload OK</ title></ head> <!-- time-
c= 19960123203618*-->_<!-- request- status= ok* --> <!-- server- id= coolhost*--> <!-- trans- id= 232323897*--> <h1>
Upload OK </ h1>< br> <body> <B> File Saved at (time- c): </B> 19960123203618< br> <B> Status (request- status):
</ B> ok< br> <B> Server (server- id): </ B>coolhost< br> <B> Transaction ID (trans- id): </ B> 232323897< br> </
body> </ html>

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SENDING INTERNET ET ERROR NOTIFICATIONS

When a Client sends an Internet ET package to a Server, the Server responds with a receipt. Further back-office processing (e.g. decryption) may be required, and additional errors may be found.

Error Notification transactions are used to communicate transport errors found by the Receiver after the initial receipt is sent to the Sender.

Errors from translation and other back-office processing are outside the scope of the Internet ET.

When a file passes the decryption step, no error notification is sent back to the Client. If the decryption step fails, an error notification must be sent to the Client.

The Error Notification format applies to the posting of an error message after the Sender's session has been disconnected. This error notification is used only if the original HTTP Response is returned with an "ok".

Additionally, trading partners are permitted to use digitally-signed error notifications, if both parties mutually agree to do so.

Required Error Notification Data Elements

The data elements for the error notification are the same as those described in the Section "Sending Transactions", with the exception of the "input-format" and "input-data" elements. The file containing the data elements for error notification should not be encrypted.

Required Data Elements for Error Notification (listed in the required order):

- 'from'
- 'to'
- 'input-format'

Error Notification "input-data" Element Specifications:

- The file containing the data elements for error notification should not be encrypted.
- All data element names will be in lower case in the Error Notification.
- Carriage returns and line feeds will be ignored in all files.
- A field delimiter of "*" will be used in the Error Notification. Please refrain from displaying a "*" anywhere else in the error notification so as not to confuse programs that need to parse on this basis.
- No spaces should surround the equal sign or the field delimiter.
- The required data elements must appear first in the response.
- Additional information can be included after the required elements at the server's discretion.
- The first occurrence of the field name within the response will contain the value.
- An error notification contains two body parts nested within a multipart/report outer envelope with the content-type of "gisb-error-notification".

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- The first body part contains human readable content in HTML. The second body part contains machine readable content in plain text. Additionally, consenting trading partners can mutually agree to digitally sign error notifications.
- If digital signatures are used, the multipart/report containing the Error Notification is used to create a digital signature body part, identified by a "content-type" of application/pgp-signature. Both the multipart/report Error Notification and application/pgp-encrypted digital signature body parts are combined in a multipart/signed envelope.

EXAMPLE: ERROR NOTIFICATION INTERNET ET PACKAGE:

```

POST /cgi-bin/AS2dispatcher HTTP/1.1
Referer: http://www.acmeenergy/upl.htm
Connection: Keep-Alive
User-Agent: brow v0.1 XYZ Corp.
Host: localhost
Accept: image/gif, image/x-bitmap, image/jpeg, image/pjpeg, */*
content-type: multipart/form-data; boundary=-----87453838942833
Content-Length: 1958
-----87453838942833
content-disposition: form-data; name="from"

234567890
-----87453838942833
content-disposition: form-data; name="to"

123456789
-----87453838942833
content-disposition: form-data; name="version"

1.6
-----87453838942833
content-disposition: form-data; name="receipt-disposition-to"

123456789
-----87453838942833
content-disposition: form-data; name="receipt-report-type"

gisb-acknowledgement-receipt
-----87453838942833
content-disposition: form-data; name="input-format"

error
-----87453838942833
content-disposition: form-data; name="input-data"; filename="c:\temp\error.not"
content-type: multipart/report; report-type="gisb-error-notification"; boundary="GISB7868"

--GISB7868
content-type: text/html

<HTML><HEAD><TITLE>Error Notification</TITLE></HEAD> <BODY><P>
orig-from=123456789*
orig-to=234567890*
orig-input-format=X12*
resp-time-c=19960619102855*
resp-server-id=coolhost*
resp-trans-id=234423897*
request-status=EEDM601: Public Key Invalid*
comments=Please contact 1-800-555-1212 for correct public key*
</P> </BODY></HTML>

```

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```
--GISB7868
content-type: text/plain

orig-from=123456789*
orig-to=234567890*
orig-input-format=X12*
resp-time-c=19960619102855*
resp-server-id=coolhost*
resp-trans-id=234423897*
request-status=EEDM601: Public Key Invalid*
comments=Please contact 1-800-555-1212 for correct public key*
--GISB7868--
-----87453838942833-----

Signed Error Notification

content-type: multipart/signed; micalg=pgp-md5; protocol="application/pgp-signature";
boundary=--boundary2--200309090001

----boundary2--200309090001

content-type: multipart/report; report-type="gisb-error-notification"; boundary="GISB7868"

--GISB7868
content-type: text/html

<HTML><HEAD><TITLE>Error Notification</TITLE></HEAD> <BODY><P>
orig-from=123456789*
orig-to=234567890*
orig-input-format=X12*
resp-time-c=19960619102855*
resp-server-id=coolhost*
resp-trans-id=234423897*
request-status=EEDM601: Public Key Invalid*
comments=Please contact 1-800-555-1212 for correct public key*

</P> </BODY></HTML>

--GISB7868
content-type: text/plain

orig-from=123456789*
orig-to=234567890*
orig-input-format=X12*
resp-time-c=19960619102855*
resp-server-id=coolhost*
resp-trans-id=234423897*
request-status=EEDM601: Public Key Invalid*
comments=Please contact 1-800-555-1212 for correct public key*

--GISB7868--
----boundary2--200309090001

content-type: application/pgp-signature
-----BEGIN PGP MESSAGE-----

Version: 6.5

iQCVAwUBMjRf2N9oWBghPDJAQE9UQQAtI7LuRVndBjrk4EqYBlb3h5QXIX/LC//JV5bNvkZIGPIcEmI5iFd9boEgvpHt
IREEqLQRkYNbActFBZmh9GC3C041WGquMbrbxc+nIs1TIKIA08rVi9ig/2Yh7LFrK5Ein57U/W72vgSxLhe/zhdfoIT9BrnH
OxEa44b+EI=
=ndaj
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-----END PGP MESSAGE-----

-----boundary2--200309090001--

Pre-validation before Decryption

Proper trapping of the range of decryption process errors listed in Table A (Internet EDM Standard Error Messages and Codes) may require program code which is external to the decryption algorithm. Some versions of the PGP software do not explicitly discriminate between EEDM601, EEDM602, EEDM603, and EEDM699 type errors.

Under such a circumstance, files inbound to the decryption process should be preprocessed to trap the errors not identified by the PGP version being used. For example, searching the file for the text strings "BEGIN PGP MESSAGE" and "END PGP MESSAGE" can quickly identify "EEDM602 File not encrypted" and "EEDM603 Encrypted file truncated" type errors when the implemented PGP version only identifies decryption success, invalid public key (EEDM601), and decryption failure (EEDM699).

SECURITY

Internet ET security requirements include four primary security aspects: data Privacy, data Integrity, Authentication, and Non-repudiation (PAIN).

- Data privacy: unauthorized parties cannot decipher the content of the data.
- Authentication: the receiver is certain of the identity of the sender.
- Data integrity: unauthorized parties cannot modify or corrupt the data.
- Non-repudiation: the sender cannot deny ownership of the transaction if it was sent with his/her digital signature.

In general, these needs are met by using the Basic Authentication capability of the Web server and the encryption and digital signature capability of the PGP and OpenPGP security application for securing transactions.

Understanding PGP and OpenPGP

Pretty Good Privacy (PGP) is the name of the chosen security application. OpenPGP is the Internet Engineering Task Force standard version of PGP which excludes all patented algorithms, allowing free commercial use of the standard. See the NAESB Web site for information on software packages to implement the PGP or OpenPGP security application. Both OpenPGP and PGP use a public key/private key pair to accomplish secure file transfers. The private key must be known only to the company which generated it. The public key counterpart is shared with trading partners.

Each company must generate its public key and private key pair. The RSA key generation algorithm should be chosen for versions of PGP which offer alternatives. Implementers of OpenPGP should choose DSA and El Gamal when creating their key pair. The public keys will be distributed using a secure method (e.g., courier mail) to the company's trading partners.

You must use the utmost care in protecting your private key. If compromised, the security is broken. It is recommended that a key size of 1024 be chosen when generating the key pair. This provides a significantly secure transaction.

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When a company wishes to send transactions to its trading partner, it will use the partner's public key to encrypt the file. Encryption provides data privacy. Only the private key counterpart can decrypt this file.

When the sending party encrypts the file, it also uses its own private key to "sign" the transaction. The receiving party can use the sender's public key to verify the signature. The digital signature provides non-repudiation.

Encryption / Digital Signature

Encryption and signatures are applied to files already translated to a NAESB standard data format, and before the data is sent to the batch browser. (Use of internal encryption such as X12.58 encryption is outside the scope of NAESB encryption standards but does not conflict with PGP.)

Encryption and signatures can be accomplished manually for each file using the online PGP or, on a mutually-agreed-upon basis, OpenPGP software, or in an automated (or "batch") fashion using programs to encrypt and sign. Whether encrypting in a manual or automated fashion, it is essential that the correct public key of the trading partner be used to encrypt and just as essential that the correct sender's own private key be used to digitally sign the file.

Digital signatures may also be applied, on a mutually-agreed-upon basis, to the HTTP Response by the Receiver of the package.

Decryption / Signature Verification

After a package is received and processed by the Receiving program, it is ready to be decrypted and have its signature verified. Given the correct userID for a trading partner, PGP and OpenPGP software use the appropriate key pair to encrypt, sign and decrypt. Upon request for signature verification, the PGP and OpenPGP software will return a human-readable descriptive text such as DUNS number or company name.

NAESB recommends that each party create a process where the descriptive text is used to look up the ID of the trading partner in a database table. If the ID is passed along with the decrypted file, a process could be created to verify that the trading partner which sent the transaction corresponds to the trading partner identified within the file, once the data has been translated.

When digital signatures are applied, on a mutually-agreed-upon basis, the HTTP Response received by the sender of the transaction may be verified to ensure non-repudiation of receipt of the transaction.

Throughput Considerations

Encryption, digital signing, decryption and signature verification are all very CPU intensive. Companies anticipating large volumes of Internet ET traffic should research state-of-the-art techniques for scalability, including but not limited to:

- separating decryption and signature verification processing from web server receiving and processing
- passing secured or to-be-secured packages to a separate computer for security processing

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- optimizing CPU and memory on security processing computers
- real-time or near real-time monitoring of website performance

Implementers of Internet ET sites should review and evaluate Domain Name Server (DNS) cache refresh intervals so as to ensure trading partner address changes are recognized on a timely basis. A refresh interval of 24 hours or less is common.

Because decryption and signature verification are not handled at the time the file is received, the sender will get an HTTP Response of successful transfer but doesn't know if the file can be decrypted by the receiver. Guidelines for communicating the status of the decryption step have been developed. See Section "Sending Error Notification Transactions" and Table A, "Internet EDM Standard Error Codes and Messages".

Security Requirements

Basic Authentication

Basic authentication, also known as realm one security, has been defined as one of the security standards for transmission on the Internet. The userid and password will be assigned by the server party according to site standards. The TPA must identify the userid and password for this security as well as procedures for changing the password, if applicable.

PGP or OpenPGP File Encryption

Payload files are encrypted using PGP 6.5 or greater (using keys generated with the RSA algorithm); or on a mutually-agreed-upon basis the OpenPGP standard, specified in IETF RFC 2440. There are freely available software implementations of the OpenPGP standard available at <http://www.gnupg.org/>.

Other Security Recommendations

A firewall should be deployed to protect HTTP servers.

CLIENT AND SERVER SPECIFICATIONS

Synchronization. Each Client and Server should be synchronized to a clock in the network of atomic clocks that is accessible via the Internet. The Client and Server should be synchronized as necessary to ensure synchronization with an atomic clock +/- 20 seconds. Please refer to Appendix A, "Time Synchronization" for references on public sites for synchronization.

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7 – TESTING GUIDELINES

NAESB INTERNET ET TEST GUIDELINES

Implementation of Internet ET requires testing to assure all parties are prepared to operate according to the Internet ET. This document focuses on testing standards for establishing Internet ET connectivity with a trading partner. Testing for transaction and other quadrant-specific testing standards can be found in each quadrant's QEDM.

Internet ET Connectivity testing standards may include:

- Connectivity test scripts. These scripts define the steps needed to adequately test connectivity.
- Technical Exchange Worksheet (TEW). This worksheet defines important operations parameters for a trading partner. The parameters include Internet ET URL's, contacts and other information.

GENERAL TESTING ASSUMPTIONS

The following assumptions apply to Internet ET testing:

- This Test Plan covers Internet ET testing. Transactions and business process test plans can be found in the QEDM.
- Testing may uncover problems. Problems found during testing should be expected.
- This Test Plan is a basic demonstration of competency, and may not uncover all problems that may eventually require correction.
- In normal circumstances, trading partner to trading partner Internet ET connectivity testing takes approximately two weeks once begun.

TESTING GOALS

The primary testing goals of this Internet ET Test Plan are:

- Establish Internet ET connectivity between trading partners including Internet connections and encryption compatibility.
- Validate that normal production transaction files can be delivered.
- Validate that a large file (1MB or larger) can be delivered.
- Validate that Internet ET Receipts are being delivered.
- Validate that protocol failures are handled properly.
- Validate that exchange failures are handled properly.
- Validate that encryption/decryption and digital signature failures are handled properly.

TEST EXECUTION

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Scripts

Test Scripts detail each step of the testing process for Connectivity. Scenarios test for both positive (accept) and negative (reject) results. Typical Test Scripts involve an exchange (Request and Response) of data between trading partners.

Testing Scripts^{LS}

Each TP will confirm receipt of test file exchange via normal Internet ET standards. A copy of the payload file can be sent via e-mail for verification.

- Each TP should confirm that received files were not corrupted.
- Each TP shall exercise fail-over mechanisms by simulating a protocol failure and an exchange failure, triggering the appropriate notices to the identified Market Participant contacts.
- Each TP shall exercise encryption failure processes by simulate an encryption/decryption failure, triggering the appropriate notices to the identified Market Participant contacts.
- Each TP shall send a formal notice of successful certification completion to their TP

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[?more detailed scripts?]

[?; include web page for interactive upload to help with testing]

[?; include 'time-sync' test?]

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Recommended Internal Tests

In addition to tests executed with trading partners, the following tests are recommended as internal tests of Internet ET systems.

- Stress Test. Ability to send and receive large production files (e.g. 10MB minimum uncompressed).
- Fail-over test. Test any processes triggered by a protocol or exchange failure by your trading partner. As an optional preliminary step, acquire or develop an HTML page for interactive file upload (sample code is earlier in this document). Test interactive file upload to your own server using an interactive browser.
- Thoroughly test using the incorrect userid and password against the secure directory.
- Request that several other trading partners and/or several clients within your own company transfer concurrently to ensure that your server can withstand the load.
- Test application with various simulated errors in both file transfers and in PGP or OpenPGP decryption.

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8 –APPENDICES

TABLE A – INTERNET ET STANDARD ERROR CODES AND MESSAGES

These errors and warnings are strictly related to problems found in the Receiving program or decryption levels of processing before translation. Errors and warnings generated by the Client batch browser are assumed to be documented at the Client site to distinguish them from problems occurring in the Receiving program or decryption. Numbering schemes and descriptions should aid in this distinction.

EEDM### standard error format with ### representing a numeric value; further processing will not take place

WEDM### standard warning format with ### representing a numeric value; further processing will take place

The string for the error or warning should appear in the following format:

[Validation Code]:[Description];[supplemental message to be defined by the issuing site up to 80 characters]

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Internet ET Standard Error Codes and Messages

Validation Code	Description	Data Element	Data Element Required or. Mutually Agreed
EEDM100	Missing "from" Common Code Identifier code	from	required
EEDM101	Missing "to" Common Code Identifier	to	required
EEDM102	Missing input format	input-format	required
EEDM103	Missing data file	input-data	required
EEDM104	Missing transaction set	transaction-set	mutually agreed
EEDM105	Invalid "from" Common Code Identifier	from	required
EEDM106	Invalid "to" Common Code Identifier	to	required
EEDM107	Invalid input format	input-format	required
EEDM108	Invalid transaction set	transaction-set	mutually agreed
EEDM109	No parameters supplied	parameter string	required
EEDM110	Invalid "version"	version	required
EEDM111	Missing "version"	version	required
EEDM112	"receipt-security-selection" not mutually agreed	receipt-security-selection	mutually agreed
EEDM113	Invalid "receipt-security-selection"	receipt-security-selection	mutually agreed
EEDM114	Missing "receipt-disposition-to"	receipt-disposition-to	required
EEDM115	Invalid "receipt-disposition-to"	receipt-disposition-to	required
EEDM116	Missing "receipt-report-type"	receipt-report-type	required
EEDM117	Invalid "receipt-report-type"	receipt-report-type	required
EEDM118	Missing "receipt-security-selection"	receipt-security-selection	mutually agreed
EEDM119	Mutually agreed element, refnum, not present	refnum	mutually agreed
EEDM601	Public key invalid	file itself	required - security
EEDM602	File not encrypted	file itself	required - security
EEDM603	Encrypted file truncated	file itself	required - security
EEDM604	Encrypted file not signed or signature not matched	file itself	required - security
EEDM699	Decryption Error		required for general decryption errors not specifically identified by PGP or OpenPGP messages or exit codes
EEDM701	Sending party not associated with Receiving party		required
EEDM702	Package file format not recognized by Receiving party		[[??MS File received but receiver doesn't recognize file format]] required if the Internet ET does not handle this exception
EEDM703	Data set exchange not established for Trading Partner		required if the translator does not handle this exception
EEDM999	System error		required for general system errors to indicate severe errors in processing at the receiving site
WEDM100	Transaction set sent not mutually agreed	transaction-set	mutually agreed
WEDM102	"receipt-security-selection" not mutually agreed	receipt-security-selection	mutually agreed
WEDM103	Missing "receipt-security-selection"	receipt-security-selection	mutually agreed
WEDM104	Element refnum received, not mutually agreed; ignored	Refnum	mutually agreed

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APPENDIX A - Reference Guide

Receiving Program

Options include Active Server Pages (ASP), Common Gateway Interface (CGI), Java Server Pages (JSP), Java Servlet technology and other technologies.

Information on ASP may be found on Microsoft's web site (www.microsoft.com).

A source on CGI is a book entitled "Special Edition Using CGI" by Jeffrey Dwight and Michael Erwin.

Information on JSP and Servlet technology may be found at SUN's web site (<http://java.sun.com>).

Firewall Security

A source which covers this topic in detail is a book entitled "Firewalls and Internet Security: Repelling the Wily Hacker" by William Cheswick and Steven Bellovin.

NAESB

NAESB Web Site: (www.naesb.org) Primary reference for energy industry standards.

HTTP

The NAESB Internet ET architecture is based on HTTP 1.1, and all implementations should be compatible with this version.

W3C WorldWide Web Consortium. All aspects of HTTP, HTML, and other Web-related topics are documented at:
www.w3.org/pub/WWW/

General information regarding HTTP with basic terminology included are documented at:
www.w3.org/pub/WWW/Protocols/HTTP/1.1/spec.html

Syntax information for multipart can be found in IETF RFC1341 section 7.2. (www.ietf.org)

HTML

Information on HTML 4.0 may be found at www.w3.org/TR/REC-html40/.

www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html

PGP Software

PGP is available for a variety of operating systems and platforms. For more information contact Network Associates (www.nai.com) or PGP Corporation, (www.pgp.com)

OpenPGP Software

The IETF OpenPGP standard is available at www.ietf.org/rfc/rfc2440.txt

Software implementations of the OpenPGP standard are freely available for commercial use from the Free Software Foundation at www.gnu.org.

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Time Synchronization

Time synchronization is required to assure that all trading partners' transaction times are accurate. Testing has shown that the clocks on all computer systems drift. Time accuracy is dependent on how much a system's clock drifts, how frequently it is resynchronized and the accuracy of the source used for synchronization.

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Each NAESB business process may have unique time-synchronization requirements. Refer to the QEDM for time-synchronization standards for target markets. Servers need to be time-synchronized according to the standards needed for the most-restrictive target market, that is the one with the smallest drift allowance.

Authoritative time synchronization is now being provided by governmental agencies around the world based on a synchronized network of atomic clocks. In the United States this includes the U. S. Naval Observatory and the National Institute of Standards and Technology.

An easy way to obtain the current time is from the U. S. Naval Observatory's Web site at tycho.usno.navy.mil/cgi-bin/timer.pl. The output from this page can easily be edited and reformatted to set a local system's time. Commercial, shareware and public domain packages are also available to synchronize system times, including JETF NTP, Internet daytime, nisttime / usnotime.

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Further information on time synchronization may be found at the following Web sites:

- <http://tycho.usno.navy.mil/ntp.html>
- www.ccd.bnl.gov/xntp

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APPENDIX B – FREQUENTLY ASKED QUESTIONS

Q: Use of “time-c-qualifier” across quadrants. We understand that the retail quadrants require the “time-c-qualifier” for “qisb-acknowledgement-receipt”, while the WGQ does not require this data element. If we participate in multiple quadrants, which standard do we use?

A: You are required to follow the standards dictated by the quadrant that governs the transaction or business process. For example, if you are executing a WGQ nomination, then you should adhere to WGQ standards, which do not require the “time-c-qualifier”. If you are executing an REQ enrollment, you need to adhere to the REQ standards, which require “time-c-qualifier”. Of course, all parties can mutually-agree to use the “time-c-qualifier” or not.

Q: NAESB EDM / AS2 Compatibility. What is the status of NAESB compatibility with AS2?

A: [??pending EC direction]

Q: Atomic Clock Synchronization. How often do we need to synchronize our system clocks with an atomic clock?

A: Refer to your QEDM for time-synchronization standards for the business processes you are executing.

Q: Internet Continuous Connection. As an end user, do I need a continuously-connected internet Web server to participate in the Internet EDM in the energy industry, or can I just use a dial-up connection to my ISP and my favorite shrink-wrapped browser software?

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A: An interactive browser connection is not enough to actively participate in the system. It is not necessary to have a private Web server, you can use a service, however the system requires that you have access to a permanent internet connection which is capable of both sending and receiving files without operator intervention.

Q: Use of ANSI X12.58. If we use ANSI X12.58 encryption do we still need to use PGP or OpenPGP encryption?

A: The use of internal encryption such as X12.58 is outside the scope of the NAESB REQ encryption standards.

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APPENDIX C – SAMPLE TECHNICAL EXCHANGE WORKSHEET (TEW)

This worksheet is intended to establish communications between two parties. Additional requirements and information may be required. Refer to your quadrant-specific EDM (QEDM).

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Company and Contact Information

Company info:	
Provider info:	

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Contacts	Transaction/EDI Contact	Communications Contact
Primary Name:		
Telephone:		
Fax:		
E-mail:		
Secondary Name:		
Telephone:		
Fax:		
E-mail:		

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Transport Specifications	Test	Production
DUNS/DUNS+4 Number		
HTTP 'to' Value		
ISA06/08 Interchange ID		
Using 'time-c-qualifier' in Receipt? (Y/N)		
X12 Segment Terminator:		
X12 Data Element Separator:		
Primary Internet ET URL		
Server Name:		
CGI Path:		
Port:		
Userid:		
Password:		
Error URL (Option)		
Server Name:		
CGI Path:		
Port:		
Userid:		
Password:		
Test URL (Option)		
Server Name:		
CGI Path:		
Port:		
Userid:		
Password:		
PGP Public Key	Distribution	Distribution
Finger Print	Distributed with Key	Distributed with Key
Userid (Alpha, spaces, numbers only; no special characters)		
Key Contact Person		

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