

Joint Initiative Strike Team

I-TAP

Intra-hour Transaction Accelerator Platform – A platform to facilitate accelerated real-time transactions between market participants via a products bulletin-board, database services, and coordinated ‘hand-shakes’ with existing external systems (e.g. OASIS, e-tag template software, e-tag approval systems and others).

System Requirements Document

April 30, 2009
Version 1.0

1.0 Background and Scope of I-TAP

In mid-2008, representatives from Northern Tier Transmission Group, ColumbiaGrid and WestConnect decided to join forces to pursue projects that would be of benefit throughout the western interconnect. Together they could utilize a broader reach of expertise and geography than any of the three entities independently. Each group had begun work on projects in areas that were of interest to the other entities and that would benefit from broader participation. As such, the Joint Initiative program was conceived and initiated. A guiding principle of the Joint Initiative efforts is that individual projects will proceed whenever there is a sufficient "critical mass" of interested parties. Unanimity, while always welcome, is not required.

I-TAP is a result of this Joint Initiative program. I-TAP is a tool envisioned to facilitate and reduce the workload burden and time required to initiate mid-hour and short-term real-time transactions. These very immediate types of transactions are more critical today because of the influx of non-dispatchable renewable generation. I-TAP will coordinate and cooperate with existing systems by linking them together via the I-TAP hub and providing a new electronic bulletin board for the posting of power products. However, I-TAP is not intended to be a market, all participation would be voluntary, and all transactions would be bi-lateral deals between the individual parties.

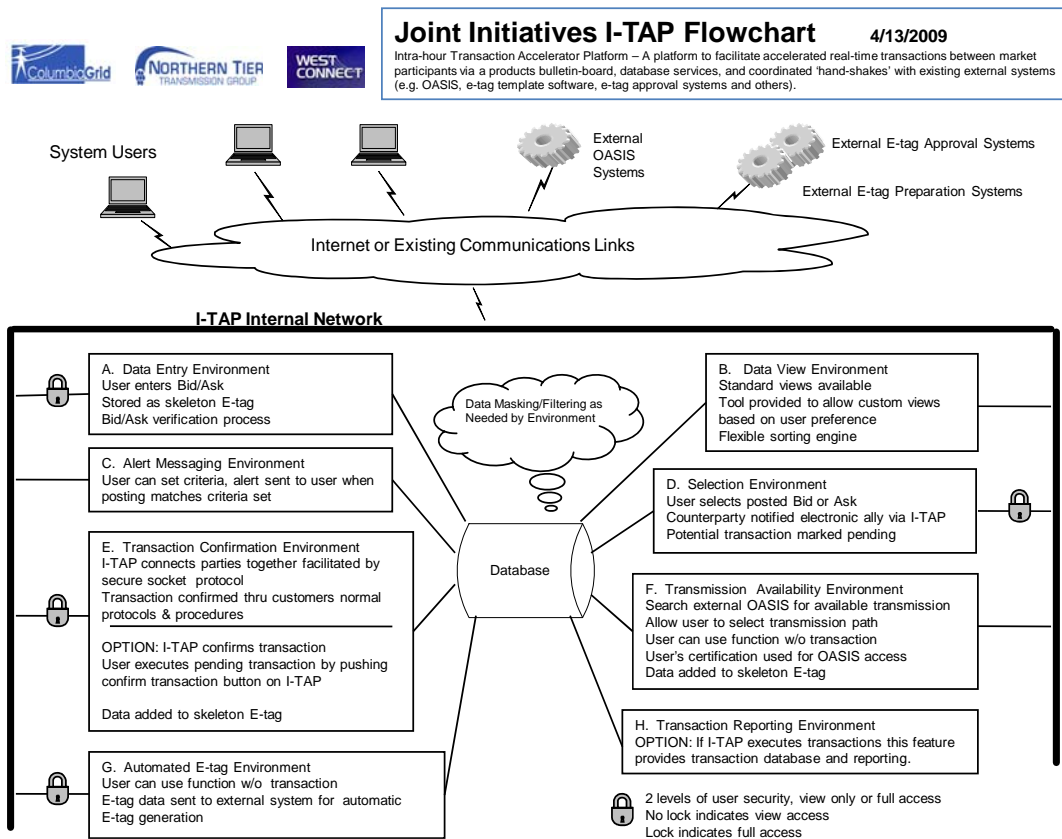
2.0 Goals and Objectives

The functional requirements described below incorporate the following goals and objectives.

I-TAP will:

- 1) Provide a platform to accelerate real-time transactions between market participants via a products bulletin-board with capability that is scalable and flexible to accommodate future products and services.
- 2) Provide a new and enhanced coordination and cooperation of existing systems but will not attempt to recreate established and efficient existing systems.
- 3) Be useable for the posting and accessing of a wide variety of products.
- 4) Minimize participant workload and training requirements.
- 5) Leverage and use existing infrastructure where possible.
- 6) Be expandable with capability to implement additional functionality going forward.
- 7) Use existing scheduling practices and applicable standards and business practices as much as possible.
- 8) Avoid tariff modifications for participating jurisdictional entities.
- 9) Not require participation by any party, participation is voluntary.
- 10) Keep it simple and add complexity via future phases or enhancements.

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3.0 Functional Requirements

There are 2 levels of I-TAP users and the public. In this document they are referred to as the public, view access users and full access users. Public access does not require registration but can only view a home page that describes the site and how to gain view access or full access. This is the only access for non-registered users. View access users are registered users with view only digital certificates and full access users are registered users with full access digital certificates.

There are two formats, or structure alternatives, for I-TAP that are being contemplated by the potential users, those being: 1) A format where I-TAP provides an environment for buyers and sellers to come together to find products and services, but where all bi-lateral deals are consummated 'off-line' from I-TAP pursuant to the parties existing procedures for deal transactions; or, 2) A format where I-TAP provides an environment for buyers and sellers to come together to find and transact products or services (i.e. bi-lateral deals are consummated on I-TAP between the individual involved parties).

3.1 Data Entry Environment

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Full access users can post offers to buy or sell products. Users must provide the following required data for a posting to be accepted:

1. Amount in megawatts
2. Product code
3. POD or POR as appropriate
4. Time frame product is available
5. Bidder identification
6. Indication whether the poster desires to mask their identity to view-only and full-access users (default is to display the bidder's identity)

Optionally, price and other data that is required on an E-tag can be provided. Data is stored and can be displayed in the form of an E-tag. It will be possible to post the same product in different quantities or for different time frames. These postings are linked so that the posting is automatically modified if one of the linked products is selected or expires. It shall be possible to easily post a product for the same hours of each day for any number of days into the future. Manually entering the same data for each day in the future does not meet this requirement. Postings automatically expire and are removed upon the expiration of the posted product stop time.

3.1.1 Option-requirement where transactions are NOT consummated on I-TAP

There are 3 ways that posted data can be modified:

- 1) The posted data can be manually edited or removed by the user that posted the data.
- 2) The data will be removed by I-TAP at the end of the posted product stop time.
- 3) I-TAP will mark the posted data "pending" when selected in 3.4 below.

3.1.2 Option-requirement where transactions ARE consummated on I-TAP

There are 4 ways that posted data can be modified:

- 1) The posted data can be manually edited or removed by the user that posted the data.
- 2) The data will be removed by I-TAP at the end of the posted product stop time.
- 3) I-TAP will mark the posted data "pending" when selected in 3.4 below.
- 4) I-TAP will automatically remove a posting when a transaction has been confirmed.

If the confirmed transaction is part of a linked posting, the linked postings will be modified as required.

3.2 Data View Environment

View access and full access users are able to use the data view environment. Users will be provided standard views of posted data. Tools will be provided to allow viewing of postings based on user provided preferences. The user preferences will be stored and will include user selectable colors for displays.

3.3 Alert Messaging Environment

View access and full access users are able to use the alert messaging environment. Users can set criteria for any parameters in the posted data. When posted data matches the criteria set, I-TAP will deliver to the user an alert message.

3.4 Selection Environment

Full access users can use the selection environment. Users can select a posted offer to buy or sell a product. I-TAP will electronically notify the counterparty of the selection. If the counterparty through I-TAP electronically agrees (i.e. this is not a deal confirmation but, rather, acknowledgement of a potential deal), the potential transaction is marked pending and the counterparty's identification is disclosed, if the identities have not already been disclosed in the initial posting and bid selection.

3.5 Transaction Confirmation Environment

3.5.1 Option-requirement where transactions are NOT consummated on I-TAP

The selection is NOT a transaction until executed, or consummated, external to I-TAP. I-TAP is manually notified by the seller when a transaction has been confirmed through a user's normal protocols and procedures. When I-TAP is notified of the external execution (via a manual user interface, a secured I-TAP 'observation only' environment, or other) additional data is stored and added to the skeleton E-tag. The potential transaction remains marked pending until the poster removes the posting, modifies the posting, renews the posting or the posting automatically expires at the end of the posted transaction stop time. The parties to the transaction can request a display of the E-tag data. Ongoing discussions will determine if I-TAP will make a permanent record of externally confirmed transactions.

3.5.2 Option-requirement where transactions ARE consummated on I-Tap

The user that made the selection, now marked pending, can finalize the transaction by pushing the confirm transaction button on the I-TAP display and the transaction is final and binding on the parties. The additional transaction data is added to the skeleton E-tag and transaction data is provided to the parties and stored on I-TAP.

3.6 Transmission Availability Environment

View access and full access users are able to use the transaction availability environment. Users can request I-TAP to search external OASIS web sites for available transmission for a transaction. I-TAP will be capable of searching any OASIS in the WECC area. Exceptions may be the Alberta Power Pool and the California ISO. I-TAP will return all of the available transmission option found and allow the user to select from the options. When a transmission selection has been made the additional data is added to the skeleton E-tag and displayed for the user.

I-TAP will have the capability for a user to use the transmission availability function without a electric power transaction facilitated on I-TAP. The user's OASIS certification will be used for the OASIS transmission search. I-TAP will act as an external OASIS interface or conduit similar to a Google search.

3.7 Automated E-tag Environment

Full access users can use the automated E-tag environment. Users can request I-TAP to automatically generate all of the information needed to populate a final E-tag and will supply such information to the existing external E-tag author system. I-TAP will accomplish the E-tag

generation by sending E-tag data to an external system for automatic E-tag generation. I-TAP will have the capability for a user to use the automated E-tag function without a electric power transaction facilitated on I-TAP. In either case the end result is a final E-tag.

4.0 User Interface Standards

The standards below are generally applicable to any user interface that the vendor designs.

4.1 Thin or Lightweight Client

If possible, the vendor shall implement the user interface using a lightweight client, such as a browser or a thin client that adds functionality without overburdening the client machine with heavy resource utilization or complicated management.

4.2 Print Button

The vendor will provide a Print button on every user display that prints the entire window (displayed or not) on user selectable sized paper. Page setup features must be provided to switch between horizontal and vertical, indicate the number of copies, etc.

4.3 Download Button

The vendor will provide a Download button on every user display that exports the data with labels in csv format to the client's computer with a user selectable directory and filename. Default directories and filenames shall be provided so that the user need not go through the step of naming the file and selecting the directory. Default filenames must contain the date and time in the format yyyyymmddhhmm.

4.4 Display Consistency

Display formats and function should be consistent across all displays. Participants will have final authority on determining if the vendor has met these requirements and will be required to state specifically what needs to be corrected in order for the vendor to be compliant.

4.5 Invalid Data Display Color

Data with a quality of invalid will display in a different, user definable color than data with a quality of valid.

4.6 User Definable Colors

Background and text colors and text font size and styles will be user definable on a per user basis. User preferences will be persistent. This means that the user preferences, once set, will remain the same until the user changes them. User preferences will not revert to default values on login, system restart, etc.

4.7 Color to Meaning Assignment

If the vendor chooses to impart information by color, then the user will be able to select which color they wish associated with which information. For example, if invalid data is displayed in one color and valid data displayed in another, then the user shall be able to select which color they wish invalid data displayed in, and which color they wish to see valid data displayed in.

4.8 Maximum Display Capability

Displays shall require no more than a 1024x768 display.

Displays shall be resizable so that if a user has a higher resolution display, they may use all of the available screen “real-estate”.

4.9 Optimization

The user interfaces shall be highly optimized in order to eliminate duplicate data entry, minimize the number of keystrokes and/or clicks to perform a specific function, and minimize the amount of extraneous data presented to the user.

4.10 Ease of Operation

The user interfaces shall be highly intuitive, using standard locations and features for menu items and popup menus, meaning and function of keyboard controls such as tab, enter, backspace and function keys. The displays shall be context consistent, where sub-displays are hierarchically related to the parent display for example.

4.11 Sorting

All displays on the I-TAP shall provide sorting capability as appropriate. Displays shall all be able to be sorted in both ascending and descending order by any column (i.e. label, Tag ID, user name, source, sink, etc.). Sorting on consecutive letters shall be possible (i.e. sorting will utilize cumulative characters entered).

4.12 Filtering

All displays on the I-TAP shall provide filtering capability. Displays shall all be able to be filtered based on the values in any meaningful column. Numeric columns shall be filterable based on both absolute and range values. Text columns must be filterable based on partial string matches and exact matches with negation. String filtering shall not be case sensitive. It shall be possible to enter up to 20 text strings for a single field that shall be logically “OR”d together.

4.13 Time Zone

The I-TAP displays will display data in the user’s local time zone as defined in their user preferences. Each display will have a drop down list of appropriate time zones so that the user may easily switch between one time zone and another.

5.0 Hardware and Software Standards

These requirements are generically applicable to hardware and software used for the I-TAP.

5.1 Hardware and Software Platform Independence

The I-TAP shall minimize the cost and complexity of client access to the I-TAP by utilizing existing infrastructure and industry standards wherever possible. The I-TAP shall be hardware and software platform independent to the extent possible.

5.2 Security and Encryption

The I-TAP interface shall use 128 bit Transport Layer Security (TLS) for the client interface, e-Tag interface, and OASIS interface. The I-TAP must use NAESB PKI compliant client certificates and use client mapping for authentication so that client key exchange is not required.

The I-TAP systems must contain virus protection software and intrusion detection software as applicable to the operating system platform.

5.3 Communication Standards

The I-TAP must be compliant with all applicable communications standards such as the e-Tagging specification and OASIS specification. Standards consistent with the E-tag and OASIS shall be used, including SOAP, SMXP, and GMT for time representation, etc. If at some point the participants require an API, the API must be implemented using XML with an associated XSD (schema) defining the XML document content. Any schemas used in the API interface must be provided to the host and/or participants for public distribution.

5.4 No Single Point of Failure

The I-TAP system must be fully redundant, including at least dual internet connections using separate providers. The I-TAP system must be configured in either a parallel or hot standby configuration. Disks holding data must be mirrored.

5.5 Data Backup and Storage

The I-TAP data must be backed up at least daily, with data being moved offsite at least weekly with access controls such that no single employee has access to the offsite data storage. *[Note: This may change based on resolution of Work Bin items. Particularly, the resolution of whether or not transactions will be consummated on I-TAP.]*

6.0 Sizing and Performance

6.1 Data Retention

6.1.1 Option-requirement where transactions are NOT consummated on I-TAP

Only information related to the performance of I-TAP will be stored (such as log data). This data must be available up to 24 months in the past. I-TAP shall NOT store any transaction data that identifies the participants in the transaction. Data retention is still under discussion and 6.1 may be revised depending on the outcome of discussions.

6.1.2 Option-requirement where transactions ARE consummated on I-Tap

I-TAP will keep a historical log of system performance that goes back in time 24 months. Transaction data will be stored and retained for 3 years. Full access users will be provided monthly reports of their transactions. These monthly reports are to inform the user of I-TAP activity and not for settlement advice. Users are expected to make and keep their own settlement records.

6.2 User Access

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The system must simultaneously accommodate 50,000 certificated viewers of posted data and 5000 full access s while meeting data throughput standards. Simultaneous use by these users with 500 active pending transactions from multiple parties defines the *heavy activity state* referenced below.

6.3 Performance under Heavy and Moderate loading

6.3.1 Moderate Loading State

Update times shall be measured when the system is in a *moderate activity state*, processing a normal loading of one half the heavy loading defined above.

Display refresh, display popup (when accessing a specific tag for example), and display change shall take a maximum of 2 seconds. Day change shall take a maximum of 4 seconds.

6.3.2 Heavy Activity State

Display call up times and API retrieval times shall be measured when the system is in a *heavy activity state* as defined above.

Display refresh, display popup, and display change shall take a maximum of 4 second. Day change shall take a maximum of 8 seconds.

6.4 Display Update Latency

Displays shall be updated with new or changed information within two seconds of receipt of the new information by the I-TAP under all loading states.

6.5 CPU Utilization

CPU Utilization, averaged over five minutes, shall be below 20% during a moderate activity state and below 50% during a heavy activity state.

6.6 Disk Utilization

Disks will be optimized to improve performance and provide storage adequate for the operating system, operating system tools, all I-TAP related software. Disk utilization measured at I-TAP system delivery shall not exceed 50%.

6.7 Random Access Memory

The I-TAP shall be configured with sufficient RAM so that during a heavy activity state, disk swapping is below 20 pages per minute.

6.8 Availability

I-TAP availability shall be 99.95% measured over a rolling 30-day period.

7.0 Testing

The testing environment must be identical to the production environment except that no actual transaction is confirmed and no E-tags are submitted for implementation.

7.1 Structured Test Document

The vendor shall provide a structured test document that tests all functional and performance requirements of the I-TAP. Participating parties may review the document and provide input and corrections which must be incorporated prior to the start of structured testing. The test document must contain numbered sections consistent with this system requirements document so that testers may easily reference required functionality and compare it to test results.

7.2 Problem Reporting

The vendor shall provide a structured method of reporting, classifying, and tracking problems.

7.2.1 Structured Problem Reporting

Each identified possible problem shall be assigned a unique number and assigned a classification that is mutually agreeable to both the vendor and participants. If mutual agreement cannot be met, the dispute will be elevated to the next level of management in each company. If mutual agreement cannot be met at the highest level, the problem may be resolved in binding arbitration.

7.2.2 Problem Classifications

Problems will be classified as:

- R – Required Functionality (In the System Requirements Document)
- E – Enhancement (Identified as necessary but not in the System Requirements Document)
- B – Bug (Software or Hardware Problem)
- D – Disputed (Agreement cannot be reached)

Problems will further be classified as:

- C – Critical (Required for system to be considered operational)
- H – High Priority (Not required but very important)
- M – Medium Priority
- L – Low Priority

7.3 Factory Acceptance Testing

The FAT shall be conducted at the vendor's facility. Certain client functions may be tested remotely at the client facilities.

The FAT will consist of both structured testing and unstructured testing. Structured testing will be conducted first.

Unstructured testing will include testing of any required functions in any order at any loading level.

FAT may be conducted several times. Passing FAT is defined as completion of structured and unstructured testing without finding any problems above those classified as low priority.

FAT testing will continue until the ColumbiaGrid Staffs or vendor staffs determine that system problems are so severe that no further testing should be done until the problems are corrected.

At completion of FAT testing, if FAT is not passed, the vendor shall correct all problems classified above low priority and another FAT shall be started. This will include re-testing of functions already tested since corrections of problems may cause problems elsewhere in the system.

7.4 Factory Performance Testing

The FPT shall be conducted at the vendor's facility. Certain client functions may be tested remotely at the client facilities.

The FPT will consist of confirmation that the system meets sizing and performance requirements. The vendor will be responsible for loading the system to both the medium and heavy activity state. ColumbiaGrid Staff will have ultimate approval and confirmation rights that these activity states are met for the duration of the appropriate performance tests.

Either the vendor or the ColumbiaGrid Staff may devise mutually agreeable timing tests (including the use of a stopwatch, performance monitors, or software timers).

7.5 Site Acceptance Testing

The SAT shall be conducted at the I-TAP host facility(ies). Client functions will be tested remotely at the participating client facilities.

SAT is a repeat of FAT with the exception that passing SAT is defined as completion of structured and unstructured testing without finding *any* problems. SAT testing will be open to any ColumbiaGrid member.

7.6 Site Performance Testing

The SPT shall be conducted at the I-TAP host facility(ies). Certain client functions may be tested remotely at the client facilities.

SPT is a repeat of FPT.

SPT *may be* waived by the ColumbiaGrid at their discretion.

8.0 Documentation

The vendor will be responsible for providing hardware and software documentation. Participants shall have approval rights over all documentation provided.

8.1 Technical Documentation

The vendor shall provide the Participants with technical documentation describing the hardware architecture and software architecture of the system. The intent of the technical documentation is to allow the host to maintain the system. Since a number of methods are possible for describing the system, including UML, DFD's, etc, there will be no specific requirement in this document as to the form of this documentation. The only requirement is that the intent be met.

8.2 User Documentation

The vendor shall provide the I-TAP users with user documentation that describes how the client interface is used and all of its possible functions. Participants will have approval rights over this documentation.

8.3 Automated Interface Documentation

The vendor shall provide the participants and host with API documentation that describes, in detail, how users may install and/or utilize the API to the I-TAP. If the API is implemented using XML, then the schema shall be provided to the users so that they may implement their own XML processor independent of any specific vendor solution.

9.0 Training

The vendor will be responsible for providing training courses. Participants have approval rights over course content and quality. The vendor must provide courses that meet Participants' approval.

These classes may need to be presented in a variety of locations over a number of different days in order to provide access to all I-TAP users.

9.1 Technical Training

The vendor shall provide technical training to Host and/or participant Staffs or their appointees in order to assure that they have sufficient knowledge to maintain the system.

9.2 User Training

The vendor shall provide training to the I-TAP users so that at the end of the course, the users are proficient at using the client interface and understand all of its functions. Training will take place on a demo system online training system.

9.3 Automated Interface Training

The vendor shall provide technical training to I-TAP users on the use of the API and EIDE interfaces so that the users, at the end of the course, have a thorough understanding of each interface and how to use it.

10.0 Post implementation Requirements

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The vendor will be responsible for providing a number of services after implementation of the I-TAP. These may commence at appropriate times after any of the modules. All upgrades or modifications to software described in this section must be implemented following procedures outlined in section 6.7 of this document.

10.1 Problem Reporting and Enhancement Requests

The vendor shall provide a mechanism for both the host and participating members to report and classify problems and enhancement requests. These will be assigned priority levels by participants' staff as follows:

- C – Critical (Required for system to be considered operational)
- H – High Priority (Not required but very important)
- M – Medium Priority
- L – Low Priority

They will also be assigned a classification as follows:

- E – Enhancement
- B – Bug (Software or Hardware Problem)
- D – Disputed (Agreement cannot be reached)

The vendor will allocate resources to correct the identified problems consistent with the priority level assigned as follows:

- C = immediate mitigation effort required and will be continuous until problem is resolved. Daily updates from the vendor will be required.
- H = mitigation effort must start no later than the next working day and continue during normal working hours until complete. Daily updates from the vendor will be required.
- M = mitigation effort must start within the next 10 working days. Vendor will provide an estimate for completion acceptable to the Columbia Grid Staff. Staff and Vendor will work together to prioritize "M" issues. Weekly updates from the vendor will be required.
- L = Vendor will provide an estimate for completion acceptable to the Columbia Grid Staff. Staff and Vendor will work together to prioritize "L" issues. Weekly updates from the vendor will be required.

10.2 System Upgrades

The Policy Member representatives or vendor with agreement from the Policy Members may initiate system hardware and/or software upgrades in order to remain current with external vendor support levels (such as the operating system, programming language, or database vendor) or improve performance or reliability.

Responsibilities for staff performing the upgrades need to be established with the vendor in the I-TAP contract.

10.3 System Patches

The Participants, the host and vendor must establish a method by which critical operating system patches, database system patches, and any other applicable patches required for ensuring system security, implementing bug fixes, and implementing enhancements will be applied. Patches that correct security issues must be applied as soon as possible.

10.4 Virus Detection Updates

The host and vendor must establish a method by which any virus detection software is updated. Updates need to be downloaded and applied daily.

10.5 Maintaining Compliance with Electric Industry Standards and Requirements

The host and vendor must establish a method by which compliance with NERC, NAESB, FERC, and WECC standards and/or requirements is assured. The vendor must ensure that their software be fully compliant with all applicable standards and requirements when they are enacted by the industry.