

Comment Version
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NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

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Interchange Authority Function Task Force Report to the Interchange Subcommittee

Version 1.0
October 18, 2004

Introduction

The Operating Committee charged the Interchange Subcommittee with operationally defining the Interchange Authority (IA) function. The Interchange Authority Function Task Force (IAFTF)¹ was formed to compile and address the outstanding issues surrounding the IA function, and define how the IA function would operate with the adoption of standards related to the NERC Reliability Functional Model (FM). This white paper:

- Defines how the tasks of an Interchange Authority could be performed operationally.
- Provides a common vision of the Interchange Authority.
- Describes how the Interchange Authority function interrelates with other functions – both market and reliability.
- Discusses the issues, options, and concerns surrounding the Interchange Authority function.

The ISOs and RTOs support the preliminary recommendations detailed in the Interchange Authority Function White Paper developed by the NERC Interchange Authority Function Task Force. We concur with the concept of the development of a single interconnection-wide Interchange Tool that will improve overall industry communication, improve communication response time between entities, reduce interoperability issues, streamline integration and, improve industry utilization through standardization. The ISOs and RTOs support the NERC Interchange Subcommittee (IS) continuing development and refinement of the principals and issues detailed in the white paper. We respectfully request the NERC IS issue periodic industry-wide updates on their progress, as open issues are resolved.

The several open issues identified by the task force are critical and must be resolved:

- Resolution of the cost/benefit issue in moving the entire industry to a new singular platform to perform all the Interchange Authority function.
- Resolution of technical issues such as handling of dynamic schedules, in-hour reliability curtailments, congestion management of transactions, etc.
- Resolution of the reliability and financial risks introduced by subjecting the industry to loss of a single entity performing all Interchange Authority functions.

Executive Summary

Today, Interchange Authority tasks are performed by entities within the control area. The IA function as described in the FM is a concept — a listing of tasks — that requires detail before the industry places the IA into operation. The purpose of this paper is to describe a process to implement the concept of an IA into an industry that “operates” within the Functional Model. The paper defines the task

Place comments in this section. You may cut-and-paste and show markups to help us understand your suggestion.

¹ The IAFTF roster is **Appendix A**.
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force's vision of how the IA will operate, and how the IA will communicate and interrelate with the other FM functions.

The white paper discusses, and attempts to resolve, the issues surrounding the IA function. These issues are summarized in **Appendix D**, and have also been identified during the public postings of the FM, meetings of the Coordinate Interchange groups,² and various industry forums.

The IAFTF summarized its vision of the IA and includes a recommendation to apply the IA function for Version 1 Standards. The majority of the group believes that the recommendation represents the most logical and efficient way to fulfill the functions of the IA. The paper describes other options for a future IA that were considered as part of the discussions (**Appendix B**).



Interchange Authority Vision

Interchange Authority Purpose

The IA function serves as a gateway to translate the Purchase-Selling Entity's (PSE) or the PSE designee's Requests for Interchange (RFI) into physically implemented schedules between Balancing Authorities (BA). The standards for the business and commercial aspects of the RFI are covered under the NASEB Coordinate Interchange Business Practice Standard, Version 1. The reliability entity responsibilities for facilitating the physical movement of energy will be covered under the NERC Coordinate Interchange Standard, Version 1.



Interchange Authority Functions

At a high level, the IA functions are:

1. Provide a methodology to accept RFI's for physical implementation.
2. Distribute and obtain confirmation of the RFIs from the reliability entities.
3. Authorize implementation of physical interchange transactions by the BAs.
4. Enter physical interchange transactions into any appropriate reliability assessment systems.
5. Maintain auditable records of physical interchange transactions.

² The Coordinate Interchange groups are NERC's Interchange Subcommittee and Coordinate Interchange Standards Drafting Team and NAESB's Coordinate Interchange Business Practice Task Force. This white paper was discussed at the Coordinate Interchange Standard DT meeting on September 8–9, 2004 (members of the NAESB Coordinate Interchange BP TF attended the meeting) and the discussion resulted in revisions to the paper. No action to "approve" the paper was taken at the meeting.

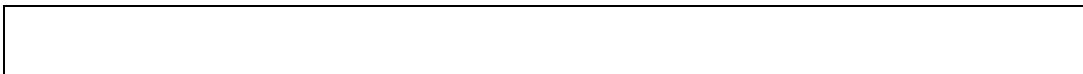
A detailed description for each of these functions is contained in **Appendix C**.³



Interchange Authority Interactions and Communications

The diagram in Figure 1 (**Appendix E**) illustrates how the IA will interact and communicate to facilitate interchange. This diagram is based on Version 1 of the NAESB Coordinate Interchange Business Practices Standards and the NERC Coordinate Interchange Standard:

- The PSE or PSE's designee assembles all energy purchases, sales, and transmission service arrangements prior to communicating with the IA (NAESB RFI Standard 2.1).
- The PSE or PSE's designee verifies all energy purchase, sale, and transmission service market arrangements prior to communicating with the IA (NAESB RFI Standard 2.1).
- Upon receipt of all necessary market verifications, the PSE or PSE's designee submits a balanced RFI to the IA (NAESB RFI Standard 2.0).
- The IA will submit the balanced RFI to the reliability entities (RA, BA, TSP) for validation (NERC CI Standard 402).
- The reliability entities will confirm or deny the RFI for the IA (NERC CI Standard 403).
- After all necessary reliability confirmations, the IA will send the individual confirmed RFI(s) along with appropriate net interchange information for all RFIs managed by that IA to the affected BAs for implementation (NERC CI Standard 401).
- After confirmation, the IA will also send the individual confirmed RFI(s) along with appropriate net interchange information for all RFIs managed by that IA to the appropriate reliability assessment systems as identified by the reliability entities (NERC CI Standard – TBD).



Recommended Option for Fulfilling the Interchange Authority Function

Successful completion of IA tasks is critical to implementing bilateral interchange between BAs. Accurate and timely coordination of Interchange by the IA is also crucial to system reliability. The IA must be able to accept the market's RFI from the PSE or the PSE's designee, distribute the RFI to affected reliability entities i.e., BA, TSP, RA, receive approvals from the reliability entities, and receive modifications to the RFI from market and reliability entities. IA

³ Information on the development of the Coordinate Interchange Standard may be found on the NERC website at: <http://www.nerc.com/~filez/standards/Coordinate-Interchange.html> and NAESB Version 1 Business Practice Standards for Coordinate Interchange (RFI) may be found on the NAESB website at: http://www.gisb.org/weq/weq_cibp.asp

communication on the status of Interchange to both market and reliability entities is of paramount concern to NERC because of its potential to affect system reliability.

The IAFTF believes the sheer volume, complexity, and multiple combinations of communication required to perform the tasks of the IA presents a coordination challenge to the industry. The IAFTF believes the most efficient way to meet the reliability needs and expeditiously communicate the necessary data to all parties involved in physically moving energy between BAs for a Version 1 implementation is through today's E-Tag system, and for a future implementation the creation of single Interconnection-wide IA tools.

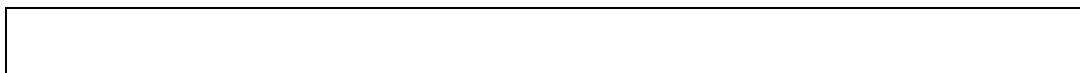
When considering industry efficiency, the IAFTF looked at the relevant experiences in implementing OASIS and E-Tag. One of the biggest problems encountered during these implementations was interoperability of systems due to variations in interpreting system functionality and technical specifications. The IAFTF believes the best way to avoid the interoperability problems that the industry might face with many IAs is to develop a single Interconnection-wide IA tool.

The IAFTF recommends that a single sourced Interchange Coordination tool be developed as an interconnection-wide medium for communications with the reliability entities. (See Interchange Authority Options section – Option 3.) Although the IAFTF has identified communication and coordination challenges with this option the group feels it represents less risk than the other options. Using an Interconnection-wide medium is logical, and consistent, because the system exists today and is deeply ingrained within the industry.

Interconnection-wide IA tools would:

- Minimize electronic communications between all involved parties. Multiple IA tools (or other methods of communication) will introduce unnecessary complexities, time delays, and decreased flexibility. A single IA tool will inherently improve reliability of the interconnected system.
- Reduce response time between affected RA and BA entities when system emergencies arise that are directly affected by BA-to-BA transactions by reducing the number of communications required.
- Avoid interoperability problems by having a single interpretation of functionality definitions and supporting technical specifications.
- Require an IA tool design that would be highly reliable and fully redundant.
- Allow for an expedited rollout by eliminating interoperability testing and reducing the development and startup effort by the vendor.
- Allow for greater accessibility by various industry backend systems because of standardization.

The IAFTF attempts to consolidate the majority opinion of the group, and the options have been captured in **Appendix B**.



Certification – Training – Next Steps

Certification

How will the IA functionality be certified? The IAFTF recommends:

- Certification based upon the IA tool used to perform IA functions.
- Create a default IA tool for use by reliability entities.
- Certify the IA tool, by complying with a series of measures defined in a test procedure, and technical requirements document.
- If an entity registers to perform the IA functions and has registered a URL to the certified IA tool, then they would be considered certified and would meet requirements for proper practices as measured by the local reliability organization.

Education

The IAFTF is concerned with the education and training of the industry regardless of the disposition of open issues. Adequate time must be allowed to address training for successfully employing the IA function.

Integration

The IAFTF believes that adequate time must be allowed to provide industry participants the ability to integrate their various systems with the IA tool. This can be accomplished by publishing interface protocols and providing an integration test environment available to all industry participants well in advance of implementation.

Next Steps

The Interchange Subcommittee requests the Operating Committee use this white paper as a means to solicit further comments on the IA from NAESB, the ISO/RTO Council, NERC Functional Model Working Group, and other industry groups. Further, we recommend the Operating Committee remand the whitepaper to the NERC Interchange Subcommittee to further development of detailed functionality and recommendations for tools.



Appendix A

NERC Interchange Authority Function Task Force (IAFTF)

John M. Simonelli, Chairman	ISO New England Inc.
Pete Harris	ISO New England Inc.
Deanna M. Phillips	Bonneville Power Administration
Albert M. DiCaprio	PJM Interconnection, L.L.C.
J. Roman Carter	Southern Company Services, Inc.
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Jim McIntosh	California ISO
Andy Rodriguez	PJM Interconnection, L.L.C.
Ed Davis	Entergy Services, Inc.
Al Boesch	Nebraska Public Power District
Mike Oatts	Southern Company Services, Inc.
Jim Hartwell	NPCC
Bert Gumm	Idaho Power
Jim Hansen	Seattle City Light
Bob Harshbarger	PSE
Karl Tammar	New York ISO
Larry Goins	TVA
Tim Ponseti	TVA
Joel Mickey	ERCOT

Appendix B

Interchange Authority Options

Option 1 – Tagging Extension Approach



Option 1 would build the IA around the E-Tag Authority concept. Today, Control Areas are responsible for maintaining an E-Tag Authority and that E-Tag Authority performs essentially all of the IA functions described in the FM. Each BA would register as an IA and perform both the BA and IA functions.

NAESB would prescribe the commercial functions needed for assembling an interchange transaction (See Market Period in **Attachment E, Figure 1**). The submitting Purchasing-Selling Entity or PSE's designee would send the completed balanced RFI to the ultimate Sink Balancing Authority's Interchange Authority (E-Tag Authority). That IA would be responsible for (See Reliability Period in **Attachment E, Figure 1**):

- Distributing the RFI to all affected reliability entities.
- Obtaining confirmation of the RFI from the reliability entities.
- Distributing status of the confirmation process.
- Authorizing implementation of physical interchange by the affected BAs.
- Forwarding individual confirmed RFI(s) along with appropriate net interchange information to the appropriate reliability assessment systems e.g., Interchange Distribution Calculator (IDC).
- Maintaining records of physical interchange.

Pros:

1. Allow for continuity with current business practices and backend application software.
2. Minimizes industry wide implementation issues because of its similarities to today's paradigm.
3. Gives the same "look and feel" to the commercial sector of the industry.

Cons:

1. Requires that all BAs perform the IA function.
2. Requires the BA receive interchange schedules from potentially many IAs to determine their net interchange, which introduces a communication and coordination challenge.
3. There could be compliance and auditability issues with multiple IAs in that a single IA would be unable to determine, communicate, and record the absolute net interchange to any particular BA.
4. May carry over some of the interoperability and implementation issues experienced in current tagging processes.

Option 2 – Distributed Approach



Option 2 would allow any entity that passes the Interchange Authority Certification and registers with NERC to perform the IA functions. Upon completion of the commercial functions as prescribed by NAESB during the Market Period, the submitting Purchasing-Selling Entity would send the completed balanced RFI to the IA of its choice. Each IA would be responsible for those functions described in Option 1.

Pros:

1. Allow for industry flexibility in determining whom to use to provide IA functionality.
2. Allow for the IA to provide creative, innovative, and value added services.

Cons:

1. Requires the BA to receive interchange schedules from potentially many IAs, which introduces a communication and coordination risk.
2. There could be compliance and auditability issues with multiple IAs in that a single IA would be unable to determine, communicate, and record the absolute net interchange to any particular BA.
3. May create interoperability and implementation issues based on the multitude of different entities providing IA functionality.

Option 3 – Consolidated Approach



Option 3 would create a single NERC wide or interconnection wide IA. Upon completion of the commercial functions as prescribed by NAESB during the Market Period, the submitting PSE would send the completed balanced RFI to a defined IA. This IA would be responsible for those functions described in Option 1.

Pros:

1. A single IA would reduce the volume of communication between:
 - a. Potentially the multiple IAs that would necessarily exist in alternate implementations to provide electronic coordination of interchange. Note: only if IA to IA exchange is mandated in the other options as a way to allow a single net composite interchange to be sent to each BA.
 - b. IAs and reliability entities.
 - c. IAs and market entities.
2. Allow the BAs to receive and communicate all individual RFI(s) with a single entity as opposed to multiple entities, reducing the communication and coordination risk.

3. Allows each BA and the IA to independently compute net interchange from individual RFI(s), providing for mutual checks and balances.
4. The IA having knowledge of each BAs net interchange can perform an interconnection-wide assessment of balanced interchange.
5. Allow for a single vendor to deal directly with those entities developing the functional definitions and technical specifications, reducing interoperability and implementation issues.

Cons:

1. Could jeopardize reliability by exposing the industry to loss of a single entity that would be performing all IA functions.
2. Could put the industry at financial risk in relying on a single entity to perform all IA functions.
3. May stymie creativity and flexibility within the industry by forcing everyone to use the same centralized IA service.

Appendix C

Interchange Authority Functions

1. Validity Checking Function

Ensuring balanced, valid Interchange Transactions. The IA function ensures that the RFI is balanced and valid prior to physical delivery of energy. The defined validation checks below are taken from the NERC Functional Model. The checks are performed by reliability entities on the contract path identified in the RFI (Reliability Authority, Balancing Authority, Transmission Service Provider). Validation checks include:

1. The source MW must be equal to the sink MW allowing for loss accounting.
2. The Transactions are between valid sources and sinks.
 - a. Verify that the BAs correlate with the Sink Point and Source Point in the interchange transaction.
 - b. Verify that there is one, and only one, BA or Scheduling Agent (SA) listed per POR/POD segment.
3. There is a (continuous) transmission arrangement from the Source to the Sink.
 - a. Verify that the POR/POD pairs are valid for the TSP.
 - b. Verify that for each TSP and POR/POD segment that the BA is valid.
 - c. Verify that the BAs shown as adjacent in the interchange transaction are adjacent to each other.
4. Ensure the requested up and down ramp rates can be met. This will be accomplished by providing the affected BA's with net schedule information so they may review and ensure that they have the physical assets available to meet the requested ramp.

The NERC Operating Manual defines a Transaction as “An agreement arranged by a Purchasing-Selling Entity to transfer energy from a seller to a buyer.” Adequate information must be provided to enable the RA to properly assess the impact of a Transaction ready to “go physical” on the Interconnection.

When the IA receives approvals from the TSP, BA, and RA, those entities responsibility for performing validations, the responsible IA directs the BAs on the contract path to implement the Transaction. If any of these entities performing the validations does not approve the Transaction the responsible IA cannot authorize the implementation of the transaction.



2. Distributes and Receives Interchange Transaction Verification

Collect and disseminate Interchange Transaction approvals, changes, and denials. The IA will receive, collect, validate, maintain, and distribute the RFI status from the reliability entities (RA, BA, TSP) on the contract path. The status will be visible to all reliability entities as well as the requesting PSE or PSE's designee (i.e., author of the RFI).

When the IA receives approvals from the TSP, BA, and RA, those entities responsibility for performing validations, the responsible IA directs the BAs on the contract path to implement the Transaction. If any of these entities performing the validations does not approve the Transaction the responsible IA cannot authorize the implementation of the transaction.

3. Authorize Implementation of Interchange Transactions

Instruct appropriate BA's to Implement the Interchange Transaction. Once the IA has collected all necessary approvals, the IA will communicate the desired net interchange schedules that it has accumulated to the affected BAs for implementation.

The IA tool shall communicate to each BA:

- ⇒ The new net Interchange Schedule for the BA (in the case if multiple IA's no one single IA would have the absolute net for any particular BA).
- ⇒ The new net Interchange Schedule by external interface for the BA.
- ⇒ The new individual Interchange Transactions list by external interface for the BA.

The IA will also communicate the final approval status and implementation of the individual RFI's to the requesting PSE or PSE's designee (i.e., author of the RFI).

4. Enter Interchange Transactions into Appropriate Reliability Assessment Systems

Ensure all required reliability data is communicated to Appropriate Reliability Assessment Systems. Once the IA has obtained all necessary approvals, the IA shall communicate the interchange schedules to the BA's for implementation and forward the interchange schedule to designated reliability assessment systems as required by the various FM reliability entities (e.g., the IDC.).

5. Maintain Records of the Interchange Transactions

The IA will make RFI information available to RAs, BAs, TPs, and Market Monitors (as mandated by Governmental Authorities, Provincial and State entities or specific Market Operators). The IA will serve as the source of net interchange, net interchange by external interface, and individual interchange transactions for each BA. The IA must retain information communicated to the BAs to facilitate the enforcement of audit and compliance measures ensuring the IA has properly communicated balanced confirmed schedules to the BAs.



Appendix D

Interchange Authority Issues

Defining the Interchange Authority as a Tool

The Functional Model defines the WHAT functions the IA will perform, this leaves open the operational questions regarding HOW these functions will be performed. Would an IA tool:

- Actually perform each IA function?
- Perform some of the IA functions while allowing the responsible reliability entities to perform the remaining IA functions?
- Simply allow the responsible reliability entities to perform all of the IA functions?

For example, an IA requirement is the validation of ramp capability. Does the IA tool perform this function by checking ramp rates supplied by BAs against the ramp rate in the RFI, or does the IA tool forward the necessary data to the appropriate BAs who perform the actual ramp capability check? The Functional Model does not specify which entity would perform the IA tasks; it simply requires that the tasks be completed. As a tool, the E-Tag Authority does not perform all E-Tag functions as much as it facilitates the validations and approvals by entities on the E-Tag.

An IA tool could be envisioned to be involved during three distinct time periods:

Ahead of Time⁴

1. Receives request from Purchasing-Selling Entities and/or Market Assembler to implement RFI.
2. Submits all RFI's to the Reliability Authorities, Balancing Authorities, and Transmission Service Providers for approvals.
 - Receives confirmation from Transmission Service Providers of transmission arrangement(s).
 - Receives confirmation from Balancing Authorities of the ability to meet ramping requirements for submitted Interchange Schedules.
 - Receives confirmation from Reliability Authorities on the ability of the interconnected system to support the RFI.
3. Provides approved, valid, and balanced physical Interchange Schedules to the Balancing Authorities for implementation on a forward-looking time frame.

⁴ Note: NERC standards have no role in the commercial ahead-of-time activities for the IA. A transaction can be agreed upon months ahead of time and this initial communications and conformations are not part of NERC's standards. The IAFTF provides the following to demonstrate the potential total performance requirements of such a system.

Real Time

1. Once Interchange Transactions have started, the IA will receive real-time Interchange Transactions changes curtailments and/or re-dispatch Interchange Transactions changes from:
 - Reliability Authorities to maintain reliability (e.g. IROL or OSL or frequency violations).
 - Balancing Authorities (e.g. interruptions due to generation loss or load interruption or excess generation).
 - Balancing Authorities or Market Operator as part of regional congestion management
2. The IA will inform all affected Transmission Service Providers, Reliability Authorities, Balancing Authorities and the requesting Purchasing-Selling Entities of curtailments and/or re-dispatch Interchange Transactions changes.

After the hour

1. Maintains and provides records of individual Interchange Transactions for the Balancing Authorities and Market Monitoring.
2. Accepts interchange transaction changes after the fact such as Emergency and Shared Reserve events.

Entity or Tool

The IA is a function comprised of several tasks. The entities performing these activities by default are responsible for ["by default" says they are responsible but "in part" implies they are not] performing the IA functions. The IAFTF believes that it is appropriate to specify the IA functions in terms of a physical standalone entity.

- Some support the concept that the IA is only a tool that will allow the designated entities to perform the IA functions. What the entity performing the IA functions is called is not relevant; therefore, one can conclude that any entity can simply designate their IA tool. For example, a Sink BA can designate their IA tool similar to how a CA can designate their Tag Authority Service today.
- Others believe the IA should be a standalone physically independent entity that will need to "own" the IA tool(s) and take responsibility for it, including financial responsibility in case the IA tool(s) fails to perform. The entity providing the IA functionality would then be subject to compliance and penalties.



Need for an IA Entity

Is the IA function actually needed under the FM since the BA can perform those functions? The IA, as defined in the FM, is a logical collection of actions or activities relating to the physical movement of energy between BAs. Since the CA in today's world performs these functions, why can't the BA under the FM perform these functions? The IAFTF believes that it is useful to specify the IA functions separately since they are associated with a specific set of actions and interactions.

- Supporters of the need for a unique IA believe its functions and ultimate responsibility under audit and compliance guidelines, requires a physically separate entity that can be held accountable. Folding the IA functions underneath another FM entity (most probably the BA) does not meet the definition and functional requirements of the BA. This would necessitate a change to the FM.
- Opponents of the requirement for an IA point out that BAs and only BAs should be responsible for the tasks, (note that today all BAs do serve as IAs), and therefore there is no need for an IA function and no foreseen problems if the IA is not established.



Singularity

One issue the IAFTF has struggled with is should there be a single interconnection-wide IA entity/tool? The Functional Model *allows for*, but does not mandate, a decentralized submission methodology. This could result in:

- Multiple E-Tagging type systems (Issue is with inter-operability of such systems).
- Non-electronic communications (Issues are:
 - Too many non-electronic communications would impede the industry's ability to deal with and implement all schedules.
 - Too many non-electronic communications would impede operator's ability to do complete analyses of the transactions.

The Functional Model also *allows for*, but does not mandate, a centralized submission methodology. This could result in only one transaction scheduling system.

- Issues are:
 - Monopoly power of 'submission system operator.'
 - Difficulty in matching diverse tariffs.
 - Difficulty in matching different Market rules
 - Difficulty in matching different congestion management approaches.
 - Lack of flexibility.

(See Recommendations and Options sections above).

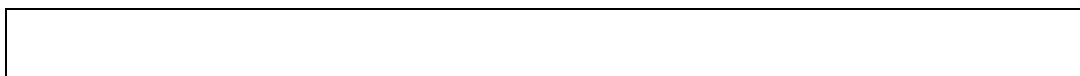
- Some within the industry feel the IA function can be performed by any entity wishing to provide the service and demonstrating their ability to meet certification. In this case any number of legitimate entities can perform the IA functions. Supporters of the FM concept cite the NERC Board and the NERC SAR process that, “No commercial process be prohibited or mandated.” They note that each Control Area today serves as its own IA under the E-Tag paradigm. This allows for a potential infinite number of IAs, which should not be precluded.
- Opponents point to the potential for “too many” IAs and the risk of creating an unimplementable technical paradigm and a potential risk to reliability. They feel a single IA (or interconnection-wide IAs) would:
 - Reduce the number of actual electronic communications that need to occur between all involved parties,
 - Reduce response time between affected RA and BA entities when system emergencies arise.
 - Allow for a single vendor to deal directly with those entities developing the functionality definitions and supporting technical specifications.
 - Provide the most reliable and fully redundant system possible
 - Allow for an expedited rollout of the IA by reducing the development, testing and startup effort by centralizing on a single vendor.



New Functions/Requirements

Are the IA functions performed today? Today, *reliability* is maintained by area-to-area net schedule checkout with the understanding that transaction by transaction information is available to crosscheck the total, all the activities associated with the IA function are carried out by today’s sink control areas; the sink control area performs those responsibilities using the E-Tag system, control area scheduling systems, and the control area-to-adjacent control area checkout of Net Interchange Schedules. Others claim that all new tools and methodologies will be required to implement the IA functionality.

- Supporters of the FM concept claim that all the functions are carried out today and that the responsibility is assigned today to the sink control area (i.e. sink BA); and that the sink control area carries out those responsibilities using the current E-tag supplemented by control area to adjacent control area checkout of Net Interchange schedules. The FM does not introduce any additional functions over and above what is performed today.
- Opponents claim that the injection of an independent entity performing the IA functions will require a new level of communication and new tools and methodologies may be required to support the IA functionality



Appendix E

Interchange Authority Figure #1

