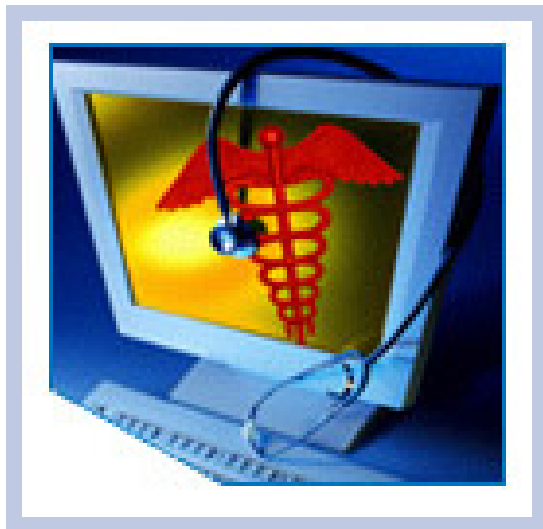


HITSP Consistent Time Transaction

HITSP/T16



Submitted to:

Healthcare Information Technology Standards Panel

Submitted by:

**Security, Privacy and Infrastructure Domain Technical Committee
(Formerly Security and Privacy Technical Committee)**



DOCUMENT CHANGE HISTORY

Version Number	Description of Change	Name of Author	Date Published
1.0	Review Copy	Security and Privacy Technical Committee	July 20, 2007
1.0.1	Review Copy	Security and Privacy Technical Committee	October 5, 2007
1.1	Released for Implementation	Security and Privacy Technical Committee	October 15, 2007
1.1.1	Review Copy	Security, Privacy and Infrastructure Domain Technical Committee	August 20, 2008
1.2	Released for Implementation	Security, Privacy and Infrastructure Domain Technical Committee	August 27, 2008



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1.0 INTRODUCTION

As an introduction to the HITSP Consistent Time Transaction, this section provides a high level overview of the information sharing scenario enabled by following this specification, provides a document map of the construct relationships for this specification, acknowledges the copyright protections that pertain, and provides a list of key reference documents and background material. If you are already familiar with this information, proceed to Section 2.0 Transaction Definition.

1.1 OVERVIEW

This section describes the contents of this specification and provides a high level definition of this Transaction and background information about the underlying Components that the Transaction is based on.

The Consistent Time Transaction provides a mechanism to ensure that all of the entities that are communicating within the network have synchronized system clocks.

1.2 TRANSACTION DOCUMENT MAP

Each HITSP specification describes how to integrate and constrain existing standards and specifications that will satisfy the requirements for the HITSP construct. There are four types of HITSP constructs called Interoperability Specifications (IS), Transaction Packages (TP), Transactions (T), and Components (C). Interoperability Specifications define the context(s) in which any other HITSP construct may be used. The current Consistent Time Transaction specification does not depend on any other HITSP constructs, however, it is used with other constructs to meet the requirements of one or more ISs. Review Section 1.2 Interoperability Specification Document Map from the relevant IS to better understand the context, dependencies, and relationships between the constructs used to meet the IS requirements.

1.3 COPYRIGHT PERMISSIONS

COPYRIGHT NOTICE

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1.4 REFERENCE DOCUMENTS

This section provides a list of key reference documents and background material. If you are already familiar with this information, proceed to Section 2.

A list of key reference documents and background material is provided in the table below. These documents can be retrieved from the hitsp.org Web Site.

Table 1.4-1 Reference Documents

Reference Document	Document Description
HITSP Interoperability Specification Overview	Provides background information about the HITSP and its role in the overall U.S. efforts to realize large scale interoperability of health information. The document also provides a description of the HITSP process for healthcare standards harmonization and explains how to use the Interoperability Specifications and other related documents to inform your health IT product development or product refinement.
HITSP Conventions List	Describes the conventions that are used to convey the full descriptions and usage of standards in the HITSP specifications
HITSP Acronyms List	Lists and defines the acronyms used in this document
HITSP Glossary	Provides definitions for relevant terms used by HITSP documents
HITSP Harmonization Framework	Describes the current framework within which the Interoperability Specifications are built
TN900 - Security and Privacy Technical Note	<p>Developed as a reference document to provide the overall context for use of the HITSP Security and Privacy constructs. It includes the following:</p> <ul style="list-style-type: none">• The scope, reference policy background, and Security and Privacy principles used in the development of the constructs• A detailed description and schematics of the conceptual relationship between the Security and Privacy constructs• A mapping of existing standards and constructs to be used in meeting the stated requirements of the AHIC Use Cases• A list of identified gaps and the recommended approaches to resolving those gaps• A roadmap for how the Security and Privacy constructs will evolve and eventually align with other HITSP Interoperability Specifications• A conceptual framework for Security and Privacy management, including reference information on privacy policies, risk assessment, and risk management• A glossary of terms used in all the Security and Privacy construct documents• A description of the application of the Security and Privacy constructs to the HITSP Interoperability Specifications for the three initial AHIC Use Cases – Biosurveillance, Electronic Health Records - Laboratory Results Reporting, and Consumer Empowerment <p>HITSP will periodically update this Technical Note as required by the introduction of new contexts for use.</p>



2.0 TRANSACTION DEFINITION

Transactions are a logical grouping of actions, including necessary content and context that must all succeed or fail as a group.

2.1 CONTEXT OVERVIEW

This section provides a general description of the Transaction. It includes a detailed definition of the Transaction and the reason for its use. It also provides all the necessary background information that further describes the context in which the Transaction is needed, and the Components or composite standards that the Transaction is based on.

The following are the requirements derived from the existing Use Cases for this Transaction:

1. Clock synchronization source is determined
2. EHR and PHR time clocks are synchronized to a predetermined source to ensure both are consistent

This HITSP Transaction references the IHE Consistent Time Integration Profile to accomplish the requirements stated above. As described in IHE ITI-TF-1 V4.0:

The text for the IHE ITI-TF-1 V4.0 begins here:

Consistent Time provides a means to ensure that the system clocks and time stamps of the many computers in a network are well synchronized. This profile specifies synchronization with a median error less than 1 second. This is sufficient for most purposes.

The Consistent Time Integration Profile defines mechanisms to synchronize the time base between multiple actors and computers. Various infrastructure, security, and acquisition profiles require use of a consistent time base on multiple computers. The Consistent Time profile requires the use of the Network Time Protocol (NTP) defined in RFC 1305. When the Time Server is grouped with a Time Client to obtain time from a higher tier Time Server, the Time Client shall utilize NTP. For some Time Clients that are not grouped with a Time Server, SNTP may be usable.

The text for the IHE ITI-TF-1 V4.0 ends here.

It is important that HITSP system clocks and time stamps are properly synchronized to assure appropriate audit, accountability and functionality of the inter-organization communications of HITSP Transactions.



2.1.1 TRANSACTION CONSTRAINTS

This section describes the constraints that limit the context in which the Transaction construct may be used. A constraint describes a rule that limits the use of the actors, actions or data within the given context, or to which the interactions must conform to be used within the described context. It is a description of the limits and scope of the interactions and can describe actions or events that are not part of the initial definition for the context.

Table 2.1.1-1 Transaction Constraints

Constraint
Network communications

2.1.2 TECHNICAL ACTORS

This section describes the technical actors that need to be integrated in order to meet the interoperability requirements for this Transaction. A Technical Actor represents an entity internal to a software application, which is engaged in one or more specific Transactions to support a specific aspect of a real world information interchange (e.g. set of message exchanges). The table below lists the technical actors involved, the relevant definition of their roles, and an indication of their requirements for the Transaction.

All Technical Actors for this Transaction are described in Appendix A of IHE ITI-TF-1 V4.0.

Table 2.1.2-1 Technical Actors

Actor	Description	Used in Component/ Composite Standard	Required = R Optional = O Conditional = C
Time Server	The text for the IHE ITI-TF-1 V4.0 begins here: 'Provides NTP time services to Time Clients. It is either directly synchronized to a UTC master clock (e.g. satellite time signal) or is synchronized by being grouped with a Time Client to other Time Server(s).'	IHE ITI-TF-1 V4.0	R
Time Client	The text for the IHE ITI-TF-1 V4.0 begins here: 'Establishes time synchronization with one or more Time Servers using the NTP protocol and either the NTP or SNTP algorithms. Maintains the local computer system clock synchronization with UTC based on synchronization with the Time Servers.'	IHE ITI-TF-1 V4.0	R

2.1.3 ACTOR INTERACTIONS

The following sections document the content of the Transaction and the basic process flows that are supported by the Transaction. It describes the underlying events that fulfill the Transaction, the sequence and timing of the events, and the specific actors involved. Process flow diagrams are provided to illustrate the process relationships.



Figure 2.1.3-1 Technical Actor Interactions

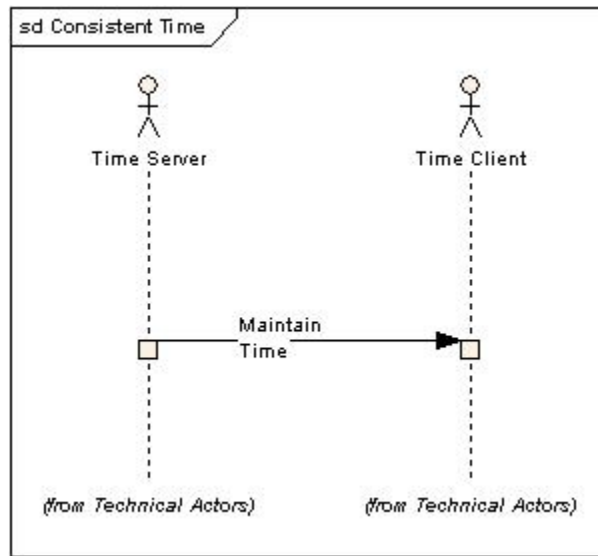


Figure 2.1.3-1 describes the interactions between the Transaction's technical actors. The time server and time client have a single interaction, which is the maintenance of time.

2.1.4 PRE-CONDITIONS

This section describes the necessary conditions that must be in place prior to the start of the workings of the Transaction. The pre-conditions are used to convey any conditions that must be true at the outset of a Transaction. They describe the context that must be established before the Transaction is executed. They are not however the triggers that initiate the Transaction. Where one or more pre-conditions are not met, the behavior of the Transaction should be considered uncertain.

Table 2.1.4-1 Pre-conditions

Pre-condition
All pre-conditions associated with this Transaction are specified in Section 3.1 of the IHE ITI-TF-2 V4.0.

2.1.4.1 Process Triggers

This section describes the process triggers, including actors and/or processes, which are necessary to start the Transaction. They can invoke an automatic or manual process or result that in turn starts off the Transaction. A process trigger is not the same as a pre-condition that describes a context that needs to be in place at the start of the event.

Table 2.1.4.1-1 Process Triggers

Process Trigger
Communication between two or more actors is required.



2.1.5 POST-CONDITIONS

This section provides an overview of the conditions or results that must occur at the end of the Transaction in order for the Transaction to be deemed successfully completed. This includes any required outputs from the Transaction, or specific actor states.

Table 2.1.5-1 Post-conditions

Post-condition
All the actors have their time appropriately synchronized.

2.1.5.1 Required Outputs

This section identifies the required outputs that must be produced at the end of the Transaction in order for the Transaction to be deemed successfully completed. This includes the format and usage of the required output.

Table 2.1.5.1-1 Required Outputs

Required Output	Format/Usage
All outputs associated with this Transaction are specified in Section 3.1 of the IHE ITI-TF-2 V4.0.	

2.1.6 DATA FLOWS

This section describes the basic data flows that are supported by this Transaction. It also describes the format of the data, the data sources, and the relevant actors involved in the successful flow of data for the Transaction. Any prevailing pre- and post-conditions are identified, as well as the purpose of each data post-condition associated with each Transaction. Any data that need to be made available to particular actors are highlighted, as well as the conditions and processes that will use the data to achieve the stated post-conditions.

All data flows associated with this Transaction are specified in Section 3.1 of the IHE ITI-TF-2 V4.0.

2.2 LIST OF HITSP CONSTRUCTS

The following list of constructs and their definitions are used by the Transaction specification.

Table 2.2-1 List of HITSP Constructs

Construct Name	Description	Event/Action Code	Content
No applicable HITSP constructs			

2.2.1 CONSTRUCT DEPENDENCIES

The following table shows a list of Components with their existing dependencies. Dependencies usually exist when there are some additional pre-requisites for a specific construct:



Table 2.2.1-1 Construct Dependencies

Construct	Depends On (Name of Component that it depends on)	Dependency Type (Pre-condition, post-condition, general)	Purpose (Reason for this dependency)
No applicable dependencies			

2.2.2 ADDITIONAL CONSTRAINTS ON REQUIRED CONSTRUCTS

This section describes the constraints that further limit the constructs that are used by this Transaction.

Table 2.2.2-1 Additional Constraints on Required Constructs

Data Element	Construct	Constraint	Constraint Type (Pre-condition, post-condition, general)	Purpose (Reason for this constraint)
No applicable constraints				

2.3 **STANDARDS**

It is important to understand that the standards selected here are within the context of the specific Use Case requirements and do not necessarily reflect selection in other contexts. The standards used by this Transaction specification fall into the following categories:

- Regulatory guidance is a legal or other authoritative declaration that HITSP must abide by in standard selection (see Section 2.3.1)
- Selected standards are necessary for interoperability. These are standards that are used to meet information exchange requirements of associated constructs. For example, they are used to realize direct information exchange, to provide the transport mechanism, to specify the content, or to address security (see Section 2.3.2)
- Informative reference standards provide additional background information or guidance, and are not required for interoperability. These standards are not required to implement the Transaction specification (see Section 2.3.3)

2.3.1 REGULATORY GUIDANCE

The following table provides a list of legal or other authoritative guidelines that HITSP must abide by, or has agreed to use as guidance in the selection of standards. Note that only the referenced sections of the regulations are relevant to this Transaction specification.

Table 2.3.1-1 Regulatory Guidance

Standard	Description
No applicable regulatory guidance	



2.3.2 SELECTED STANDARDS

The following table provides a list of standards that are used to meet information exchange requirements of the Transaction specification, and a detailed description of each standard.

Table 2.3.2-1 Selected Standards

Standard	Description
Integrating the Healthcare Enterprise (IHE) IT Infrastructure Technical Framework (ITI-TF) Revision 4.0, Consistent Time (CT) Integration Profile	The Consistent Time Integration Profile (CT) provides a means to ensure that the system clocks and time stamps of the many computers in a network are well synchronized. This profile specifies synchronization with a median error less than 1 second. This is sufficient for most purposes. The current version of the ITI-TF, rev. 4.0 for Final Text, specifies the IHE CT Integration Profile, and other transactions defined and implemented as of August 22, 2007. The latest version of the IHE Technical Framework is available at www.ihe.net
Internet Engineering Task Force (IETF) Network Time Protocol (Version 3) Specification, Implementation and Analysis, "Request for Comment" (RFC) # 1305, March, 1992	Describes the Network Time Protocol (NTP): the mechanisms to synchronize time and coordinate time distribution in a large, diverse Internet operating at rates from mundane to lightwave. For more information visit www.ietf.org
Internet Engineering Task Force (IETF) Simple Network Time Protocol (SNTP) Version 4, "Request for Comment" (RFC) # 2030, October, 1996	Describes the Simple Network Time Protocol (SNTP) Version 4, which is an adaptation of the Network Time Protocol (NTP). SNTP can be used when the ultimate performance of the full NTP implementation is not needed or justified. When operating with current and previous NTP and SNTP versions, SNTP Version 4 involves no changes to the NTP specification or known implementations, but is rather a clarification of certain design features of NTP. For more information visit www.ietf.org

2.3.3 INFORMATIVE REFERENCE STANDARDS

The following table lists standards that provide additional background information or guidance; however, they are not required for the implementation of the Transaction specification.

Table 2.3.3-1 Informative Reference Standards

Standard Name	Description/Reason for Use
No applicable informative references	



3.0 TECHNICAL IMPLEMENTATION

3.1 CONFORMANCE

This section describes the conformance criteria, which are objective statements of requirements that can be used to determine if a specific behavior, function, interface, or code set has been implemented correctly.

3.1.1 CONFORMANCE CRITERIA

In order to claim conformance to this construct specification, an implementation must satisfy all the requirements and mandatory statements listed in this specification, the associated HITSP Interoperability Specification, its associated construct specifications, as well as conformance criteria from the selected base and composite standards. A conformant system must also be constrained as specified in Table 2.1.1-1, and implement all of the required actors from Table 2.1.2-1, within the scope, subset or implementation option that is selected from the associated Interoperability Specification.

Claims of conformance may only be made for the overall HITSP Interoperability Specification with which this construct is associated.

3.1.2 CONFORMANCE SCOPING, SUBSETTING AND OPTIONS

A HITSP Interoperability Specification must be implemented in its entirety for an implementation to claim conformance to the specification. HITSP may define the permissibility for actor scoping, subsetting or implementation options by which the specification may be implemented in a limited manner. Such scoping, subsetting and options may extend to associated constructs, such as this construct. This construct must implement all requirements within the selected scope, subset or options as defined in the associated Interoperability Specification to claim conformance.



4.0 APPENDIX

The following sections include relevant materials referenced throughout this document.

No additional information at this time.



5.0 CHANGE HISTORY

The following sections provide the history of changes made to this document.

5.1 OCTOBER 5, 2007

The changes in this cycle address the following comments received during the Public Comment and Inspection Testing period (July 23, 2006 - August 17, 2007):

836, 838, 1204, 1237, 1238

The full text of the comments along with the Technical Committee's disposition can be reviewed on the HITSP Public Web Site.

5.2 OCTOBER 15, 2007

Upon approval by the HITSP Panel on October 15, 2007, this document has been moved to Version 1.1. This document is now Released for Implementation.

5.3 AUGUST 20, 2008

This document has been modified to reflect the updated HITSP approach to categorizing standards as Regulatory Guidance, Selected Standards, and Informative References. Also, IHE ITI TF Revision 3 was updated to Revision 4 and was modified to more specifically reference the Consistent Time Profile. A duplicate standard listing for IHE ITI TF was removed.

The following have been added as Selected Standards:

- Internet Engineering Task Force (IETF) Network Time Protocol (NTP) (Version 3) Specification, Implementation and Analysis, "Request for Comment" (RFC) # 1305, March, 1992
- Internet Engineering Task Force (IETF) Simple Network Time Protocol (SNTP) Version 4, "Request for Comment" (RFC) # 2030, October, 1996

5.4 AUGUST 27, 2008

Upon approval by the HITSP Panel on August 27, 2008, this document is now Released for Implementation.

