

# Mapping of Joint Technical Architecture (JTA) Version 3.1 Core Standards to Technical Reference Model (TRM) Version 1.0 Services and Interfaces

2 March 2001

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Prepared for

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Engineering and Technology Group

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MAPPING OF JOINT TECHNICAL ARCHITECTURE (JTA) VERSION 3.1  
CORE STANDARDS TO TECHNICAL REFERENCE MODEL (TRM)  
VERSION 1.0 SERVICES AND INTERFACES

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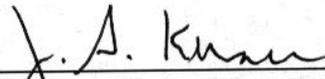
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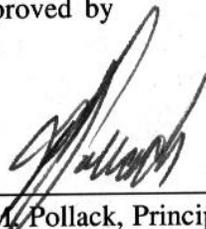
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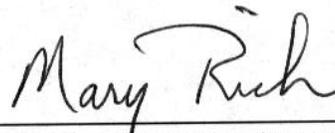
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## **1 Introduction**

According to the Department of Defense (DoD) Technical Reference Model (TRM), the purpose of the TRM is to "provide a common conceptual framework, and define a common vocabulary so that the diverse components within DoD can better coordinate acquisition, development, interoperability, and support of DoD information systems". The TRM provides a high-level representation of the information system domain showing major service areas, so that it can be used as a guideline for selecting appropriate standards for implementation and systems planning.

The TRM further points out that the model "has also been enhanced with an extensive set of interfaces to support the identification and resolution of issues where real-time and performance considerations are of importance." According to the DoD Joint Technical Architecture, "The JTA is structured into service areas based on the DoD Technical Reference Model." Because of the evolutionary nature of these two documents, developing a detailed mapping of the JTA standards to both service areas and interfaces as defined in the TRM can provide insight into ways to improve both documents in order to make them easier to understand and apply to DoD Information Technology systems. Also, a detailed mapping provides a reference correlation between the JTA standards and the TRM services and interfaces. A software developer required to implement a JTA-compliant system can utilize this correlation to determine what JTA standards are available for specific services. Finally, the principles used in developing the mapping form the basis of a valuable case study in the application of the TRM.

This document contains a mapping of the JTA core standards to the TRM services and interfaces. With some noted exceptions, all of the standards referenced in the JTA core are mapped to one or more services and/or one or more interfaces defined in the TRM, using the definitions of the services and interfaces in TRM Version 1.0. Our understanding of the definitions of the service areas and interfaces defined in the TRM has evolved as a consequence of the process of doing this mapping, but there are still some ambiguities raised and not resolved. Section 2 of this document provides a list of the principles used in performing the mapping, and a discussion of the issues that arose in interpreting the TRM in various situations. Examples are provided. Section 3 provides a description of the different forms of interfaces in the Interface View of the TRM, along with descriptions of the layers in the Interface View. Section 4 provides descriptions of the TRM Services, accompanied by examples of JTA standards mapped to the service. Section 5 is a guide to the tables that contain the mapping, followed by the mapping tables showing each standard in the JTA core mapped to TRM services and/or interfaces.

## **2 Mapping Principles and Issues**

This section describes the guidelines that evolved in the process of mapping from the JTA standards to TRM service areas and interfaces. For some standards, the authors could not determine definitively, either from the JTA write-up or from any documentation freely available about the standard, whether any services are identified in the standard, and/or whether any interfaces are specified. In these cases, the authors made a preliminary assessment based on whatever information was available.

Some of the situations encountered in mapping JTA standards to the TRM are listed below. For convenience, the situations are grouped into categories. Most of the standards fell into one of the categories described under General Cases below. The remaining subsections describe the other categories of standards, with a description of the approaches used to resolve the mapping for each.

### **2.1 General Cases**

The most straightforward mapping is when a standard clearly identifies a service described in the TRM, including both the interfaces to it and its behavior. We considered this to be the nominal case.

In this case, the standard was mapped to the appropriate TRM service area and also to a direct interface, generally 3D or 4D depending on the layer in which the service resides. In most cases, direct interfaces are provided by a service in one layer to user services in the layer above it. To illustrate, a 4D Interface is used by applications in Layer 4 to access services provided in Layer 3; a 3D Interface provides services to Layer 3 from services provided in Layer 2; and similarly for the other interfaces. However, in some situations, standards which mapped to services in the Application Platform Entity provided interfaces to other services in the same layer; those standards were mapped to the 3X Interface instead of the 4D Interface. Note: one corollary of this process is that a mapping to a direct interface cannot exist without a corresponding mapping to a service area. (Ex: 2.2.2.2.1.3 ISO/ IEC 9075-3 -1995 Information Technology - Database Languages – SQL mapped to Data Management Services and 4D Interface; 2.2.2.2.1.4.5.1.1 ANSI/SMPTE 292M-1998, Television - Bit-Serial Digital Interface for High-Definition Television Systems mapped to Physical Environment Services and 3D Interface; 2.2.2.2.1.11.2 OMG document orbos/ 98-06-01, CORBA services DCE/ CORBA Internetworking Service mapped to Distributed Computing Services and 3X Interface.)

Some of the standards mapped to two or more different services, particularly the Information Security standards and the Distributed System standards. The Information Security standards were considered to map to the Security Services, even though there may not be any actual services identified or any interfaces specified in the standard. Then, depending on the standard, there might be an additional service identified, and/or interfaces specified. Similarly, Distributed System standards were typically mapped to both Distributed Computing Services and also to whatever other service the particular standard identified. (Ex: 2.6.2.2.2.2.2 IETF RFC-1510, The Kerberos Network Authentication Service mapped to Security Services, Communication Services and 4D Interface; 2.2.3.1 ISO/IEC 9579: 1999 Information Technology – Remote Database Access for SQL mapped to Distributed Services, Data Management Services and 4D Interface.)

In general, standards that specify protocols were mapped to the Communication Services at the Application Platform Entity layer; if a standard also specifies an interface, then it was also mapped to direct interfaces, logical interfaces, or both. (Ex: 2.3.2.1.1.1.1 IETF Standard 10/ RFC-821/ RFC-1869/ RFC-1870, Simple Mail Transfer Protocol (SMTP) Service Extensions mapped to Communications Services and 4D Interface; 2.3.2.1.1.1.6 IETF RFC-951, Bootstrap Protocol mapped to Communication Services and 3L Interface; 2.3.2.1.1.1.2.2 IETF RFC- 777, Lightweight Directory Protocol (LDAP) mapped to Communication Services, and 4D and 3L Interfaces.)

## **2.2 Design Considerations**

Some JTA standards do not identify any services defined in the TRM, nor specify any direct or logical interfaces. Rather, these standards specify processes, procedures, and/or guidelines for a person to follow in designing a system. We mapped this type of standard to what we tentatively refer to as Design Considerations. The main example of this type of standard is a user's or programmer's guide. Most of the standards that were mapped to Design Considerations were not also mapped to any TRM service areas or interfaces, but there were some exceptions: there were some multi-volume standards, where some volumes identified a service and/or interface, and another specified guidelines or procedures; also, some of the standards from JTA Section 2.6 (Security Standards) specified programmer guidelines, although they were considered to map to security services. This kind of standard was mapped to Design Considerations in addition to whatever other mapping was appropriate. Suggestions for other ways of dealing with these JTA standards are solicited. (Ex: 2.2.2.2.1.2 M021 CDE 2.1/ Motif 2.1 User's Guide mapped to Design Considerations; 2.3.2.1.1.1.1 IETF RFCs 2045-2049, Multipurpose Internet Mail Extensions (MIME) mapped to Communication Services, Design Considerations, and 4L Interface; 2.6.2.3.1.1 FIPS-PUB 140-1, Security Requirements for Cryptographic Modules mapped to Security Services and Design Considerations.)

## 2.3 Data and Data Formats

Standards that specify data formats are mapped to logical interfaces because they specify the format to be used for the exchange of information, usually between services in the same layer. In the case of human-readable formats, there may be no relationships specified in the standard between services, but they were still mapped to the 4L Interface. (Ex: 2.3.2.1.1.1.8.2 IETF RFC-1738, Uniform Resource Locators mapped to the 4L Interface; 2.4.2.5.2.2 MIL-STD-6040, United States Message Text Format (USMTF), mapped to the 4L Interface.)

In some cases, the standard specifies a data format whose purpose is included in the description of a service in the TRM, even though the standard does not specify any behavior. In these cases, the relevant TRM service area is cited, even though there are no direct interfaces specified. (Ex: 2.3.2.1.1.1.2.1 ITU-T X.500, The Directory -Overview of Concepts, Models, and Services - Data Communication Networks Directory mapped to Communication Services and 4L Interface; 2.6.2.3.1.1.2 MIL-STD-2045-48501, Common Security Label mapped to Security Services and 3L Interface.)

Standards that specified data content were mapped to the 4L Interface because this seemed like the closest fit, since the data format was also specified. A special case of that type of standard are standards that specify character sets. These standards were mapped only to the 4L Interface, since they specify a format for the representation of characters, even though, in the JTA, they are listed under a TRM service area such as Internationalization. (Ex: 2.2.2.2.1.4.3 FIPS PUB 10-4, Countries, Dependencies, Areas of Special Sovereignty, and Their Principal Administrative Division mapped to the 4L Interface; 2.2.2.2.1.8 ANSI/ISO 8859-1:1987, Information Processing – 8- Bit Single Byte Coded Character Sets, Part 1: Latin Alphabet No. 1 mapped to the 4L Interface.)

## 2.4 Other Cases

Standards that only specify algorithms are considered to map to logical interfaces because no services or direct interfaces were specified in the standard. (Ex: 2.2.2.2.1.4.4 MIL-STD-188-196, Bi-Level Image Compression for the National Imagery Transmission Format Standard mapped to the 4L Interface)

Standards that specify communication transmission formats, such as those in JTA Section 2.3.2.3, also identify Communication Infrastructure services. Since the standard specifies the interface to the communications link itself, not the data transmitted across it, it was mapped to the External Environment Entity. This type of standard also mapped to an associated 1D Interface. (Ex: 2.3.2.3.1.1.1 MIL-STD-188-181B, Interoperability Standard for Single Access 5-kHz and 25-kHz UHF Satellite Communications Channels mapped to External Environment Entity and 1D Interface.)

The Java Virtual Machine allows applications to run on a variety of platforms without the need to rewrite or recompile the application. The standard that specifies the Java Virtual Machine was mapped to the Software Engineering Services because it describes a platform that enables Java applications to run on any computer without rewriting or recompiling; and to the 3X Interface because it contains a description of the interfaces required for compiled bytecode to invoke the JVM services.(Ex: 2.2.3.4.2 Java Virtual Machine (JVM) mapped to the Software Engineering Services and the 3X Interface)

## 3 Description of TRM Interfaces and Layers

This section contains descriptions excerpted from the TRM Version 1.0 of the different forms of interfaces and layers in the Interface View of the TRM. The individual mappings for each of the

standards in the JTA core contain abbreviated descriptions of the relevant TRM interfaces and layers for reference.

### **3.1 Interfaces**

Direct Interface is the specification among hierarchical entities that supports the physical transfer of information (objects, data, parameters, status, and control) among those entities.

Logical Interface is the specification among peer entities that supports the understanding necessary for sharing of information (objects, data, parameters, status, and control) among those entities, and can be independent of the exchange transport mechanisms and media between them.

### **3.2 Interface View Layers**

Layer 4 is the highest hierarchical layer and is termed the Applications Software layer. This layer corresponds to the DoD TRM [Services View] Application Software entity.

Layer 3 is the top software isolation layer directly below the Software Applications layer and is termed the System Services layer.

Layer 2 is also an isolation layer and is termed the Resource Access Services layer. It is composed of low level services or functional entities, typically referred to as “device or hardware function drivers,” which abstract hardware entity details from layer 3.

Layer 1 is the lowest hierarchical layer and is termed the Physical Resources layer. It may be composed of just hardware entities, but could also include firmware and very low level software.

Layer 1, Layer 2, and Layer 3 form the Application Platform or “host” for Layer 4 Applications software, in the DoD TRM [Services View].

## **4 Description of TRM Services**

Following are excerpts from the TRM Version 1.0 which describe the TRM Services cited in this mapping. The description of the services has been tailored for the standards listed in the JTA, and examples of the JTA standards that map to each service are cited. Complete descriptions for these services can be found in the TRM.

### **4.1 Application Software Entity**

The TRM decomposes the Application Software Entity level into Mission Area Applications and Software Support Applications. The Software Support Applications consist of a common set of support applications that form the basis for the development of mission-area applications. Mission-area applications are designed and developed to access this common set of support applications.

The following sections describe Software Support Application services.

#### **4.1.1 Communications Services**

Communications services provide the capability to send, receive, forward, and manage electronic and voice messages. They also provide real-time information exchange services in support of interpersonal conferences. The standards in the JTA that identify this type of services include organizational-messaging services and videoconferencing services from Section 2.3 Information Transfer Standards.

### **4.1.2 Environment Management Services**

Environment management services integrate and manage the execution of platform services for particular applications and users. They include transaction-processing services which are used to support the online capture and processing of information in an interactive exchange with the user. Transaction services may include support for distribution of transactions to a combination of local and remote processors. The only standard in the JTA that identifies this type of services is the CORBA services Transaction Service Specification from Section 2.2 Information Processing Standards.

### **4.1.3 Database Utilities**

Database utility services provide the capability to retrieve, organize, and manipulate data extracted from a database management system. These common services provide a consistent interface to the user while providing access to a variety of databases. The only standard in the JTA that identifies this type of services is the Trusted Database Management System Interpretation from Section 2.6 Information Security Standards.

### **4.1.4 Engineering Support**

Engineering support services include support for analysis, design, modeling, development, and simulation for a wide variety of users and environments. The standards in the JTA that identify this type of services include modeling standards from Section 2.4 Information Modeling, Metadata and Information Exchange Standards.

## **4.2 Application Platform Entity**

The application platform is defined as the set of resources that support the services on which application software will execute. It provides services at its interfaces that, as much as possible, make the implementation-specific characteristics of the platform transparent to the application software.

The following sections describe Application Platform services.

### **4.2.1 Software Engineering Services**

Professional system developers require tools appropriate to the development and maintenance of applications. Bindings and object code linking provide the ability for programs to access the underlying application and operating system platform through [application program interfaces] (APIs) that have been defined independently of the computer language. Programming tools may use procedural or object-oriented languages to define the functionality of the desired applications. These services include remote-access services and object services. The only standards in the JTA that identify this type of services are the Binary Floating Point Arithmetic standard and the Java Virtual Machine Standard from Section 2.2 Information Processing Standards.

### **4.2.2 User Interface Services**

User interface services define how users may interact with an application. They provide a consistent way for people who develop, administer, and use a system to gain access to applications programs, operating systems, and various system utilities. The user interface is a combination of menus, screen design, keyboard commands, command language, and help screens, which create the way a user interacts with a computer. The standards in the JTA that identify this type of services include the window management standards from Section 2.2 Information Processing Standards.

### **4.2.3 Data Management Services**

Central to most systems is the management of data that can be defined independently of the processes that create or use it, maintained indefinitely, and shared among many processes. Data management services include data-dictionary/directory services and database management system services. The standards in the JTA that identify this type of services include the relational database management languages from Section 2.2 Information Processing Standards.

### **4.2.4 Data Interchange Services**

Data interchange services provide specialized support for the interchange of information between applications and to/from the external environment. These services are designed to handle data interchange between applications on the same platform and applications on different (heterogeneous) platforms. These standards include document interchange services that support specifications for encoding the data (e.g., text, pictures, numerics, special characters) and both the logical and visual structures of electronic documents. The only standard in the JTA that identifies this type of services is the Resource Description Framework (RDF) Model and Syntax Specification from Section 2.2 Information Processing Standards.

### **4.2.5 Graphics Services**

Graphics services provide functions required for creating and manipulating pictures. Device interfaces provide [application program interface] (API) services for accessing graphics devices, such as monitors, scanners and printers. The only standard in the JTA that identifies this type of services was the OpenGL standard from Section 2.2 Information Processing Standards.

### **4.2.6 Communications Services**

Communications services are provided to support distributed applications requiring data access and applications interoperability in networked environments. Application services are the functions and interfaces that reside on the underlying network and communications system protocol software and are used by applications. Transport services perform a variety of functions concerned primarily with the end-to-end transmission of data across a network and end-to-end reliability. Subnetwork technologies services support access to local area networks (LANs) and other networks based on the physical, data link, and network layers of the OSI Reference Model. The standards in the JTA that identify this type of services include the communication protocols from Section 2.3 Information Transfer Standards.

### **4.2.7 Security Services**

Multilevel security cuts across all aspects of the system and adds an additional complexity to the hardware and software that interacts with the rest of the system. It includes services for authentication, access control, integrity, confidentiality, non-repudiation, system management and security labeling . The standards in the JTA that identify this type services include the Department of Defense Trusted Computer System Evaluation Criteria from Section 2.6 Information Security Standards.

### **4.2.8 System Management Service**

Information systems are composed of a wide variety of diverse resources that must be managed effectively to achieve the goals of an open system environment. While the individual resources may differ, the abstraction of these resources as managed objects allows for treatment in a uniform manner. The basic concepts of management, including operation, administration, and maintenance, may then be applied to the full suite of Open Systems Environment components along with their

attendant services. The standards in the JTA that identify this type of services include the network management protocols from Section 2.3 Information Transfer Standards.

#### **4.2.9 Distributed Computing Services**

Distributed-computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. These services include remote-access services and object services. The standards in the JTA that identify this type of services include the Common Object Request Broker Architecture standards from Section 2.2 Information Processing Standards.

#### **4.2.10 Operating System Services**

Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. These services include clock/calendar services, real-time extension services, thread services, shell and utility services and fault management services. The standards in the JTA that identify this type of services include Portable Operating System Interface (POSIX) standards from Section 2.2 Information Processing Standards.

#### **4.2.11 Physical Environment Services**

Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. The standards in the JTA that identify this type of services include the low level communication protocols from Section 2.3 Information Transfer Standards.

### **4.3 External Environment Entity**

#### **4.3.1 Network**

The External Environment Entity represents the external entities with which the application platform exchanges information. Networks include telephone lines, local area networks, cabling, and packet-switching equipment. The standards in the JTA that identify this type of services include the ATM Physical Layer Specifications from Section 2.3 Information Transfer Standards.

## **5 Mapping from JTA Standards to TRM Services and Interfaces**

The mapping consists of tables with an entry (row) for each JTA standard. The contents of the columns in the table (with the titles in bold) are described below.

**JTA Section & Service Area:** The first entry contains the JTA section number and service area name listed in the JTA. If none is listed, the standard belongs to the same section number and service area as the standard immediately preceding it.

**Currently Mandated Standard or Emerging Standard:** The second entry contains the name of the standard listed in the JTA. Note that in each section of the JTA core, all the mandated standards are listed first, followed by all the emerging standards. The mapping duplicates the organization of the JTA in this regard. The title of the column indicates if the standard is mandated or emerging.

**TRM Mapping:** The third entry contains a mapping of the standard to TRM services, TRM interfaces, and/or Design Considerations.

**Mapping Justification:** The fourth entry contains the rationale for the mapping, based on the description of the standard, which is listed in the Notes column. The methodology used to decide the mapping is described earlier in Section 2.

**Notes:** The fifth entry contains a description of the standard followed by an abbreviated description of the TRM service(s)/interface(s) to which the standard was mapped. The description of the standard is copied verbatim either from the JTA or from information on the World Wide Web. The source of the description is identified in brackets. For instance, the use of [JTA] indicates that the source is from the JTA, while the use of [<http://www.opengroup.org/publications/catalog/m027.htm>] indicates a URL from the World Wide Web. Where the description of the services/interfaces from the TRM Version 1.0 is included, it is identified by [TRM].

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area          | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|-------------------------------------|--|--|--|--|
| 2.2.2.2.1.2 User Interface Services | C507, Window Management (X11R5), X-Window System Protocol, X/ Open CAE Specification, April 1995.              | Application Platform Entity - User Interface Services and 3L Interface | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 3L Interface because it provides a description and definition of the X Protocol. | <ul style="list-style-type: none"> <li>• This document contains a description and definition of the X Protocol. [<a href="http://www.opengroup.org/pubs/catalog/c507.htm#">http://www.opengroup.org/pubs/catalog/c507.htm#</a>]</li> <li>• Graphical client-server operations define the relationships between client and server processes operating within a network, in particular, graphical user interface display processes. In this case, the program that controls each display unit is a server process, while independent user programs are client processes that request display services from the server. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                                     | C508, Window Management (X11R5): Xlib – C Language Binding, X/ Open CAE Specification, April 1995              | Application Platform Entity - User Interface Services and 4D Interface | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it provides programmatic interfaces to the X Protocol.      | <ul style="list-style-type: none"> <li>• This specification defines the programmatic interface to the X Window core protocol; it does not attempt to define the format and semantics of the protocol itself. [<a href="http://www.opengroup.org/pubs/catalog/c508.htm">http://www.opengroup.org/pubs/catalog/c508.htm</a>]</li> <li>• Graphical client-server operations define the relationships between client and server processes operating within a network, in particular, graphical user interface display processes. In this case, the program that controls each display unit is a server process, while independent user programs are client processes that request display services from the server. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>                          |
|                                     | C509, Window Management (X11R5): X Toolkit Intrinsic, X/ Open CAE Specification, April 1995                    | Application Platform Entity - User Interface Services and 4D Interface | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it contains a description of the X Toolkit functions.       | <ul style="list-style-type: none"> <li>• This specification contains a description of X Toolkit functions and their use. [<a href="http://www.opengroup.org/pubs/catalog/c509.htm">http://www.opengroup.org/pubs/catalog/c509.htm</a>]</li> <li>• Graphical client-server operations define the relationships between client and server processes operating within a network, in particular, graphical user interface display processes. In this case, the program that controls each display unit is a server process, while independent user programs are client processes that request display services from the server. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |
|                                     | C510, Window Management (X11R5): File Formats & Application Conventions, X/ Open CAE Specification, April 1995 | Application Platform Entity - User Interface Services and 3L Interface | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 3L Interface because it contains specification for file formats.                 | <ul style="list-style-type: none"> <li>• This specification covers the various formats and conventions for application cooperation and communication. [<a href="http://www.opengroup.org/publications/catalog/c510.htm">http://www.opengroup.org/publications/catalog/c510.htm</a>]</li> <li>• Graphical client-server operations define the relationships between client and server processes operating within a network, in particular, graphical user interface display processes. In this case, the program that controls each display unit is a server process, while independent user programs are client processes that request display services from the server. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|----------------------------|--|--|--|---|
|                            | M021: CDE 2.1/ Motif 2.1 User's Guide, ISBN 1-85912-173-X, October 1997.                           | Design Considerations  | This standard maps to the Design Considerations because it describes the basic features of Motif and the Common Desktop Environment.   | <ul style="list-style-type: none"> <li>This guide describes the basic features of both the Motif user environment and the Common Desktop Environment. It explains how a user interacts with these features...<br/>[http://www.opengroup.org/publications/catalog/m021.htm]</li> </ul>   |
|                            | M027: CDE 2.1/ Motif 2.1 – Style Guide and Glossary, ISBN 1-85912-104-7, October 1997.             | Design Considerations  | This standard maps to the Design Considerations because it provides developers with a framework of behavior specifications applicable to user interfaces.  | <ul style="list-style-type: none"> <li>This guide provides developers who design and implement new products with a framework of behavior specifications that is consistent with the Motif and Common Desktop Environment (CDE) user interface. This behavior is established by drawing out the common elements from a variety of current behavioral models.<br/>[http://www.opengroup.org/publications/catalog/m027.htm]</li> </ul>   |
|                            | M028: CDE 2.1/ Motif 2.1 – Style guide Certification Check List, ISBN 1-85912-109-8, October 1997. | Design Considerations  | This standard maps to the Design Considerations because it contains a checklist for evaluating application software for a consistent desktop style.  | <ul style="list-style-type: none"> <li>This document is a supplement to the CDE 2.1/Motif 2.1 - Style Guide and Glossary and the CDE 2.1/Motif 2.1 - Style Guide Reference. It provides detailed checklists for the style guidelines covered in its two companion volumes, allowing developers to evaluate their products for consistent Desktop style.<br/>[http://www.opengroup.org/publications/catalog/m028.htm]</li> </ul>   |
|                            | M029: CDE 2.1/ Motif 2.1 – Style Guide Reference, ISBN 1-85912-114-4, October 1997.                | Design Considerations  | This standard maps to the Design Considerations because it presents desktop style guidelines for developers to use when implementing user interfaces.  | <ul style="list-style-type: none"> <li>This reference volume is a supplement to the CDE 2.1/Motif 2.1 - Style Guide and Glossary. It presents a complete set of specific Desktop style guidelines for the new product developer.<br/>[http://www.opengroup.org/publications/catalog/m029.htm]</li> </ul>  |
|                            | M213: Motif 2.1 – Programmer's Guide, ISBN- 1-85912-134-9, October 1997.                           | Design Considerations  | This standard maps to the Design Considerations because it provides an overview of the architecture of the Motif widget set.   | <ul style="list-style-type: none"> <li>This document explains how to use the Motif application programming interface to create Motif applications. It provides an overview of the architecture of the Motif widget set, explains features of the Motif toolkit, and presents a model and examples for constructing Motif applications.<br/>[http://www.opengroup.org/publications/catalog/m213.htm]</li> </ul>  |
|                            | M214A: Motif 2.1 – Programmer's Reference, Volume 1, ISBN 1-85912-119-5, October 1997.             | Application Platform Entity - User Interface Services and 4D Interface | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it provides programmatic interfaces to Motif. | <ul style="list-style-type: none"> <li>Volume 1 of 3 volumes providing detailed reference descriptions of all Motif programs, Xt widget classes, Xm widget classes, translations, Xm data types and functions, Mrm functions, Uil functions, and file formats.<br/>[http://www.opengroup.org/publications/catalog/m214a.htm]</li> <li>Window management specifications, which define how windows are created, moved, stored, retrieved, removed, and are related to each other. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | M214B: Motif 2.1 – Programmer's Reference, Volume 2, ISBN 1-85912-124-1, October 1997.             | Application Platform Entity - User Interface Services and 4D Interface | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it provides programmatic interfaces to Motif. | <ul style="list-style-type: none"> <li>Volume 2 of 3 volumes providing detailed reference descriptions of all Motif programs, Xt widget classes, Xm widget classes, translations, Xm data types and functions, Mrm functions, Uil functions, and file formats.<br/>[http://www.opengroup.org/publications/catalog/m214b.htm]</li> <li>Window management specifications, which define how windows are created, moved, stored, retrieved, removed, and are related to each other. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area            | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|---------------------------------------|--|---|---|--|
|                                       | M214C: Motif 2.1 – Programmer's Reference, Volume 3, ISBN 1-85912-164-0, October 1997.   | Application Platform Entity - User Interface Services and 4D Interface  | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it provides programmatic interfaces to Motif.                          | <ul style="list-style-type: none"> <li>Volume 3 of 3 volumes providing detailed reference descriptions of all Motif programs, Xt widget classes, Xm widget classes, translations, Xm data types and functions, Mrm functions, Uil functions, and file formats. [http://www.opengroup.org/publications/catalog/m214c.htm ]</li> <li>Window management specifications, which define how windows are created, moved, stored, retrieved, removed, and are related to each other. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                                       | Win32 APIs, Window Management and Graphics Device Interface, Volume 1 Microsoft Win32 Programmers Reference Manual, 1993 or later, Microsoft Press                   | Application Platform Entity - User Interface Services and 4D Interface  | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it provides programmatic interfaces to Win32.                          | <ul style="list-style-type: none"> <li>The following standard is mandated for use with operating systems running (or intended to run) Win32 Applications [TRM]</li> <li>Window management specifications, which define how windows are created, moved, stored, retrieved, removed, and are related to each other. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.2.2.2.1. 3 Data Management Services | ISO/ IEC 9075: 1992, Information Technology - Database Language - SQL, as modified by FIPS PUB 127- 2: 1993, Database Language for Relational DBMS (Entry Level SQL) | Application Platform Entity - Data Management Services and 4D Interface | This standard maps to the Data Management Services because it describes a database management language. This standard maps to the 4D Interface because it provides the ability to retrieve information from an RDBMS using SQL. | <ul style="list-style-type: none"> <li>These services support the definition, storage, and retrieval of data elements from Database Management Systems (DBMSs). [JTA]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. ... DBMS services are accessible through a programming language interface, an interactive data manipulation language interface such as SQL, or an interactive/fourth-generation language interface. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                                       | ISO/ IEC 9075- 3 - 1995 Information Technology - Database Languages - SQL - Part 3: Call- Level Interface (SQL/ CLI)   | Application Platform Entity - Data Management Services and 4D Interface | This standard maps to the Data Management Services because it describes a database management language. This standard maps to the 4D Interface because the TRM defines API's to be 4D Interfaces.                               | <ul style="list-style-type: none"> <li>The SQL/Call Level Interface (CLI) addendum to the SQL standard provides a standard CLI between database application clients and database servers. The following API is mandated for both database application clients and database servers. [JTA]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. ... DBMS services are accessible through a programming language interface, an interactive data manipulation language interface such as SQL, or an interactive/fourth-generation language interface. [TRM]</li> <li>The API is defined as the interface between the application software and the application platform across which all services are provided. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area                   | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|--|--|--------------|--|---|
| 2.2.2.2.1. 4.1<br>Document Interchange       | ISO 8879: 1986, Standard Generalized Markup Language (SGML), with Amendment 1, 1988  | 4L Interface | This standard maps to the 4L Interface because it describes the rules for applying a system of markup tags.  | <ul style="list-style-type: none"> <li>• SGML is a meta-language, providing the rules for designing and applying a system of markup tags rather than the specific set of tags. [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | HTML 4.0 Specification, W3C Recommendation, revised 24- Apr- 1998, Rec- html40- 19980424.                                  | 4L Interface | This standard maps to the 4L Interface because it contains a specification for representing structural, presentational, and semantic information in combination with the contents of the document. | <ul style="list-style-type: none"> <li>• For hypertext documents intended to be interchanged via the Web or made available via organizational intranets .... [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | Extensible Markup Language (XML) 1.0 W3C Recommendation, 10 February 1998. Reference: REC- xml- 19980210,                  | 4L Interface | This standard maps to the 4L Interface because it is used to describe markup languages.  | <ul style="list-style-type: none"> <li>• The eXtensible Markup Language (XML) is a meta-language, based on SGML, for describing languages based on name-attribute tuples. [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
| 2.2.2.2.1.4.2<br>Graphics Data Interchange   | JPEG File Interchange Format (JFIF), Version 1.02, C- Cubed Microsystems.  | 4L Interface | This standard is used to specify the format for picture/graphic files. This standard maps to the 4L Interface because it's used as a format to exchange graphics data.                             | <ul style="list-style-type: none"> <li>• Graphics Interchange Format (GIF) and JFIF are de facto standards for exchanging graphics and images over an internet.[JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | PNG (Portable Network Graphics) Specification, W3C Recommendation, REC- png. html <http:// www. w3.org/ TR/ REC- png. htm> | 4L Interface | This standard is used to specify the format for raster images. This standard maps to the 4L Interface because it's used as a format to exchange raster images                                      | <ul style="list-style-type: none"> <li>• Portable Network Graphics (PNG) is an extensible file format for the lossless, portable, well-compressed storage of a raster image. Indexed-color, grayscale, and truecolour images are supported, plus an optional alpha channel for transparency. [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | Graphics Interchange Format (GIF), Version 89a, 31 July 1990, CompuServe Incorporated                                      | 4L Interface | This standard is used to specify the format for picture/graphic files. This standard maps to the 4L Interface because it's used as a format to exchange graphics data.                             | <ul style="list-style-type: none"> <li>• Graphics Interchange Format (GIF) and JFIF are de facto standards for exchanging graphics and images over an internet.[JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.2.2.2.1.4.3<br>Geospatial Data Interchange | MIL- STD- 2411, Raster Product Format (RPF), 6 October 1994, with Notice of Change 1, 17 January 1995                      | 4L Interface | This standard is used to specify the format for raster data. This standard maps to the 4L Interface because it's used as a common format to exchange raster data.                                  | <ul style="list-style-type: none"> <li>• The Raster product Format (RPF) is a standard data structure for geospatial databases composed of rectangular arrays of pixel values (e.g. in digitized maps or images) in compressed or uncompressed form. RPF is intended to enable application software to use the data in RPF format on computer-readable interchange media directly without further manipulations or transformation. ... The RPF is intended to define a common format for interchange of raster data between producers of such data in DoD and users of the data. [http://164.214.2.59/publications/specs/printed/2411/2411_RPF.pdf]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area                    | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|---|--|--------------|--|--|
|   | MIL- STD- 2407, Interface Standard for Vector Product Format (VPF), 28 June 1996   | 4L Interface | This standard is used to specify the format for geographic data objects. This standard maps to the 4L Interface because it's used as a common format to exchange data objects in large geographic databases. | <ul style="list-style-type: none"> <li>Vector Product Format (VPF) defines a common format, structure, and organization for data objects in large geographic databases based on a georelational data model and intended for direct use. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|   | MIL- STD- 2401, Department of Defense World Geodetic System (WGS- 84), 11 January 1994   | 4L Interface | This standard maps to the 4L Interface because it specifies the requirements for the World Geodetic System.  | <ul style="list-style-type: none"> <li>This standard specifies the requirements for use of World Geodetic System 1984 (WGS 84) , the defining and derived parameters for WGS 84, and methods for transforming between WGS 84 and other geodetic systems. ... A world geodetic system is a consistent global coordinate system which allows an unambiguous representation of positional information. [http://astimage.daps.dla.mil/docimages/0000\14\81\113328.PD3]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|   | FIPS PUB 10- 4, Countries, Dependencies, Areas of Special Sovereignty, and Their Principal Administrative Divisions, April 1995  | 4L Interface | This standard contains a list of data. This standard maps to the 4L Interface.   | <ul style="list-style-type: none"> <li>This Standard provides a list of the basic geopolitical entities in the world, together with the principal divisions that comprise each entity. [http://www.itl.nist.gov/fipspubs/fip10-4.htm#FORE_SEC]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
| 2.2.2.2.1. 4.4 Still Imagery Data Interchange | MIL- STD- 2500B, National Imagery Transmission Format (Version 2.1) for the National Imagery Transmission Format Standard, 22 August 1997 with Notice 1, 2 October 1998. An additional document, titled "CHANGE SUMMARY NITF2.0 to NITF2.1," 28 Jan 97, describes the changes and additions (including the Y2K fix) made to this standard. | 4L Interface | This standard maps to the 4L Interface because it describes the file format for exchange of imagery data.  | <ul style="list-style-type: none"> <li>This standard establishes the requirements for the file format component of the National Imagery Transmission Format Standard (NITFS). The file format described in this document is called the National Imagery Transmission Format (NITF). The NITFS is a collection of related standards and specifications developed to provide a foundation for interoperability in the dissemination of imagery and imagery associated data among different computer systems. [http://astimage.daps.dla.mil/docimages/0001\64\15\2500B.PD7]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------|---|--------------|---|--|
|                            | MIL- STD- 188- 196, Bi-Level Image Compression for the National Imagery Transmission Format Standard, 18 June 1993; with Notice 1, 27 June 1996.  | 4L Interface | This standard maps to the 4L Interface because it describes a compression algorithm for use with the NITFS systems.     | <ul style="list-style-type: none"> <li>• This standard establishes the requirements to be met by NITFS systems when image Data are compressed using the bi-level facsimile compression specified by the International Telecommunications Union (ITU) International Telegraph and Telephone Consultative Committee (CCITT) Recommendation T.4 and MIL-STD-188-161C for Group 3 facsimile devices. ... This standard provides technical detail of the NITFS compression algorithm designated by the code C1 in the image compression field of the image subheader for bi-level images or overlays. [<a href="http://astimage.daps.dla.mil/docimages/0000\14\80\112960.PD9">http://astimage.daps.dla.mil/docimages/0000\14\80\112960.PD9</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |
|                            | MIL- STD- 188- 199, Vector Quantization Decompression for the National Imagery Transmission Format Standard, 27 June 1994; with Notice 1, 27 June 1996.   | 4L Interface | This standard maps to the 4L Interface because it describes a compression algorithm for use with the NITFS systems.     | <ul style="list-style-type: none"> <li>• The following standards are mandated for imagery product dissemination. [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | ISO/ IEC 8632: 1992 Computer Graphics Metafile (CGM) for the Storage and Transfer of Picture Description Information, as profiled by MIL- STD- 2301A, Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard, 5 June 1998 | 4L Interface | This standard maps to the 4L Interface because it describes a format for the storage and exchange of 2D graphical data. | <ul style="list-style-type: none"> <li>• The Computer Graphics Metafile (CGM) is the International Standard for storage and exchange of 2D graphical data. [<a href="http://www.agocg.ac.uk/CGM.html">http://www.agocg.ac.uk/CGM.html</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area      | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|---------------------------------|--|--------------|--|---|
|                                 | ISO/IEC 10918- 1: 1994, Joint Photographic Experts Group (JPEG), as profiled in MIL- STD-188- 198A, Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard, 15 December 1993; with Notice 1, 12 October 1994 and Notice 2, 14 March 1997. | 4L Interface | This standard maps to the 4L Interface because it describes a compression algorithm for use with graphic images.                           | <ul style="list-style-type: none"> <li>A JPEG (pronounced JAY-peg) is a graphic image created by choosing from a range of compression qualities (actually, from one of a suite of compression algorithm). [<a href="http://www.whatis.com/Whats_Definition_Page/0,4152,212425,00.html">http://www.whatis.com/Whats_Definition_Page/0,4152,212425,00.html</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
| 2.2.2.2.1.4.5.1.1 Video Imagery | ITU- R BT. 601- 4, Encoding Parameters of Digital Television for Studios, 1994   | 3L Interface | This standard maps to the 3L Interface because it describes encoding parameters such as compressing conversions for digital television.    | <ul style="list-style-type: none"> <li>For video-imagery distribution and compression, ITU-R BT.601-4 Component (4:2:2) shall be used for baseband (uncompressed) video signal waveforms and for the transitional sampling structure, compressing conversions, and processing of standard definition digital video. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                                 | ISO/IEC 13818- 1: 1996 Information Technology - Generic Coding of Moving Pictures and Associated Audio Information - Part 1: Systems (MPEG- 2); 1996, with Amendment 1: 1997.  | 4L Interface | This standard maps to the 4L Interface because it describes a compression profile for use with standard and high-definition video imagery. | <ul style="list-style-type: none"> <li>ISO/IEC 13818, commonly known as MPEG-2, supports the compression profile for both standard and high-definition compression video imagery. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                                 | ISO/IEC 13818- 2; 1996 Information Technology - Generic Coding of Moving Pictures and Associated Audio Information - Part Information - Part 2: Video (MPEG- 2); 1996, with Amendment 1: 1997 and Amendment 2: 1997.   | 4L Interface | This standard maps to the 4L Interface because it describes a compression profile for use with standard and high-definition video imagery. | <ul style="list-style-type: none"> <li>ISO/IEC 13818, commonly known as MPEG-2, supports the compression profile for both standard and high-definition compression video imagery. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                                 | ISO/IEC 13818- 4; 1996 Information Technology - Generic Coding of Moving Pictures and Associated Audio Information - Part 4: Conformance testing; 1996.  | 4L Interface | This standard maps to the 4L Interface because it describes a compression profile for use with standard and high-definition video imagery. | <ul style="list-style-type: none"> <li>ISO/IEC 13818, commonly known as MPEG-2, supports the compression profile for both standard and high-definition compression video imagery. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|---|--|--|--|
|                            | ANSI/ SMPTE 12M-1998, Time and Control Code for Video and Audio Tape for 525 Line/ 60 Field Television Systems.           | 3L Interface   | This standard maps to the 3L Interface because it describes the code used to synchronize the picture with the sound for use with video tape technology.  | <ul style="list-style-type: none"> <li>SMPTE is a time code synchronization protocol originally developed for use in the television and motion picture industry to deal with video tape technology. [http://www.etconnect.com/html/service_smpte.html]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ANSI/ SMPTE 309M-1998, Transmission of Date and Time Zone Information in Binary Groups of Time and Control Code.          | 3L Interface   | This standard maps to 3L Interface because it provides a common encoding method for date and time representation.  | <ul style="list-style-type: none"> <li>This standard specifies a coding technique for the transmission of date and time zone information in the user groups of a time and control code signal. [http://www.smpte.org/stds/stscope.html]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | ANSI/ SMPTE 259M-1997, Television - 10 bit 4: 2: 2 Component (Serial Digital Interface).                                  | Application Platform Entity – Physical Environment Services and 3D Interface | This standard maps to the Physical Environment Services because it applies to digital television equipment. This standard maps to the 3D Interface because this standard describes a serial digital interface system for digital television. | <ul style="list-style-type: none"> <li>This standard describes a serial digital interface system M (525/60) digital television equipment operating with either 4:2:2 component signals or 4fsc NTSC composite digital signals. [http://www.smpte.org/stds/stscope.html]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | ANSI/ SMPTE 292M-1998, Television - Bit-Serial Digital Interface for High- Definition Television Systems                  | Application Platform Entity – Physical Environment Services and 3D Interface | This standard maps to the Physical Environment Services because it applies to digital television equipment. This standard maps to the 3D Interface because it describes a coaxial and fiber optic interface for HDTV component signals.      | <ul style="list-style-type: none"> <li>This standard defines a bit-serial digital coaxial and fiber-optic interface for HDTV component signals operating at data rates in the range of 1.3 Gb/s to 1.5 Gb/s. [http://www.smpte.org/stds/stscope.html]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>                   |
|                            | ANSI/ SMPTE 293M-1996, Television - 720 x 483 Active Line at 59.94-Hz Progressive Scan Production- Digital Representation | 3L Interface   | This standard maps to the 3L Interface because it defines the digital representation of stationary or moving two-dimensional images.   | <ul style="list-style-type: none"> <li>This standard defines the digital representation of stationary or moving two-dimensional images for television production. The representation is sampled linearly in the spatial domain and sampled temporally at a constant frame rate. [http://www.smpte.org/stds/stscope.html]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ANSI/ SMPTE 296M-1997, Television – 1270 x 720 Scanning, Analog and Digital Representation and Analog Interface           | 3L Interface   | This standard maps to the 3L Interface because it defines a raster representation of stationary or moving two-dimensional images.  | <ul style="list-style-type: none"> <li>This standard defines a family of raster scanning systems for the representation of stationary or moving two-dimensional images sampled temporally at a constant frame rate and having an image format of 1280 x 720 and an aspect ratio of 16:9 ... [http://www.smpte.org/stds/stscope.html]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area      | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|---------------------------------|--|--------------|--|--|
|                                 | ANSI/ SMPTE 274M-1995, Television -1920 x 1080 Scanning and Interface  | 3L Interface | This standard maps to the 3L Interface because it defines a raster representation of stationary or moving two-dimensional images.          | <ul style="list-style-type: none"> <li>This standard defines a family of raster-scanning systems for the representation of stationary or moving two-dimensional images sampled temporally at a constant frame rate and having an image format of 1920 x 1080 and an aspect ratio of 16:...<br/>[http://www.smpete.org/stds/stscope.html]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.2.2.2.1.4.5.1.4 Video Support | ISO/ IEC 11172- 1: 1993, Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1. 5 Mbits/ s – Part1: Systems, 1993; with Technical Corrigendum 1, 1995 | 4L Interface | This standard maps to the 4L Interface because it describes a video compression algorithm for use with CD-ROM data transfers.              | <ul style="list-style-type: none"> <li>MPEG-1 is an open international standard for video compression that has been optimized for single- and double-speed CD-ROM data transfer rates. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                                 | ISO/ IEC 11172- 2: 1993, Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbits/ s - Part2 Video, 1993   | 4L Interface | This standard maps to the 4L Interface because it describes a video compression algorithm for use with CD-ROM data transfers.              | <ul style="list-style-type: none"> <li>MPEG-1 is an open international standard for video compression that has been optimized for single- and double-speed CD-ROM data transfer rates. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                                 | ISO/ IEC 13818- 1: 1996, Information technology – Generic Coding of Moving Pictures and Associated Audio Information – Part 1: Systems (MPEG- 2), 1996 with Amendment 1: 1997.                                     | 4L Interface | This standard maps to the 4L Interface because it describes a compression profile for use with standard and high-definition video imagery. | <ul style="list-style-type: none"> <li>ISO/IEC 13818, commonly known as MPEG-2, supports the compression profile for both standard and high-definition compression video imagery. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                                 | ISO/ IEC 13818- 2: 1996 – Generic Coding of Moving Pictures and Associated Audio Information – Part 2: Video (MPEG- 2), 1996; with Amendment 1: 1997 and Amendment 2: 1997, Information technology                 | 4L Interface | This standard maps to the 4L Interface because it describes a compression profile for use with standard and high-definition video imagery. | <ul style="list-style-type: none"> <li>ISO/IEC 13818, commonly known as MPEG-2, supports the compression profile for both standard and high-definition compression video imagery. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area                   | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|--|--|--------------|---|---|
| 2.2.2.2.1.4.6<br>Audio Data Interchange      | ISO/ IEC 11172- 1: 1993, Information Technology – Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mb/s – Part 1: Systems, 1993; with Technical Corrigendum 1: 1995.                            | 4L Interface | This standard maps to the 4L Interface because it describes a video compression algorithm for use with CD-ROM data transfers.                               | <ul style="list-style-type: none"> <li>MPEG-1 is an open international standard for video compression that has been optimized for single- and double-speed CD-ROM data transfer rates. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | ISO/ IEC 11172- 3: 1993, Information Technology – Encoding of moving pictures and associated audio for digital storage media at up to about 1.5 Mb/s – Part 3 (Audio Layer- 3 only); with Technical Corrigendum 1: 1996.                   | 4L Interface | This standard maps to the 4L Interface because it describes a video compression algorithm for use with CD-ROM data transfers.                               | <ul style="list-style-type: none"> <li>MPEG-1 is an open international standard for video compression that has been optimized for single- and double-speed CD-ROM data transfer rates. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.2.2.2.1.4.6.1.1<br>Audio for Video Imagery | ANSI S4.40- 1992/ AES3- 1992, AES (Audio Engineering Society) Recommended Practice for Digital Audio Engineering - Serial transmission format for two- channel linearly represented digital audio data, 1992 (reaffirmed and amended 1997) | 2L Interface | This standard maps to the 2L interface because it provides the format for the digital transmission of audio signals on a single shielded twisted wire pair. | <ul style="list-style-type: none"> <li>The format provides for the serial digital transmission of two channels of periodically sampled and uniformly quantized audio signals on a single shielded twisted wire pair. [<a href="http://www.aes.org/standards/reports/AES-STANDARDS-IN-PRINT.html">http://www.aes.org/standards/reports/AES-STANDARDS-IN-PRINT.html</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|  | ISO/ IEC 13818- 3: 1995, Information technology - Generic coding of moving pictures and associated audio information, with Amendment 1: 1996. Used for compressed digital audio systems, MPEG- 2 Part 3: Audio                             | 4L Interface | This standard maps to the 4L Interface because it describes a compression profile for use with standard and high-definition video imagery.                  | <ul style="list-style-type: none"> <li>ISO/IEC 13818, commonly known as MPEG-2, supports the compression profile for both standard and high-definition compression video imagery. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area                                      | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|---|---|--------------|---|---|
| 2.2.2.2.1.4.6.1.4<br>Audio for Video Support                    | ISO/ IEC 11172- 3: 1993, Information technology - Encoding of moving pictures and associated audio for digital storage media at up to about 1.5 Megabits per second (Mbit/ s) - Part 3 (Audio Layer- 3 only); with Technical Corrigendum 1: 1996. | 4L Interface | This standard maps to the 4L Interface because it describes a video compression algorithm for use with CD-ROM data transfers.                             | <ul style="list-style-type: none"> <li>MPEG-1 is an open international standard for video compression that has been optimized for single- and double-speed CD-ROM data transfer rates. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.2.2.2.1.4.7<br>Multimedia Data Interchange                    | ISO 9660: 1988, Information processing - Volume and file structure of CD- ROM for information interchange   | 2L Interface | This standard maps to the 2L Interface because it describes the volume and file structure of CD-ROM technology.   | <ul style="list-style-type: none"> <li>MIL-HDBK-9660B, 1 September 1997, provides additional guidance in the use of Compact Disc-Read Only Memory (CD-ROM) technology. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>   |
| 2.2.2.2.1.4.8<br>Atmospheric and Oceanographic Data Interchange | FM 92- X Ext. GRIB WMO No. 306, Manual on Codes, International Codes, Volume 1.2 (Annex II to WMO Technical Regulations) Parts B and C  | 4L Interface | This standard is a bit oriented exchange format for gridded data. This standard maps to the 4L Interface because it specifies a format for data exchange. | <ul style="list-style-type: none"> <li>The World Meteorological Organization (WMO) Commission for Basic Systems (CBS) Extraordinary Meeting Number VIII (1985) approved a general purpose, bit-oriented data exchange format, designated FM 92-VIII Ext. GRIB (GRIdded Binary). [<a href="http://www.wmo.ch/web/www/reports/Guide-binary-2.html">http://www.wmo.ch/web/www/reports/Guide-binary-2.html</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
|   | FM 94- X Ext. BUFR WMO No. 306, Manual on Codes, International Codes, Volume 1.2 (Annex II to WMO Technical Regulations) Parts B and C  | 4L Interface | This standard maps to the 4L Interfaces because it specifies a format for data exchange.  | <ul style="list-style-type: none"> <li>Besides being used for the transfer of data, BUFR is used as an online storage format and as a data-archiving format. A BUFR record (message) containing observational data of any sort also contains a complete description of what those data are [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area                      | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|---|--|--|---|--|
| 2.2.2.2.1.4.9<br>Time- of- Day Data Interchange | ITU- R Recommendation TF. 460- 4, Standard-frequency and Time-signal Emissions, International Telecommunications Union, July 1986  | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides a method of maintaining an accurate account of time. This standard maps to the 4D, 3X Interface because it is used for the exchange of time-of-day information between applications and platforms.      | <ul style="list-style-type: none"> <li>Coordinated Universal Time (UTC), traceable to UTC (USNO) maintained by the U.S. Naval Observatory (USNO), shall be used for time-of-day information exchanged among DoD systems. [JTA]</li> <li>Clock/calendar services provide mechanisms for measuring the passage of time and maintaining the system time. This includes clocks and timers, real-time timers, and distributed timing services. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.2.2.2.1.5<br>Graphic Services                 | ANSI/ ISO/ IEC 9636- 1,2, 3,4,5,6: 1991 (R1997), Information Technology- Computer Graphics- Interfacing (CGI) Techniques for Dialogue with Graphics Devices                        | Design Considerations  | This standard maps to the Design Considerations because it specifies design requirements for encodings of CGI.  | <ul style="list-style-type: none"> <li>ISO/IEC 9636 established the conceptual model, functional capability, and minimum conformance requirements of the Computer Graphics Interface (CGI). It specifies design requirements for encodings of the CGI. This part of ISO/IEC 9636 gives an overview of ISO/IEC 9636, explains the relationship between its parts and their relation to other standards, describes a reference model for graphics systems, and defines certain Foundation Constituency Profiles. ISO/IEC 9636-2, ISO/IEC 9636-3, ISO/IEC 9636-4, ISO/IEC 9636-5 and ISO/IEC 9636-6 specify the CGI functions for different functional areas using an abstract notation.<br/>[<a href="http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9636%2D1%2D1991+%28R1997%29">http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9636%2D1%2D1991+%28R1997%29</a>]</li> </ul> |
|   | The OpenGL Graphics System: A Specification (Version 1.1) 25 June 1996   | Application Platform Entity- Graphics Services and 4D Interface              | This standard maps to the Graphic Services because it provides the capability to create and manipulate graphics images. This standard maps to the 4D Interface because it specifies the procedures and functions that allow a programmer to interface to the graphics hardware. | <ul style="list-style-type: none"> <li>OpenGL is a software interface to graphics hardware. The interface consists of a set of several hundred procedures and functions that allow a programmer to specify the objects and operations involved in producing high quality graphical images<br/>[<a href="ftp://sgigate.sgi.com/pub/opengl/doc/opengl1.2/opengl1.2.pdf">ftp://sgigate.sgi.com/pub/opengl/doc/opengl1.2/opengl1.2.pdf</a>]</li> <li>Graphics services provide functions required for creating and manipulating pictures. Device interfaces provide API services for accessing graphics devices, such as monitors, scanners and printers. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.2.2.2.1.7<br>Operating System Services        | ISO/ IEC 9945- 1: 1996, Information Technology - Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) [C language] (Mandated Services) | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides the core services required to operate a computer platform. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.  | <ul style="list-style-type: none"> <li>These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|--|--|---|---|
|                            | ISO/ IEC 9945- 1: 1996:( Real- time Extensions) to ISO/ IEC 9945- 1: 1996, Information Technology – Portable Operating System Interface (POSIX)- Part 1: System Application Program Interface (API) [C language] (Real- time Optional Services)  | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides real-time services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.         | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | ISO/ IEC 9945- 1: 1996: (Thread Extensions) to ISO/ IEC 9945- 1: 1996, Information Technology – Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) [C language] (Thread Optional Services)   | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides thread services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.            | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Thread services provide an underlying service used for multiple concurrent executions within a single computer process. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | ISO/ IEC 9945- 2: 1993, Information Technology – Portable Operating System Interface (POSIX) – Part 2: Shell and Utilities, as profiled by FIPS PUB 189: 1994, Information Technology - Portable Operating System Interface (POSIX) – Recommendations (Section 12) and Implementation Guidance (Section 13). | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides shell and utility services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Shell and utilities include mechanisms for services at the operator level, such as comparing, printing, and displaying file contents; editing files; searching patterns; evaluating expressions; logging messages; moving files between directories; sorting data; executing command scripts; scheduling signal execution processes; and accessing environment information. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|---|--|---|---|
|                            | IEEE 1003.2d: 1994, POSIX - Part 2: Shell and Utilities – Amendment: Batch Environment  | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides shell and utility services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Shell and utilities include mechanisms for services at the operator level, such as comparing, printing, and displaying file contents; editing files; searching patterns; evaluating expressions; logging messages; moving files between directories; sorting data; executing command scripts; scheduling signal execution processes; and accessing environment information. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | ISO/ IEC 14519: 1999, Information Technology – POSIX Ada Language Interfaces - Binding for System Application Program Interface (API) – Realtime Extensions.                                      | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provide real-time services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.          | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | IEEE 1003.5g: 1999, IEEE Standard for Information Technology - POSIX Ada Language Interfaces – Part 1: Binding for System Application Program Interface (API) - Amendment g: Realtime Extensions. | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provide real-time services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.          | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | IEEE 1003.13: IEEE Standard for Information technology – Standardization Applications Environment Profile – POSIX Realtime Application Program Interface (API).                                   | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provide real-time services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.          | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area                 | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|--|--|---|---|--|
|  | IEEE 1003.5b: 1996, IEEE Standard for Information Technology - POSIX Ada Language Interfaces – Part 1: Binding for System Application Programming Interface (API) - Amendment 1: Real-time Extensions (Incorporates IEEE 1003.5: 1992) | Application Platform Entity - Operating System Services and 4D, 3X Interface  | This standard maps to the Operating System Services because it provides real-time services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>• These core services are necessary to operate and administer a computer platform and to support the operation of application software. They include kernel operations, shell, and utilities. [JTA]</li> <li>• Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>   |
|  | Win32 APIs, Window Management and Graphics Device Interface, Volume 1 Microsoft Win32 Programmers Reference Manual, 1993 or later, Microsoft Press   | Application Platform Entity - User Interface Services and 4D Interface        | This standard maps to the User Interface Services because it applies to graphics based windowing systems. This standard maps to the 4D Interface because it provides programmatic interfaces to Win32.                                  | <ul style="list-style-type: none"> <li>• The following standard is mandated for use with operating systems running (or intended to run) Win32 Applications [TRM]</li> <li>• Window management specifications, which define how windows are created, moved, stored, retrieved, removed, and are related to each other. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.2.2.2.1.8 International ization Services | ANSI/ ISO 8859- 1: 1987, Information Processing – 8- Bit Single Byte Coded Character Sets, Part 1: Latin Alphabet No. 1  | 4L Interface  | Although the TRM provides a service for internationalization, this standard maps to the 4L Interface because it specifies a format for a character set.   | <ul style="list-style-type: none"> <li>• This part of ISO 8859 specifies a set of 191 graphic characters identified as Latin alphabet [<a href="http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO+8859%2D1%2D1987">http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO+8859%2D1%2D1987</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | ISO/ IEC 10646- 1: 1993, Information Technology - Universal Multiple- Octet Coded Character Set (UCS), Part 1: Architecture and Basic Multilingual Plane with Technical Corrigendum 1: 1996  | 4L Interface  | Although the TRM provides a service for internationalization, this standard maps to the 4L Interface because it specifies a format for a character set.   | <ul style="list-style-type: none"> <li>• In order to interchange text information between systems, it is fundamental that systems agree on the character representation of textual data. The following character set coding standards, which build upon the ASCII character set, are mandated for the interchange ... 16-bit textual information [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
| 2.2.2.2.1.11.1 Remote- Procedure Computing | C310, DCE 1.1: Time Services Specification, X/ Open CAE Specification, November 1994   | Application Platform Entity - Distributed Computing Services and 4D Interface | This standard maps to the Distributed Computing Services because it provides a distributed time service. This standard maps to the 4D Interface because it describes interfaces to the DCE time services.                               | <ul style="list-style-type: none"> <li>• This document specifies the Distributed Time Service (DTS) time representations, RPC interfaces to the DTS, and application programming interfaces to the DTS. The purpose of this document is to provide a portability guide for DTS application programs and a conformance specification for DTS implementations. [<a href="http://www.opengroup.org/pubs/catalog/c310.htm">http://www.opengroup.org/pubs/catalog/c310.htm</a>]</li> <li>• Distributed-computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------|--|--|---|--|
|                            | C311, DCE 1.1: Authentication and Security Services, Open Group CAE Specification, August 1997 | Application Platform Entity - Distributed Computing Services and Application Platform Entity - Security Services and 4D Interface        | This standard maps to the Distributed Computing Services because it applies to distributed computing. This standard maps to the Security Services because it specifies DCE security services. This standard maps to the 4D Interface because it describes interfaces to the DCE security services.      | <ul style="list-style-type: none"> <li>This document specifies the DCE security model, services, interfaces and protocols. Its purpose is to provide a portability guide for security programs and a conformance specification for DCE implementations. It is written for security application programmers and developers of DCE security implementations [<a href="http://www.opengroup.org/pubs/catalog/c311.htm">http://www.opengroup.org/pubs/catalog/c311.htm</a>]</li> <li>Distributed-computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. [TRM]</li> <li>Multilevel security cuts across all aspects of the system and adds an additional complexity to the hardware and software that interacts with the rest of the system. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | C705, DCE 1.1: Directory Services, Open Group CAE Specification, August 1997                   | Application Platform Entity – Distributed Computing Services and Application Platform Entity – Data Management Services and 4D Interface | This standard maps to the Distributed Computing Services because it describes DCE directory services. This standard maps to the Data Management Services because it describes directory services. This standard maps to the 4D Interface because it describes interfaces to the DCE directory services. | <ul style="list-style-type: none"> <li>This document specifies the Directory Services, using the concepts of global name space and cell name space. It defines application programming interfaces based on the Directory Services (XDS) interface (C317), OSI-Abstract-Data Manipulation (XOM) (C315) and Federated Naming: the XNF Specification (P403). It also defines the Global Directory Service and Cell Directory Service. This document provides a portability guide to application programs using Directory Services and a conformance specification for implementation. [<a href="http://www.opengroup.org/pubs/catalog/c705.htm">http://www.opengroup.org/pubs/catalog/c705.htm</a>]</li> <li>Distributed-computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. [TRM]</li> <li>Data-dictionary/directory services, which allow data administrators and information engineers to access and modify data about data (i.e., metadata). [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | C706, DCE 1.1: Remote Procedure Call, Open Group CAE Specification, August 1997                | Application Platform Entity - Distributed Computing Services and 4D Interface  | This standard maps to the Distributed Computing Services because it describes services for remote computing. This standard maps to the 4D Interface because it describes interfaces to the RPC services.  | <ul style="list-style-type: none"> <li>This document specifies Remote Procedure Call (RPC) services, interface, protocols, encoding rules and the Interface Definition Language (IDL). The purpose of this document is to provide a portability guide for RPC application programs and a conformance specification for RPC implementations. [<a href="http://www.opengroup.org/publications/catalog/c706.htm">http://www.opengroup.org/publications/catalog/c706.htm</a>]</li> <li>Remote-Access Services provide location transparency functionality for distributed-computing services, allowing users and client processes to access appropriate systems resources (files, data, processes) without regard to the location of either. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area                     | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|--|--|--|---|--|
| 2.2.2.2.1.11.2<br>Distributed-Object Computing | OMG document formal/ 98- 12- 01, Common Object Request Broker: Architecture and Specification, Version 2.3, June 1999. | Design Considerations  | This standard maps to the Design Considerations because It contains the architecture and specification for the Object Request Broker.   | <ul style="list-style-type: none"> <li>The architecture and specifications described in this manual are aimed at software designers and developers who want to produce applications that comply with OMG standards for the Object Request Broker (ORB). [<a href="http://ftp.omg.org/pub/docs/formal/98-12-01.pdf">ftp://ftp.omg.org/pub/docs/formal/98-12-01.pdf</a>]</li> </ul>  |
|  | OMG document formal/ 97- 12- 10, CORBA services Naming Service Specification, March 1995                               | Application Platform Entity – Distributed Computing Services and 3X Interface  | This standard maps to the Distributed Computing Services because it describes a naming services for use in an object based environment. This standard maps to the 3X Interface because it contains operations and objects to be used to interface to the naming service.  | <ul style="list-style-type: none"> <li>This specification addresses the issues identified for a name service in the OMG <i>Object Services Architecture</i> document [<a href="http://ftp.omg.org/pub/docs/formal/97-12-10.pdf">ftp://ftp.omg.org/pub/docs/formal/97-12-10.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|  | OMG document formal/ 97- 12- 11, CORBA services Event Service Specification, March 1995                                | Application Platform Entity - Distributed Computing Services and 3X Interface  | This standard maps to the Distributed Computing Services because it describes event generation and handling services for use in an object based environment. This standard maps to the 3X Interface because it describes interfaces to the CORBA event service.   | <ul style="list-style-type: none"> <li>This specification addresses the issues identified for event services in the OMG <i>Object Services Architecture</i> 1 document as follows:<br/>Distributed environment ... Event generation ... Events involving multiple objects ... Scoping, grouping, and filtering events ... Registration and generation of events ... Event parameters ... Forgery and secure events ... Performance ... Formalized Event Information ... Confirmation of Reception [<a href="http://ftp.omg.org/pub/docs/formal/97-12-11.pdf">ftp://ftp.omg.org/pub/docs/formal/97-12-11.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|  | OMG document formal/ 97- 12- 17, CORBA services Transaction Service Specification, November 1997                       | Application Software Entity – Environment Management and Application Platform Entity - Distributed Computing Services and 4D, 3X Interface | This standard maps to the Distributed Computing Services because it describes a transaction service for use in an object based environment. This standard maps to the Environment Management because it describes a transaction service. This standard maps to the 4D, 3X Interface because it describes interfaces to the CORBA transaction service. | <ul style="list-style-type: none"> <li>The Transaction Service described in this specification brings the transaction paradigm, essential to developing reliable distributed applications, and the object paradigm, key to productivity and quality in application development, together to address the business problems of commercial transaction processing. ... The Transaction Service supports the concept of a transaction. [<a href="http://ftp.omg.org/pub/docs/formal/97-12-17.pdf">ftp://ftp.omg.org/pub/docs/formal/97-12-17.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Transaction-processing services provide support for the online capture and processing of information in an interactive exchange with the user. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes  |
|----------------------------|--|---|--|--|
|                            | OMG document formal/ 97- 12- 21, CORBA services Time Service Specification, July 1997            | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes a time service for use in an object based environment. This standard maps to the 3X Interface because it describes interfaces to the CORBA time service.       | <ul style="list-style-type: none"> <li>The requirements explicitly stated in the RFP ask for a service that enables the user to obtain current time together with an error estimate associated with it. [<a href="ftp://ftp.omg.org/pub/docs/formal/97-12-21.pdf">ftp://ftp.omg.org/pub/docs/formal/97-12-21.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | OMG document formal/ 97- 12- 23, CORBA services Trading Object Service Specification, March 1997 | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes a trading service for use in an object based environment. This standard maps to the 3X Interface because it describes interfaces to the CORBA trading service. | <ul style="list-style-type: none"> <li>The OMG trading object service facilitates the offering and the discovery of instances of services of particular types. A trader is an object that supports the trading object service in a distributed environment. It can be viewed as an object through which other objects can advertise their capabilities and match their needs against advertised capabilities. [<a href="ftp://ftp.omg.org/pub/docs/formal/97-12-23.pdf">ftp://ftp.omg.org/pub/docs/formal/97-12-23.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | OMG document orbos/ 98- 06- 01, CORBA services DCE/ CORBA Internetworking Service                | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because CORBA provides distributed computing capabilities. This standard maps to the 3X Interface because it specifies the interfaces to be used between DCE users and CORBA.       | <ul style="list-style-type: none"> <li>For DCE users that need to interwork with CORBA [JTA]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | OMG document orbos/ 97- 09- 06, COM/ CORBA Part B, Internetworking, November 19, 1997.           | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because CORBA provides distributed computing capabilities. This standard maps to the 3X Interface because it specifies the interfaces to be used between COM users and CORBA.       | <ul style="list-style-type: none"> <li>For COM users that need to interwork with CORBA [JTA]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | OMG document orbos/ 97- 09- 07, COM/ CORBA Part A Revision, November 19, 1997.                   | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because CORBA provides distributed computing capabilities. This standard maps to the 3X Interface because it specifies the interfaces to be used between COM users and CORBA.       | <ul style="list-style-type: none"> <li>For COM users that need to interwork with CORBA [JTA]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|----------------------------|---|---|---|---|
| 2.2.3.1<br>Data Management | ISO/ IEC DIS 9075- 1<br>Information technology – Database languages – SQL – Part 1: Framework (SQL/ Framework).           | Design Considerations   | This standard maps to the Design Considerations because it contains the framework specifications for SQL.   | <ul style="list-style-type: none"> <li>The emerging SQL3 specification contains a number of data abstraction facilities, including user-defined data types and methods. The emerging SQL3 specification also contains facilities for defining and referencing object identifiers. Lastly, the emerging SQL3 specification supports knowledge-based data management and remote data access capabilities. [JTA]</li> </ul>  |
|                            | ISO/ IEC DIS 9075- 2<br>Information technology – Database languages – SQL – Part 2: Foundation (SQL/Foundation).          | Design Considerations   | This standard maps to the Design Considerations because it contains the foundation specifications for SQL.  | <ul style="list-style-type: none"> <li>The emerging SQL3 specification contains a number of data abstraction facilities, including user-defined data types and methods. The emerging SQL3 specification also contains facilities for defining and referencing object identifiers. Lastly, the emerging SQL3 specification supports knowledge-based data management and remote data access capabilities. [JTA]</li> </ul>  |
|                            | ISO/ IEC DIS 9075- 3<br>Information technology – Database languages – SQL – Part 3: Call Level Interface (for SQL3).      | Application Platform Entity - Data Management Services and 4D Interface | This standard maps to the Data Management Services because it specifies the SQL database management language. This standard maps to the 4D Interface because it specifies the procedures and structures for application programmers to use in order to include SQL functionality in their applications. | <ul style="list-style-type: none"> <li>Defines the structures and procedures that may be used to execute statements of the database language SQL from within an application written in a standard programming language in such a way that procedures used are independent of the SQL statements to be executed. [<a href="http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9075%2D3%2D1999">http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9075%2D3%2D1999</a>]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. ... DBMS services are accessible through a programming language interface, an interactive data manipulation language interface such as SQL, or an interactive/fourth-generation language interface. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | ISO/ IEC DIS 9075- 4<br>Information technology – Database languages – SQL – Part 4: Persistent Stored Modules (SQL/ PSM). | Application Platform Entity - Data Management Services and 4D Interface | This standard maps to the Data Management Services because it specifies the SQL database management language. This standard maps to the 4D Interface because it contains syntax and semantics for declaring persistent database language routines for use by SQL server modules.                        | <ul style="list-style-type: none"> <li>Specifies the syntax and semantics of a database language for declaring and maintaining persistent database language routines in SQL-server modules. [<a href="http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9075%2D4%2D1999">http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9075%2D4%2D1999</a>]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. ... DBMS services are accessible through a programming language interface, an interactive data manipulation language interface such as SQL, or an interactive/fourth-generation language interface.[TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|---|---|--|---|
|                            | ISO/ IEC DIS 9075- 5<br>Information technology –<br>Database languages –<br>SQL – Part 5: Host<br>Language Bindings (SQL/<br>Bindings).       | Application Platform<br>Entity - Data<br>Management<br>Services<br>and<br>4D Interface  | This standard maps to the Data Management Services because it specifies the SQL database management language. This standard maps to the 4D Interface because it describes language bindings.   | <ul style="list-style-type: none"> <li>This part of ISO/IEC 9075 specifies: Syntax for embedding SQL- statements in a compilation unit that otherwise conforms to the standard for a particular programming language (host language). [<a href="http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9075%2D5%2D1999">http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9075%2D5%2D1999</a>]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. ... DBMS services are accessible through a programming language interface, an interactive data manipulation language interface such as SQL, or an interactive/fourth-generation language interface.[TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | ISO/ IEC DIS 9075- 10<br>Information technology –<br>Database languages –<br>SQL – Part 10: Object<br>Language Bindings (SQL/<br>OLB).        | Application Platform<br>Entity - Data<br>Management<br>Services<br>and<br>4D Interface  | This standard maps to the Data Management Services because it specifies the SQL database management language. This standard maps to the 4D Interface because it describes the facilities in SQL3 for defining and using object identifiers.  | <ul style="list-style-type: none"> <li>The emerging SQL3 specification also contains facilities for defining and referencing object identifiers. [JTA]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. ... DBMS services are accessible through a programming language interface, an interactive data manipulation language interface such as SQL, or an interactive/fourth-generation language interface.[TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | ISO/ IEC DIS 13249- 3<br>Information Technology –<br>Database languages –<br>SQL Multimedia and<br>Application Packages –<br>Part 3: Spatial. | 3L Interface  | This standard maps to the 3L Interface because it specifies SQL abstract data type definitions.  | <ul style="list-style-type: none"> <li>SQL Multimedia (SQL/MM) is a set of extensions to the SQL3 specification and will specify packages of SQL abstract data type (ADT) definitions using the facilities for ADT specification and invocation provided in the SQL3 specification. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ISO/ IEC 9579: 1999<br>Information Technology –<br>Remote Database Access<br>for SQL.   | Application Platform<br>Entity - Data<br>Management<br>Services<br>and<br>Application Platform<br>Entity – Distributed<br>Computing Services<br>and<br>4D Interface | This standard maps to the Data Management Services because it describes data management functions. This standard maps to the Distributed Computing Services because it applies to remote access services, specifically remote database access. This standard maps to the 4D Interface because it specifies communication protocols to use in order to access a database server in a distributed environment. | <ul style="list-style-type: none"> <li>Specifies the functionality of a database server within a distributed open systems environment and specifies the communication service and protocol for accessing its capabilities. [<a href="http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9579%2D2%2D1993">http://webstore.ansi.org/product_external.asp?sku=ANSI%2FISO%2FIEC+9579%2D2%2D1993</a>]</li> <li>Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. To manage the data, the DBMS provides concurrency control and facilities to combine data from different schemas. Facilities may also include the capability to manage data in a distributed computing environment where data are stored on multiple, heterogeneous platforms. [TRM]</li> <li>Remote-Access Services provide location transparency functionality for distributed-computing services, allowing users and client processes to access appropriate systems resources (files, data, processes) without regard to the location of either. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area     | Emerging Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|--------------------------------|---|--|---|---|
|                                | The Object Database Standard: ODMG 2.0, Edited by R. G. G. Cattell et al. The Morgan Kaufmann Series in Data Management, 1997, ISBN 1- 55860- 463- 4.   | Application Platform Entity - Data Management Services and 4D Interface      | This standard maps to the Data Management Services because it describes data management functions. This standard maps to the 4D Interface because it specifies an interface for use with object databases.  | <ul style="list-style-type: none"> <li>• ODMG 2.0 provides for object databases what SQL provided for relational databases by ensuring the portability of applications across platforms and products. The goal of the standard is to combine programming languages and database systems into a single environment, providing better performance and more powerful representation for complex database applications. [<a href="http://www.mkp.com/books_catalog/catalog.asp?ISBN=1-55860-463-4#Contents">http://www.mkp.com/books_catalog/catalog.asp?ISBN=1-55860-463-4#Contents</a>]</li> <li>• Database management system services, which provide data administration, managed objects functionality, and controlled access to, and modification of, structured data. To manage the data, the DBMS provides concurrency control and facilities to combine data from different schemas. Facilities may also include the capability to manage data in a distributed computing environment where data are stored on multiple, heterogeneous platforms. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |
| 2.2.3.2.1 Document Interchange | XHTML™ 1.0: The Extensible HyperText Markup Language: A Reformulation of HTML 4.0 in XML 1.0, W3C Working Draft 5th May 1999 < <a href="http://www.w3.org/TR/1999/xhtml1-19990505">http:// www. w3. org/ TR/ 1999/ xhtml1- 19990505</a> > | 4L Interface   | This standard is a specification for a document mark-up language that's compatible with XML (Extensible Markup Language). This standard maps to the 4L Interface because it is a specification for representing structural, presentational, and semantic information in combination with the contents of a document.  | <ul style="list-style-type: none"> <li>• This specification defines XHTML 1.0, a reformulation of HTML 4.0 as an XML 1.0 application, and three DTDs corresponding to the ones defined by HTML 4.0. ... A DTD, or document type definition, is a collection of XML declarations that, as a collection, defines the legal structure, elements, and attributes that are available for use in a document that complies to the DTD. [<a href="http://www.w3.org/TR/1999/xhtml1-19990505#dtds">http://www.w3.org/TR/1999/xhtml1-19990505#dtds</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                                | Resource Description Framework (RDF) Model and Syntax Specification, REC- rdf- syntax- 19990222 < <a href="http://www.w3.org/TR/1999/REC-rdf-syntax-19990222">http:// www. w3. org/ TR/ 1999/ REC- rdf- syntax- 19990222</a> >            | Application Platform Entity – Data Interchange Services and 4D, 3L Interface | This standard maps to the Data Interchange Services because it applies to document interchange. This standard maps to the 4D Interface because it contains a syntax for encoding and transporting RDF metadata. This standard maps to the 3L interface because it defines resources, resource properties and the relationships between resource properties. | <ul style="list-style-type: none"> <li>• Resource Description Framework (RDF) is a foundation for processing metadata; it provides interoperability between applications that exchange machine-understandable information on the Web. ... This document introduces a model for representing RDF metadata as well as a syntax for encoding and transporting this metadata in a manner that maximizes the interoperability of independently developed Web servers and clients [<a href="http://www.w3.org/TR/1999/REC-rdf-syntax-19990222#xhtml">http://www.w3.org/TR/1999/REC-rdf-syntax-19990222#xhtml</a>]</li> <li>• Document interchange services are supported by specifications for encoding the data (e.g., text, pictures, numerics, special characters) and both the logical and visual structures of electronic documents. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>   |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area                       | Emerging Standard   | TRM Mapping           | Mapping Justification  | Notes  |
|--|---|-----------------------|--|--|
|  | Resource Description Framework (RDF) Schema Specification, W3C Recommendation PR- rdf- schema- 19990303 ( <a href="http://www.w3.org/TR/1999/PR-rdf-schema-19990303">http:// www. w3. org/ TR/ 1999/ PR- rdf- schema- 19990303</a> ). | Design Considerations | This standard maps to Design Considerations because it specifies a language for describing RDF schema's.   | <ul style="list-style-type: none"> <li>This document does not specify a vocabulary of descriptive elements such as "author". Instead, it specifies the mechanisms needed to define such elements, to define the classes of resources they may be used with, to restrict possible combinations of classes and relationships, and to detect violations of those restrictions. Thus, this document defines a schema specification language. More succinctly, the RDF Schema mechanism provides a basic type system for use in RDF models. It defines resources and properties such as Class and subClassOf that are used in specifying application-specific schemas. [<a href="http://www.w3.org/TR/1999/PR-rdf-schema-19990303/#refs">http://www.w3.org/TR/1999/PR-rdf-schema-19990303/#refs</a>]</li> </ul> |
| 2.2.3.2.2.1<br>Virtual Reality Modeling Language | ISO/ IEC 14772- 1: 1998, Information technology – Computer graphics and image processing - The Virtual Reality Modeling Language - Part 1: Functional specification and UTF- 8 encoding   | 4L Interface          | This standard maps to the 4L Interface because it describes a common language for specifying 3D world description and WWW hyper-links (e.g. an analog of HTML for virtual reality) | <ul style="list-style-type: none"> <li>The Virtual Reality Modeling Language (VRML) is a language for describing multi-participant interactive simulations -- virtual worlds networked via the global Internet and hyper-linked with the World Wide Web. All aspects of virtual world display, interaction and internetworking can be specified using VRML. [<a href="http://www.web3d.org/Specifications/VRML1.0/#Introduction">http://www.web3d.org/Specifications/VRML1.0/#Introduction</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.2.3.2.3<br>Geospatial Data Interchange         | DIGEST Digital Geographic Information Exchange Standard (DIGEST): Edition 2.0, June 1997  | 4L Interface          | This standard maps to the 4L Interface because it describes information required to support the exchange of geospatial data.   | <ul style="list-style-type: none"> <li>The Digital Geographic Information Working Group (DGIWG) has developed the Digital Geographic Information Exchange Standard (DIGEST) to support the exchange of geospatial data among producers and users. [<a href="http://www.digest.org/documents/DIGEST_Tech_Paper.doc">http://www.digest.org/documents/DIGEST_Tech_Paper.doc</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.2.3.2.5.1.1<br>Video Imagery                   | ATSC A/ 52 (Audio), Dolby Digital AC3 is an emerging standard for advanced television applications.   | 4L Interface          | This standard maps to the 4L Interface because it provides a description of a compression algorithm for use with audio signals.  | <ul style="list-style-type: none"> <li>The goal of the digital compression algorithm is to produce a digital representation of an audio signal which, when decoded and reproduced, sounds the same as the original signal, while using a minimum of digital information (bit-rate) for the compressed (or encoded) representation. [<a href="http://www.atsc.org/Standards/A52/a_52.doc">http://www.atsc.org/Standards/A52/a_52.doc</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area                  | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|---|--|--|--|---|
| 2.2.3.3<br>Binary Floating Data Interchange | ANSI/ IEEE 754- 1985, IEEE standard for Binary Floating – Point Arithmetic, March 21, 1985   | Application Platform Entity - Software Engineering Services and 3L Interface | This standard maps to the Software Engineering Services because it describes floating-point arithmetic. This standard maps to the 3L Interface because it specifies the syntax for the representation of floating point numbers.                         | <ul style="list-style-type: none"> <li>The IEEE (Institute of Electrical and Electronics Engineers) has produced a standard for floating point arithmetic. This standard specifies how single precision (32 bit) and double precision (64 bit) floating point numbers are to be represented, as well as how arithmetic should be carried out on them. [<a href="http://www.psc.edu/general/software/packages/ieee/ieee.html">http://www.psc.edu/general/software/packages/ieee/ieee.html</a>]</li> <li>Bindings and object code linking provide the ability for programs to access the underlying application and operating system platform through APIs that have been defined independently of the computer language. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.2.3.4.1<br>POSIX                          | IEEE P1003.1a Draft Standard for Information Technology – Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) [C Language] – Amendment, Draft 16, December 1998.  | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides system call services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.                | <ul style="list-style-type: none"> <li>P1003.1a defines the interface between applications programs and the operating system, based on historical UNIX system models. It consists of a library of functions that are often implemented as system calls. [<a href="http://hebb.cis.uoguelph.ca/~deb/27320/standards1.html">http://hebb.cis.uoguelph.ca/~deb/27320/standards1.html</a>]</li> <li>Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|   | IEEE P1003.1d D13, April 1999: Standard for Information Technology – Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) – Amendment d: Additional Realtime Extensions [C Language], Draft 11, May 1998 | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides real-time operating system services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>The following POSIX standards are emerging [JTA]</li> <li>Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|   | IEEE P1003.1g – Information Technology – Portable Operating System Interface (POSIX) – Part xx: Protocol Independent Interfaces (PII) Draft 6. 6, March 1997.  | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides operating system services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.           | <ul style="list-style-type: none"> <li>POSIX P1003.1 defines a standard operating system interface to support application portability at the source code level. [<a href="http://snad.ncsl.nist.gov/snad-staff/olsen/pubs/titledot12/node10.html">http://snad.ncsl.nist.gov/snad-staff/olsen/pubs/titledot12/node10.html</a>]</li> <li>Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|--|--|--|--|
|                            | IEEE P1003.1h D9, July 1999: Services for Reliable, Available, Serviceable Systems.  | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides fault management services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.                 | <ul style="list-style-type: none"> <li>This work is a (POSIX) standards effort in the P1003.1 System Services group project P1003.1h . This standard is intended to be used to provide fault management and serviceability application programs a common C language binding interface to operating system services.<br/>[http://computer.org/proceedings/WPD96/ABSTRACT.HTM]</li> <li>Fault management services include the prevention, isolation, notification, diagnosis, and correction of fault conditions, which arise whenever a malfunction or abnormal behavior results or may result in an error, outage, or degradation of services. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | IEEE P1003.1j D9, July 1999: Draft Standard for Information Technology – Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) – Amendment j: Advanced Realtime Extensions [C Language], Draft 7, October 1998. | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides real time extensions for operating system. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>The same POSIX working group which developed POSIX.1b and POSIX.1c is currently developing IEEE PASC P1003.1j draft standard, which specifies a set of extensions for realtime and threaded programming [http://www.unix-systems.org/version2/whatsnew/login_threads.html]</li> <li>Real-time extension services support event-driven processes supporting management and actuation of physical processes. ... Thread services provide an underlying service used for multiple concurrent executions within a single computer process. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | IEEE P1003.1m – Draft Standard for Information Technology – Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) – Amendment m: Checkpoint/ Restart Interface {C Language}, Draft 2, November 1998.            | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides operating system services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.                 | <ul style="list-style-type: none"> <li>The following POSIX standards are emerging [JTA]</li> <li>Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | P1003.1q - Draft Standard for Information Technology – Portable Operating System Interface (POSIX) – Part 1: System Application Program Interface (API) – Amendment q: Trace [C Language], Draft 5, July 1999.   | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides operating system services. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.                 | <ul style="list-style-type: none"> <li>The following POSIX standards are emerging [JTA]</li> <li>Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|--|--|---|---|
|                            | P1003. 5g, Standard for Information Technology – Portable Operating System Interface (POSIX) – Ada Language Interfaces – Part 1: Application Program Interface (API) – Amendment g: Realtime Extension, September 1999.              | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides real time extension for operating systems. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services.  | <ul style="list-style-type: none"> <li>The following POSIX standards are emerging [JTA]</li> <li>Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | P1003. 13a/ D1, Standard for Information Technology – Standardized Application Environment Profile – POSIX Realtime Application Support (AEP) – Admendment a: Realtime Extension, September 1999.                                    | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides real time extensions for operating systems. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>The following POSIX standards are emerging [JTA]</li> <li>Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | P1003. 21 Draft Standard for Information Technology – Portable Operating System Interface (POSIX) – Part 1: Realtime Distributed Systems Communication Application Program Interface (API) [Language-Independent], V2.0, August 1998 | Application Platform Entity - Operating System Services and 4D, 3X Interface | This standard maps to the Operating System Services because it provides real time extensions for operating systems. This standard maps to the 4D, 3X Interface because it contains interfaces for the application and platform software to access its services. | <ul style="list-style-type: none"> <li>The following POSIX standards are emerging [JTA]</li> <li>Real-time extension services support event-driven processes supporting management and actuation of physical processes. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area                | Emerging Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|---|---|---|---|---|
| 2.2.3.4.2<br>Virtual Machines             | The Java Virtual Machine (JVM) is defined in "The Java Virtual Machine Specification" by Tim Lindholm and Frank Yellin, Addison-Wesley, 1997, ISBN 0-201-63452-X. | Application Platform Entity - Software Engineering Services and 3X Interface  | This standard maps to the Software Engineering Services because it describes a platform that enables java applications to run on any computer without rewriting or recompiling. This standard maps to the 3X Interface because it contains a description of the interfaces required for compiled bytecode to invoke the JVM services. | <ul style="list-style-type: none"> <li>The nucleus of the Java(TM) 2 platform, the Java(TM) virtual machine is the technology that enables the Java 2 platform to host applications on any computer or operating system without rewriting or recompiling. The Java virtual machine is also responsible for the compactness of applications targeting the Java 2 platform, and is the basis for its security capabilities. In this book you will find comprehensive coverage of the class file format, the hardware, operating system, and implementation-independent binary format for compiled code. The authors fully describe the instruction set of the Java virtual machine. [<a href="http://cseng.aw.com/bookdetail.qry?ISBN=0-201-43294-3&amp;ptype=0">http://cseng.aw.com/bookdetail.qry?ISBN=0-201-43294-3&amp;ptype=0</a>]</li> <li>Other programming tools may use procedural or object-oriented languages to define the functionality of the desired applications. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
| 2.2.3.5.1<br>Remote-Procedure Computing   | OSF- DCE Version 1.2. 2, was issued to developers by the Open Group in November 1997  | Application Platform Entity - Distributed Computing Services and 4D Interface | This standard maps to the Distributed Computing Services because it describes DCE, a standard for distributed computing. This standard maps to the 4D Interface because it contains the interfaces to access DCE services.  | <ul style="list-style-type: none"> <li>The following adopted specification from the Open Group is emerging [JTA]</li> <li>Distributed-computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.2.3.5.2<br>Distributed-Object Computing | OMG document orbos/98-05-10, Persistent State Service 2.0.  | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes a persistent state service for use with CORBA. This standard maps to the 3X Interface because it contains the interfaces to access persistent state services.   | <ul style="list-style-type: none"> <li>The Persistent State Service builds on the Objects by Value specification [orbos/98-01-18] to provide a convenient way to describe application-specific, CORBA-friendly and data store-independent interfaces to persistent information: persistent-values. [<a href="ftp://ftp.omg.org/pub/docs/orbos/98-05-10.pdf">ftp://ftp.omg.org/pub/docs/orbos/98-05-10.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|   | OMG document orbos/98-03-04, CORBA services Interoperable Name Service.   | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes a name service for use with CORBA. This standard maps to the 3X Interface because it contains the interfaces to access name services.   | <ul style="list-style-type: none"> <li>This initial submission proposes several extensions to enhance the OMG Naming Service. ... It is expected that this document will eventually become a part of the Corba Naming Service specification. [<a href="ftp://ftp.omg.org/pub/docs/orbos/98-03-04.pdf">ftp://ftp.omg.org/pub/docs/orbos/98-03-04.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|----------------------------|--|---|---|--|
|                            | OMG document orbos/98-05-04, CORBA services CORBA/Firewall Security                  | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes CORBA communication through firewalls. This standard maps to the 3X Interface because it contains the interfaces that application programmers need to use to access its services. | <ul style="list-style-type: none"> <li>The intent of the submission is to provide a standard approach to control IIOP traffic through network firewalls, thereby allowing outside access to CORBA applications. ... Thus, the main goal of this specification is to specify the changes to CORBA that are needed for ORBs to function in a slightly different manner, so that CORBA communication can more easily be handled by firewalls. An additional goal of this document is to provide information on how current firewall techniques can be used to control CORBA communication. [<a href="ftp://ftp.omg.org/pub/docs/orbos/98-05-04.pdf">ftp://ftp.omg.org/pub/docs/orbos/98-05-04.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                            | OMG document ad/97-08-14, Meta Object Facility (MOF)                                 | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes extensions to CORBA. This standard maps to the 3X Interface because it contains the interfaces that application programmers need to use to access its services.                   | <ul style="list-style-type: none"> <li>The main purpose of the OMG MOF is to provide a set of CORBA interfaces that can be used to define and manipulate a set of interoperable metamodels. ... [<a href="ftp://ftp.omg.org/pub/docs/ad/97-08-14.pdf">ftp://ftp.omg.org/pub/docs/ad/97-08-14.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | OMG document ec/98-02-04, Negotiation Facility                                       | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes object management standards. This standard maps to the 3X Interface because it contains the interfaces to access the negotiation facility services                                | <ul style="list-style-type: none"> <li>The following adopted specifications from the Object Management Group (OMG) are emerging [JTA]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | OMG Document Number: bom/99-03-01, Workflow Management Facility, dated 9 March 1999. | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes object management standards. This standard maps to the 3X Interface because it contains the interfaces that application programmers need to use to access its services.           | <ul style="list-style-type: none"> <li>This submission specifies interfaces for workflow execution control, monitoring, and interoperability between workflows defined and managed independently of each other. The interfaces are based on a model of workflow objects which includes their relationships and dependencies with requesters, assignments, and resources. [<a href="ftp://ftp.omg.org/pub/docs/bom/99-03-01.pdf">ftp://ftp.omg.org/pub/docs/bom/99-03-01.pdf</a>]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area          | Emerging Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|-------------------------------------|---|---|---|---|
|                                     | OMG document mfg/ 98-06-06 Distributed Simulation Service   | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes object management standards. This standard maps to the 3X Interface because it contains the interfaces that application programmers need to use to access its services.             | <ul style="list-style-type: none"> <li>The following adopted specifications from the Object Management Group (OMG) are emerging [JTA]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                                     | OMG document orbos/ 99-02-12, Joint Revised Realtime CORBA submission.  | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes CORBA real time extensions. This standard maps to the 3X Interface because it contains the interfaces that application programmers need to use to access its services.              | <ul style="list-style-type: none"> <li>To provide specialist capabilities for specialist application without over constraining non Real-Time development, Real-time CORBA is positioned as a separate Extension to CORBA. The set of capabilities provided by Real-time CORBA constitute an optional, additional compliance point. [ftp://ftp.omg.org/pub/docs/orbos/99-02-12.pdf]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|                                     | OMG document orbos/ 99-03-29, Errata for the Realtime CORBA joint/ revised submission orbos/ 99-02-12   | Application Platform Entity - Distributed Computing Services and 3X Interface | This standard maps to the Distributed Computing Services because it describes CORBA real time extensions. This standard maps to the 3X Interface because it contains the interfaces that application programmers need to use to access its services.              | <ul style="list-style-type: none"> <li>The following adopted specifications from the Object Management Group (OMG) are emerging [JTA]</li> <li>Object Services support the definition, instantiation, and interaction of objects in a distributed environment, and include services that handle operating system bindings, message transport and delivery, and data persistence. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.2.3.6.1<br>Environment Management | DoD- 5015.2- STD, Design Criteria Standard for Electronic Records Management Software Applications, November 1997 (Sections 2.2.1-2.2.1.1 only).  | Design Considerations   | This standard maps to the Design Criteria because it describes design specifications for records management.  | <ul style="list-style-type: none"> <li>C2.2.1. Implementing File Plans C2.2.1.1. RMAs shall provide the capability for only authorized individuals to create, add, edit, and delete record categories, files and their codes. Each file or category code shall be linked to its associated file or category and to its higher-level category code(s). [http://web7.whs.osd.mil/text/p50152s.txt]</li> </ul>   |
| 2.2.3.6.2<br>Learning Technology    | IEEE 1484.1, Architecture and Reference Model. Base Document entitled, "Learning Technology Systems Architecture (LTSA)," Version 4.00, 1998-05-21, is linked to/ from: <http:// grouper.ieee.org/groups/ltscltsdocs/>. | Application Software Entity - Engineering Support                             | This standard maps to Engineering Support because it describes a reference model for Computer-Aided Instruction (CAI) systems. The logical interfaces for this standard are described in IEEE P1484.2, Learner Model and IEEE P1484.12, Learning Object Metadata. | <ul style="list-style-type: none"> <li>This standard will specify a Reference Model/Architecture for component-based Computer-Aided Instruction (CAI) systems, specifically including the needs of Intelligent Learning Environment (ILE) and Intelligent Tutoring System (ITS) software applications. [http://ltscc.ieee.org/wg1/index.html#S&amp;P]</li> <li>Modeling and simulation services provide the capability to capture or set object characteristics or attributes and parameters of a system of objects, and to portray the relationships and interactions of the objects to assist in the analysis of the system. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.2 – Information Processing Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping           | Mapping Justification  | Notes  |
|----------------------------|--|-----------------------|--|--|
|                            | IEEE P1484.2, Learner Model. Base Document entitled, "Personal and Performance Information (PAPI) Specification," Draft Version 5, 15 January 1999, is linked to/ from: < <a href="http://grouper.ieee.org/groups/ltsc/ltscdocs/">http://grouper.ieee.org/groups/ltsc/ltscdocs/</a> >.   | 4L Interface          | This standard maps to the 4L Interface because it specifies syntax and semantics for information that characterizes a learner. | <ul style="list-style-type: none"> <li>This standard will specify the syntax and semantics of a 'Learner Model,' which will characterize a learner (student or knowledge worker) and his or her knowledge/abilities. [<a href="http://ltsc.ieee.org/wg2/index.html#S&amp;P">http://ltsc.ieee.org/wg2/index.html#S&amp;P</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IEEE P1484.12 Learning Object Metadata (LOM), Version 2.5a December 1998, is linked to/ from: < <a href="http://grouper.ieee.org/groups/ltsc/ltscdocs/">http://grouper.ieee.org/groups/ltsc/ltscdocs/</a> >.   | 4L Interface          | This standard maps to the 4L Interface because it describes syntax and semantics for learning object metadata.                 | <ul style="list-style-type: none"> <li>This standard will specify the syntax and semantics of Learning Object Metadata, defined as the attributes required to fully/adequately describe a Learning Object. Learning Objects are defined here as any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning. [<a href="http://ltsc.ieee.org/wg12/index.html#S&amp;P">http://ltsc.ieee.org/wg12/index.html#S&amp;P</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
|                            | AICC AGR 006 Computer Managed Instruction (CMI), V2.0, 1998 May 19, (See < <a href="http://www.aicc.org/pages/down-docs-index.htm">http://www.aicc.org/pages/down-docs-index.htm</a> >) is an emerging standard for non- Web- based training. Additionally, this specification is being further developed by IEEE P1484.11 Standard for Computer- Managed Instruction (CMI) linked to/ from: < <a href="http://grouper.ieee.org/groups/ltsc/ltscdocs/">http://grouper.ieee.org/groups/ltsc/ltscdocs/</a> > | Design Considerations | This standard maps to Design Considerations because it provides guidelines for CMI systems.                                    | <ul style="list-style-type: none"> <li>This document recommends guidelines that promote the interoperability of CMI systems. [<a href="http://www.aicc.org/docs/AGRs/agr006v2doc.zip">http://www.aicc.org/docs/AGRs/agr006v2doc.zip</a>]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area    | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|-------------------------------|---|---|---|---|
| 2.3.2.1.1 Host Standards      | IETF Standard 3/ RFC-1122/ RFC- 1123, Host Requirements, October 1989 | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 4D, 3L, 3D, 2L Interfaces | These standards discuss all of the Internet host protocols for OSI layers 2-6. They map to the Communications Services and the Physical Environment Services and also the 4D, 3L, 3D and 2L interfaces because these protocols specify how information will be transferred on the Internet. | <ul style="list-style-type: none"> <li>• This document is one of a pair that defines and discusses the requirements for host system implementations of the Internet protocol suite. This RFC covers the communication protocol layers: link layer, IP layer, and transport layer. [<a href="http://www.ietf.org/rfc/rfc1122.txt">http://www.ietf.org/rfc/rfc1122.txt</a>]</li> <li>• This document is one of a pair that defines and discusses the requirements for host system implementations of the Internet protocol suite. This RFC covers the applications layer and support protocols. [<a href="http://www.ietf.org/rfc/rfc1123.txt">http://www.ietf.org/rfc/rfc1123.txt</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
| 2.3.2.1.1.1.1 Electronic Mail | ACP 123, Common Messaging Strategy and Procedures, November 1994      | Application Software Entity- Communications Services and Application Platform Entity- Communications Services and 4D, 4L, 4X, 3L Interfaces       | This standard is mapped to the Communications Services and 4D, 4L, 4X, 3L Interfaces because it specifies military messaging standards for transferring information.  | <ul style="list-style-type: none"> <li>• The standard for official organizational-messaging traffic between DoD organizations is the Defense Message System's (DMS) X.400-based suite of military messaging standards defined in Allied Communication Protocol (ACP) 123. [JTA]</li> <li>• Organizational-messaging services, including the capability to send, receive, forward, display, retrieve, prioritize, and manage predefined and unformatted organizational messages. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Class 4X: direct interfaces between Mission Applications components and Support Services components within the Applications Layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|--|---|--|---|
|                            | ACP 123, U. S. Supplement No. 1, Common Messaging Strategy and Procedures, November 1995                                 | 4L, 3L Interfaces   | This standard is mapped to the 4L, 3L Interfaces because it contains procedural issues for the use of ACP 123 specific to the U. S.  | <ul style="list-style-type: none"> <li>• The ACP 123 document identifies numerous technical and procedural issues that require further refinement for each nation. The DMS addresses these issues in the US Supplement to ACP 123 (US Supplement 1). [<a href="http://www.ieca.com/File-Archive/CDB-MILCOM-9511/index.html">http://www.ieca.com/File-Archive/CDB-MILCOM-9511/index.html</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF Standard 10/ RFC- 821/ RFC- 1869/ RFC- 1870, Simple Mail Transfer Protocol (SMTP) Service Extensions, November 1995 | Application Platform Entity- Communications Services and 4D Interface | This standard is mapped to the Communications Services because it describes the transactions between a mailer program and the SMTP program. It also maps to the 4D Interface because it contains the commands, arguments and return codes that a mailer program uses to interface to SMTP. | <ul style="list-style-type: none"> <li>• The SMTP provides mechanisms for the transmission of mail; directly from the sending user's host to the receiving user's host when the two host are connected to the same transport service, or via one or more relay SMTP-servers when the source and destination hosts are not connected to the same transport service. [<a href="http://www.ietf.org/rfc/rfc1869.txt">http://www.ietf.org/rfc/rfc1869.txt</a>]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | IETF Standard 11/ RFC- 822/ RFC- 1049, Standard for the Format of ARPA Internet Text Messages, 13 August 1982            | 4L Interface  | This standard maps to the 4L Interface because it describes a new header field for use with the Internet Mail Protocol.  | <ul style="list-style-type: none"> <li>• A standardized Content-type field allows mail reading systems to automatically identify the type of a structured message body and to process it for display accordingly. The structured message body must still conform to the RFC-822 requirements concerning allowable characters. A mail reading system need not take any specific action upon receiving a message with a valid Content-Type header field. The ability to recognize this field and invoke the appropriate display process accordingly will, however, improve the readability of messages, and allow the exchange of messages containing mathematical symbols, or foreign language characters. [<a href="http://www.ietf.org/rfc/rfc1049.txt?number=1049">http://www.ietf.org/rfc/rfc1049.txt?number=1049</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                                    | Currently Mandated Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|---|---|---|--|--|
|   | IETF RFCs 2045- 2049, Multipurpose Internet Mail Extensions (MIME) Parts 1- 5, November 1996                            | Application Software Entity – Communication Services and Design Considerations and 4L Interface | Since this standard consists of 5 separate IETF's RFC's, each one must be mapped to the JTA. RFC's 2045, 2046, 2047 describe the format of the MIME headers, general structure and format of the media types and non-text extensions to the header fields. These three standards map to the 4L Interface because they describe the format of the MIME messages. RFC 2048 describes registration procedures and requirements for new MIME types, external body access types and content-transfer-encodings. This standard maps to Design Considerations. RFC 2049 discusses what parts of MIME must be supported by a MIME conformant mailing system. This standard maps to the Communication Services because it specifies how mailer programs are to support the MIME standard. | <ul style="list-style-type: none"> <li>This initial document specifies the various headers used to describe the structure of MIME messages. The second document, RFC 2046, defines the general structure of the MIME media typing system and defines an initial set of media types. The third document, RFC 2047, describes extensions to RFC 822 to allow non-US-ASCII text data in Internet mail header fields. The fourth document, RFC 2048, specifies various IANA registration procedures for MIME-related facilities. The fifth and final document, RFC 2049, describes MIME conformance criteria as well as providing some illustrative examples of MIME message formats, acknowledgements, and the bibliography. [<a href="http://www.ietf.org/rfc/rfc2045.txt?number=2045">http://www.ietf.org/rfc/rfc2045.txt?number=2045</a>]</li> <li>Communications services provide the capability to send, receive, forward, and manage electronic and voice messages. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
| 2.3.2.1.1.2.1<br>X. 500 Directory Services                    | ITU- T X. 500, The Directory - Overview of Concepts, Models, and Services - Data Communication Networks Directory, 1993 | Application Software Entity- Communication Services and 4L Interface                            | This standard maps to the Communications Services because it describes the X.500 directory structure and the services provided to user applications by the standard. It also maps to the 4L Interface because it describes the interfaces used to retrieve and modify entries in an X.500 directory.   | <ul style="list-style-type: none"> <li>International Telecommunications Union (ITU) X.500 provides directory services that may be used by users or host applications to locate other users and resources on the network. [JTA]</li> <li>This Recommendation   International Standard introduces the concepts of the Directory and the DIB (Directory Information Base) and overviews the services and capabilities which they provide. [<a href="http://www.itu.int/itudoc/itu-t/rec/x/x500up/s_x500.htm">http://www.itu.int/itudoc/itu-t/rec/x/x500up/s_x500.htm</a>]</li> <li>This service includes the use of directories and distribution lists for routing information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.3.2.1.1.2.2<br>Lightweight Directory Access Protocol (LDAP) | IETF RFC- 1777, Lightweight Directory Protocol (LDAP), March 1995   | Application Platform Entity- Communication Services and 4D, 3L Interfaces                       | This standard is mapped to the Communication Services because it describes the usage and behavior of LDAP. This standard is mapped to the 4D Interface because it contains commands and arguments used to access the LDAP services. This standard maps to the 3L Interface because it defines specifications for the standard.   | <ul style="list-style-type: none"> <li>The protocol described in this document is designed to provide access to the X.500 Directory while not incurring the resource requirements of the Directory Access Protocol (DAP). This protocol is specifically targeted at simple management applications and browser applications that provide simple read/write interactive access to the X.500 Directory, and is intended to be a complement to the DAP itself. [<a href="http://www.ietf.org/rfc/rfc1777.txt?number=1777">http://www.ietf.org/rfc/rfc1777.txt?number=1777</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area          | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|-------------------------------------|--|--|---|---|
| 2.3.2.1.1.2.3<br>Domain Name System | IETF Standard 13/ RFC-1034/ RFC- 1035, Domain Name System, November 1987   | Application Platform<br>Entity-<br>Communication Services<br>and<br>3L Interface | This standard maps to the Communication Services because it describes how applications use DNS to access information about objects stored in the DNS database. It also maps to the 3L Interface because it defines what a query into the DNS looks like, but doesn't actually define any API's. | <ul style="list-style-type: none"> <li>• This RFC introduces domain style names, their use for Internet mail and host address support, and the protocols and servers used to implement domain name facilities.<br/>[http://www.ietf.org/rfc/rfc1034.txt?number=1034]</li> <li>• This RFC describes the details of the domain system and protocol, and assumes that the reader is familiar with the concepts discussed in a companion RFC, "Domain Names - Concepts and Facilities" [RFC-1034]. The domain system is a mixture of functions and data types which are an official protocol and functions and data types which are still experimental.<br/>[http://www.ietf.org/rfc/rfc1035.txt?number=1035]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.3.2.1.1.1.3<br>File Transfer      | IETF Standard 9/ RFC-959, File Transfer Protocol, October 1985, with the following FTP commands mandated for reception: Store unique (STOU), Abort (ABOR), and Passive (PASV). | Application Platform<br>Entity-<br>Communication Services<br>and<br>3L Interface | This standard maps to the Communication Services because it describes how files and data can be transferred over the network. This standard maps to the 3L Interface because it contains the FTP commands and a description of the behavior of the commands.                                    | <ul style="list-style-type: none"> <li>• The objectives of FTP are 1) to promote sharing of files (computer programs and/or data), 2) to encourage indirect or implicit (via programs) use of remote computers, 3) to shield a user from variations in file storage systems among hosts, and 4) to transfer data reliably and efficiently.<br/>[http://www.ietf.org/rfc/rfc0959.txt?number=959]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |

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### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                    | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|---|---|--|---|---|
| 2.3.2.1.1.1.4<br>Remote Terminal              | IETF Standard 8/ RFC-854/ RFC- 855, Telnet Protocol, May 1983                                     | Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>Design<br>Considerations<br>and<br>4D, 3L Interface | This standard maps to the Communication Services because it describes how Telnet allows interfacing terminal devices or processes to communicate to each other over the network. It also maps to the 4D, 3L Interface because it contains the Telnet commands and a description of the behavior of the commands. This standard maps to the Design Considerations because it specifies procedures for option code assignment and standards for documentation of new options. | <ul style="list-style-type: none"> <li>• The purpose of the TELNET Protocol is to provide a fairly general, bi-directional, eight-bit byte oriented communications facility. Its primary goal is to allow a standard method of interfacing terminal devices and terminal-oriented processes to each other. It is envisioned that the protocol may also be used for terminal-terminal communication ("linking") and process-process communication (distributed computation).<br/>[http://www.ietf.org/rfc/rfc0854.txt?number=854]</li> <li>• This document specifies a method of option code assignment and standards for documentation of options.<br/>[http://www.ietf.org/rfc/rfc0855.txt?number=855]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
| 2.3.2.1.1.1.5<br>Network Time Synchronization | IETF RFC- 1305, Network Time Protocol (V3), Specification Implementation and Analysis, March 1992 | Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>3L Interface  | This standard maps to the Communication Services because it describes a mechanism to synchronize time between servers and clients. This standard maps to the 3L Interface because it defines the entities used by NTP.  | <ul style="list-style-type: none"> <li>• This document constitutes a formal specification of the Network Time Protocol (NTP) Version 3, which is used to synchronize timekeeping among a set of distributed time servers and clients. It defines the architectures, algorithms, entities and protocols used by NTP and is intended primarily for implementors.<br/>[http://www.ietf.org/rfc/rfc1305.txt?number=1305]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |
| 2.3.2.1.1.1.6<br>Bootstrap Protocol           | IETF RFC- 951, Bootstrap Protocol, 1 September 1985   | Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>3L Interface  | This standard maps to the Communication Services and 3L Interface because it describes how a client machine uses the bootstrap protocol to retrieve its IP and bootfile from a server machine on the network.   | <ul style="list-style-type: none"> <li>• This RFC describes an IP/UDP bootstrap protocol (BOOTP) which allows a diskless client machine to discover its own IP address, the address of a server host, and the name of a file to be loaded into memory and executed. The bootstrap operation can be thought of as consisting of TWO PHASES. This RFC describes the first phase, which could be labeled 'address determination and bootfile selection'. After this address and filename information is obtained, control passes to the second phase of the bootstrap where a file transfer occurs. [http://www.ietf.org/rfc/rfc0951.txt?number=951]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |

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### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                       | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes  |
|--|---|---|---|--|
|  | IETF RFC- 2132 DHCP Options and BOOTP Vendor Extensions, March 1997                       | Application Platform Entity-Communication Services and 3L Interface | This standard describes options for use with BOOTP and DHCP. This standard maps the same as these two standards.  | <ul style="list-style-type: none"> <li>This document specifies options for use with both the Dynamic Host Configuration Protocol and the Bootstrap Protocol. [<a href="http://www.ietf.org/rfc/rfc2132.txt?number=2132">http://www.ietf.org/rfc/rfc2132.txt?number=2132</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|  | IETF RFC- 1542, Clarifications and Extensions for the Bootstrap Protocol, 27 October 1993 | Application Platform Entity-Communication Services and 3L Interface | This standard describes options for use with BOOTP. This standard maps the same as that standard.   | <ul style="list-style-type: none"> <li>Some aspects of the BOOTP protocol were rather loosely defined in its original specification. In particular, only a general description was provided for the behavior of "BOOTP relay agents" (originally called BOOTP forwarding agents"). The client behavior description also suffered in certain ways. This memo attempts to clarify and strengthen the specification in these areas. [<a href="http://www.ietf.org/rfc/rfc1542.txt?number=1542">http://www.ietf.org/rfc/rfc1542.txt?number=1542</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.3.2.1.1.1.7 Configuration Information Transfer | IETF RFC- 2131, Dynamic Host Configuration Protocol, March 1997                           | Application Platform Entity-Communication Services and 3L Interface | This standard maps to the Communication Services and 3L Interface because it describes how DHCP servers allocate IP addresses and deliver configuration information to clients over the network.                  | <ul style="list-style-type: none"> <li>The Dynamic Host Configuration Protocol (DHCP) provides a framework for passing configuration information to hosts on a TCPIP network. DHCP is based on the Bootstrap Protocol (BOOTP) [7], adding the capability of automatic allocation of reusable network addresses and additional configuration options. [<a href="http://www.ietf.org/rfc/rfc2131.txt?number=2131">http://www.ietf.org/rfc/rfc2131.txt?number=2131</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
| 2.3.2.1.1.1.8.1 Hypertext Transfer Protocol      | IETF RFC- 2616, Hypertext Transfer Protocol – HTTP/ 1. 1, June 1999.                      | Application Software Entity-Communication Services and 4L Interface | This standard maps to the Communication Services because it describes a protocol for exchanging hypermedia information. This standard maps to the 4L Interface because it contains the format of the HTTP header. | <ul style="list-style-type: none"> <li>The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information systems. [<a href="http://www.ietf.org/rfc/rfc2616.txt?number=2616">http://www.ietf.org/rfc/rfc2616.txt?number=2616</a>]</li> <li>Communications services provide the capability to send, receive, forward, and manage electronic and voice messages. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |

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### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                       | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|--|--|---|--|---|
| 2.3.2.1.1.1.8.2<br>Uniform Resource Locator      | IETF RFC- 1738, Uniform Resource Locators, 20 December 1994  | 4L Interface  | This standard is mapped to the 4L Interface because it defines the syntax and semantics of URL's.  | <ul style="list-style-type: none"> <li>This document specifies a Uniform Resource Locator (URL), the syntax and semantics of formalized information for location and access of resources via the Internet. [http://www.ietf.org/rfc/rfc1738.txt?number=1738]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | IETF RFC- 1808, Relative Uniform Resource Locators, June 1995  | 4L Interface  | This standard is mapped to the 4L Interface because it defines the syntax and semantics of relative URL's.   | <ul style="list-style-type: none"> <li>A Uniform Resource Locator (URL) is a compact representation of the location and access method for a resource available via the Internet. When embedded within a base document, a URL in its absolute form may contain a great deal of information which is already known from the context of that base document's retrieval, including the scheme, network location, and parts of the url-path. In situations where the base URL is well-defined and known to the parser (human or machine), it is useful to be able to embed URL references which inherit that context rather than re-specifying it in every instance. This document defines the syntax and semantics for such Relative Uniform Resource Locators. [http://www.ietf.org/rfc/rfc1808.txt?number=1808]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
| 2.3.2.1.1.1.9<br>Connectionless Data Transfer    | MIL- STD- 2045- 47001B, Connectionless Data Transfer Application Layer Standard, 20 January 1998   | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communication Services and 3L Interface because it applies to computer networks and the transfer of information on the networks.   | <ul style="list-style-type: none"> <li>This MIL-STD presents the minimum essential technical parameters in the form of a mandatory system standard and optional design objectives for interoperability and compatibility among digital message transfer devices (DMTDs), between DMTDs and applicable command, control, communications, computers, and intelligence (C4I) systems and among C4I systems using digital data for information transfer over limited bandwidth communication channels. [http://www-cnrgw.itsi.disa.mil/docs/ms47001b.pdf]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>                       |
| 2.3.2.1.1.2.1.1<br>Transmission Control Protocol | IETF- Standard 7/ RFC- 793, Transmission Control Protocol, September 1981. In addition, PUSH flag and the NAGLE algorithm, as defined in IETF Standard 3, Host Requirements. | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communication Service because it describes the packetized communication services offered by TCP. This standard maps to the 3L Interface because it describes the functions performed by TCP. | <ul style="list-style-type: none"> <li>This document describes the functions to be performed by the Transmission Control Protocol, the program that implements it, and its interface to programs or users that require its services.. [http://www.ietf.org/rfc/rfc0793.txt?number=793]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |

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### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area             | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|--|---|--|---|---|
|  | IETF RFC- 2001, TCP Slow Start, Congestion Avoidance, Fast Retransmit, and Fast Recovery Algorithms, January 1997 | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communication Services and the 3L Interface because it describes TCP tuning, specifically the timing of bits on the wire.   | <ul style="list-style-type: none"> <li>• Modern implementations of TCP contain four intertwined algorithms that have never been fully documented as Internet standards: slow start, congestion avoidance, fast retransmit, and fast recovery. ... The purpose of this document is to document these four algorithms for the Internet. [<a href="http://www.ietf.org/rfc/rfc2001.txt?number=2001">http://www.ietf.org/rfc/rfc2001.txt?number=2001</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.3.2.1.1.2.1.2 User Datagram Protocol | IETF Standard 6/ RFC-768, User Datagram Protocol, 28 August 1980  | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communication Service because it describes the network communication services offered by UDP. This standard maps to the 3L Interface because it describes the functions performed by UDP. | <ul style="list-style-type: none"> <li>• This User Datagram Protocol (UDP) is defined to make available a datagram mode of packet-switched computer communication in the environment of an interconnected set of computer networks. [<a href="http://www.ietf.org/rfc/rfc0768.txt?number=768">http://www.ietf.org/rfc/rfc0768.txt?number=768</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |

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### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area           | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes  |
|--------------------------------------|---|--|---|--|
| 2.3.2.1.1.2.1.3<br>Internet Protocol | IETF Standard 5/ RFC-791/ RFC- 950/ RFC-919/ RFC- 922/ RFC-792/ RFC- 1112, Internet Protocol, September 1981. In addition, all implementations of IP must pass the 8- bit Type-of- Service (TOS) byte transparently up and down through the transport layer as defined in IETF Standard 3, Host Requirements. | Application Platform<br>Entity-<br>Communications<br>Services<br>and<br>Application Platform<br>Entity- Physical<br>Environment<br>Services<br>And<br>3L, 2L Interface | These standards map to the Communication Services because they describe a network protocol. These standards map to the 3L Interface because they describe the functions performed by IP. These standards map to the Physical Environment Services and 2L Interface in the situation where there isn't a link layer underneath the network layer (e.g. radio will often use IP as a link layer). | <ul style="list-style-type: none"> <li>• This document specifies the DoD Standard Internet Protocol. ... This edition revises aspects of addressing, error handling, option codes, and the security, precedence, compartments, and handling restriction features of the internet protocol. [http://www.ietf.org/rfc/rfc0791.txt?number=791]</li> <li>• The Internet Protocol (IP) [1] is used for host-to-host datagram service in a system of interconnected networks called the Catenet [2]. [ftp://ftp.isi.edu/in-notes/rfc792.txt]</li> <li>• ROADCASTING INTERNET DATAGRAMS ... We propose simple rules for broadcasting Internet datagrams on local networks that support broadcast, for addressing broadcasts, and for how gateways should handle them. [ftp://ftp.isi.edu/in-notes/rfc919.txt]</li> <li>• ROADCASTING INTERNET DATAGRAMS IN THE PRESENCE OF SUBNETS... We propose simple rules for broadcasting Internet datagrams on local networks that support broadcast, for addressing broadcasts, and for how gateways should handle them. [http://www.ietf.org/rfc/rfc0922.txt?number=922]</li> <li>• This memo specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. [ftp://ftp.isi.edu/in-notes/rfc1112.txt]</li> <li>• This memo discusses the utility of "subnets" of Internet networks, which are logically visible sub-sections of a single Internet network. [http://www.ietf.org/rfc/rfc0950.txt?number=950]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |

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| JTA Section & Service Area                          | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes  |
|---|---|--|---|--|
|   | IETF RFC- 1770, IPv4 Option for Sender Directed Multi-Destination Delivery, 28 March 1995 | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 3L, 2L Interface | This standard maps the same as the IPv4 standard because it's an option for IPv4.   | <ul style="list-style-type: none"> <li>This memo defines an IPv4 option to provide a sender directed multi-destination delivery mechanism called Selective Directed Broadcast Mode (SDBM). The SDBM provides unreliable UDP delivery to a set of IP addresses included in the option field of an IPv4 datagram. [<a href="http://www.ietf.org/rfc/rfc1770.txt?number=1770">http://www.ietf.org/rfc/rfc1770.txt?number=1770</a>]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
| 2.3.2.1.1.2.2 OSI Transport Over IP- based Networks | IETF Standard 35/ RFC-1006, ISO Transport Service on top of the TCP, May 1987             | Application Platform Entity- Communications Services and 3L Interface  | This standard is similar to TCP and maps the same as TCP.   | <ul style="list-style-type: none"> <li>The [ISO8072] standard describes the ISO transport service definition, henceforth called TP. ... The ISO transport service definition describes the services offered by the TS-provider (transport service) and the interfaces used to access those services. This memo focuses on how the ARPA Transmission Control Protocol (TCP) [RFC793] can be used to offer the services and provide the interfaces. [<a href="http://www.ietf.org/rfc/rfc1006.txt?number=1006">http://www.ietf.org/rfc/rfc1006.txt?number=1006</a>]</li> <li>Transport services. ... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
| 2.3.2.1.2 Video Tele-conferencing Standards         | FTR 1080A- 1998, Appendix A, Video Teleconferencing Profile, October 1998                 | Application Software Entity – Communication Services and 4L Interface  | This standard maps to the Communication Services and 4L Interface because it applies to video teleconferencing communication.   | <ul style="list-style-type: none"> <li>The ASD (C3I) mandated Federal Telecommunications Recommendation (FTR) 1080A-1998 Video Teleconferencing Profile identifies ITU-T H.320 as the key standard to provide interoperability between VTC terminal equipment, both point-to-point and multipoint configurations operating at data rates of 56-1,920 Kilobits per second (Kbps). [JTA]</li> <li>Videoconferencing services that provide two-way video transmission between different sites. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|   | ITU-T T. 120, Transmission Protocols for Multimedia Data, July 1996.                      | Application Software Entity – Communication Services and 4L Interface  | This standard maps to the Communication Services because it is a communication service used in multimedia conferencing environments. It also maps to the 4L Interface because it provides interfaces for use by applications at the Application Software layer. | <ul style="list-style-type: none"> <li>The T.120-Series of Recommendations collectively define a multipoint data communication service for use in multimedia conferencing environments. [<a href="http://www.itu.int/itudoc/itu-t/rec/ts_t120.txt">http://www.itu.int/itudoc/itu-t/rec/ts_t120.txt</a>]</li> <li>Communications services provide the capability to send, receive, forward, and manage electronic and voice messages. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area             | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes   |
|--|--|---|---|---|
|  | ITU-T H. 323, Packet-based Multimedia Communications Systems, January 1998.          | Application Software Entity - Communication Services and 4L Interface | This standard maps to the Communication Services because it is a communication service used in multimedia conferencing environments. It also maps to the 4L Interface because it provides interfaces for use by applications at the Application Software layer. | <ul style="list-style-type: none"> <li>For VTC terminals operating within Local Area Networks, the following standard is mandated [JTA]</li> <li>Communications services provide the capability to send, receive, forward, and manage electronic and voice messages. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | ITU-T H. 324, Terminal for Low Bit Rate Multimedia Communications, January 1998      | Application Software Entity - Communication Services and 4L Interface | This standard maps to the Communication Services and 4L Interface because it applies to multimedia communication over a network.  | <ul style="list-style-type: none"> <li>This Recommendation describes terminals for low bit-rate multimedia communication, utilizing V.34 modems operating over the GSTN. H.324 terminals may carry real-time voice, data, and video, or any combination, including videotelephony. [<a href="http://www.itu.int/itudoc/itu-t/rec/h/s_h324.htm">http://www.itu.int/itudoc/itu-t/rec/h/s_h324.htm</a>]</li> <li>Communications services provide the capability to send, receive, forward, and manage electronic and voice messages. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
|  | ITU-T H. 244, Synchronized Aggregation of Multiple 64 or 56 Kbps channels, July 1995 | Application Software Entity - Communication Services and 4L Interface | This standard maps to the Communication Services and 4L Interface because it applies to multimedia communication over a network (television over aggregated ISDN lines).  | <ul style="list-style-type: none"> <li>For VTC terminals operating at low bit rates (9.6 to 28.8 Kbps) the following standard is mandated [JTA]</li> <li>Videoconferencing services that provide two-way video transmission between different sites. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.3.2.1.3.1 Analog Facsimile Standards | EIA/ TIA-465-A, Group 3 Facsimile Apparatus for Document Transmission, 21 March 1995 | External Environment Entity - Networks and 2D Interface               | This standard maps to the External Environment Entity and a 2D Interface because it contains facsimile standards for analog output.   | <ul style="list-style-type: none"> <li>For Facsimile (analog output) standards that comply with the ITU-T Group 3 specifications, the following standards are mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|  | EIA/ TIA-466-A, Procedures for Document Facsimile Transmission, 27 September 1996    | External Environment Entity - Networks and 2D Interface               | It appears that this standard applies, at least in part, to signaling functions. It maps to the External Environment Entity and a 2D Interface because it describes signal functions and formats.   | <ul style="list-style-type: none"> <li>For Facsimile (analog output) standards that comply with the ITU-T Group 3 specifications, the following standards are mandated [JTA]</li> <li>Procedures for document facsimile transmission in the general switched telephone network. [<a href="http://www.itu.int/itudoc/itu-t/rec/t/t30.html#Table_of_Contents">http://www.itu.int/itudoc/itu-t/rec/t/t30.html#Table_of_Contents</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area  | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|---|---|--|--|---|
| 2.3.2.1.3.2<br>Digital Facsimile Standard                             | MIL-STD 188-161D, Interoperability and Performance Standards for Digital Facsimile Equipment, 10 January 1995   | Application Platform Entity – Communication Services and 3L Interface    | This standard maps to the Communication Services and 3L Interface because it applies to standards for facsimile communication. It appears to define a frame format.  | <ul style="list-style-type: none"> <li>• The purpose of this MIL-STD is to establish, in the most economical manner, interoperability and performance parameters necessary to ensure interoperability among long-haul and tactical digital facsimile equipment. The technical parameter established by this MIL-STD represent a set of minimum interoperability and performance characteristics, which may be exceeded to satisfy specific requirements.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>      |
| 2.3.2.1.4<br>Secondary Imagery Dissemination Communications Standards | MIL-STD-2045-44500, National Imagery Transmission Format Standard (NITFS) Tactical Communications Protocol 2 (TACO2), 18 June 1993; with Notice of Change 1, 29 July 1994; and Notice of Change 2, 27 June 1996 | Application Platform Entity- Communication Services and 3L Interface     | This standard maps to the Communication Services and 3L Interface because it applies to standards for transmitting imagery data.   | <ul style="list-style-type: none"> <li>• This document establishes the requirements for the TActical Communications protocol 2 (TACO2), part of the national Imagery Transmission Format Standards (NITFS). National Imagery Transmission Format (NITF) is a standard format for transmitting digital imagery and imagery-related products among members of the Intelligence Community, and TACO2 is a protocol suite that may be used for that transmission.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.3.2.1.5 Global Positioning System                                   | ICD- GPS- 200C, NAVSTAR GPS Space Segment/ Navigation User Interfaces, 16 October 1997.   | Application Platform Entity- Communication Services and 4D, 3L Interface | This standard maps to the Communication Services and the 3L Interface because it applies to standards for transmitting navigational information. This standard maps to the 4D Interface because it defines the requirements for the interface between the Space Segment (SS) and the Navigation User Segment (US). | <ul style="list-style-type: none"> <li>• This Interface Control Document (ICD) defines the requirements related to the interface between the Space Segment (SS) of the Global Positioning System (GPS) and the Navigation User Segment (US) of the GPS.<br/>[http://www.navcen.uscg.mil/pubs/gps/icd200/default.htm]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                   | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes  |
|--|--|---|--|--|
|  | ICD- GPS- 222A, NAVSTAR GPS UE Auxiliary Output Chip Interface (U), 26 April 1996.   | Application Platform Entity- Communication Services and Application Platform Entity- Security Services and 4D, 3L Interface | This standard maps to the Communication Services, Security Services and 4D, 3L Interfaces because it applies to standards for not only transmitting navigational information but also limiting access to the navigational information through the use of cryptography. | <ul style="list-style-type: none"> <li>• The PPS was designed primarily for U.S. military use, and the DoD will control access to the PPS through cryptography. DoD GPS users with combat, combat support, or combat service support missions must acquire and use PPS-capable GPS receivers. The U.S. will enter into special arrangements with military users of allied and friendly governments to allow them use of the PPS. [JTA]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Multilevel security cuts across all aspects of the system and adds an additional complexity to the hardware and software that interacts with the rest of the system. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
|  | ICD- GPS- 225A, NAVSTAR GPS Selective Availability/ Anti- spoofing Host Application Equipment Design Requirements with the Precise Positioning Service Security Module (U), 12 March 1998. | Application Platform Entity- Communication Services and Application Platform Entity- Security Services and 4D, 3L Interface | This standard maps to the Communication Services, Security Services and 4D, 3L Interface because it applies to standards for not only transmitting navigational information but also limiting access to the navigational information through the use of cryptography.  | <ul style="list-style-type: none"> <li>• The PPS was designed primarily for U.S. military use, and the DoD will control access to the PPS through cryptography. DoD GPS users with combat, combat support, or combat service support missions must acquire and use PPS-capable GPS receivers. The U.S. will enter into special arrangements with military users of allied and friendly governments to allow them use of the PPS. [JTA]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Multilevel security cuts across all aspects of the system and adds an additional complexity to the hardware and software that interacts with the rest of the system. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
| 2.3.2.2.1 Internetworking (Router) Standards | IETF RFC- 1812, Requirements for IP Version 4 Routers, 22 June 1995  | Application Platform Entity- Communications Services and 3L Interface   | This standard maps to the Communication Services and 3L Interfaces because it supports the transfer or routing of data over a network.   | <ul style="list-style-type: none"> <li>• This memo defines and discusses requirements for devices that perform the network layer forwarding function of the Internet protocol suite. The Internet community usually refers to such devices as IP routers or simply routers. [<a href="http://www.ietf.org/rfc/rfc1812.txt">http://www.ietf.org/rfc/rfc1812.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|----------------------------|---|---|---|---|
|                            | IETF Standard 6/ RFC-768, User Datagram Protocol, 28 August 1980        | Application Platform Entity-Communications Services and 3L Interface                              | This standard maps to the Communication Service because it describes the network communication services offered by UDP. This standard maps to the 3L Interface because it describes the functions performed by UDP.   | <ul style="list-style-type: none"> <li>This User Datagram Protocol (UDP) is defined to make available a datagram mode of packet-switched computer communication in the environment of an interconnected set of computer networks. [<a href="http://www.ietf.org/rfc/rfc0768.txt">http://www.ietf.org/rfc/rfc0768.txt</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF Standard 7/ RFC-793, Transmission Control Protocol, September 1981 | Application Platform Entity-Communications Services and 3L Interface                              | This standard maps to the Communication Service because it describes the packetized communication services offered by TCP. This standard maps to the 3L Interface because it describes the functions performed by TCP.  | <ul style="list-style-type: none"> <li>This document describes the functions to be performed by the Transmission Control Protocol, the program that implements it, and its interface to programs or users that require its services. [<a href="http://www.ietf.org/rfc/rfc0793.txt">http://www.ietf.org/rfc/rfc0793.txt</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | IETF Standard 8/ RFC-854/ RFC- 855, TELNET Protocol, May 1983           | Application Platform Entity-Communication Services and Design Considerations and 4D, 3L Interface | This standard maps to the Communication Services because it describes how Telnet allows interfacing terminal devices or processes to communicate to each other over the network. It also maps to the 4D, 3L Interface because it contains a description of the Telnet control functions and commands used by user applications to interface to the Telnet services. This standard maps to the Design Considerations because it describes the documentation that's required for new options. | <ul style="list-style-type: none"> <li>The purpose of the TELNET Protocol is to provide a fairly general, bi-directional, eight-bit byte oriented communications facility. Its primary goal is to allow a standard method of interfacing terminal devices and terminal-oriented processes to each other. It is envisioned that the protocol may also be used for terminal-terminal communication ("linking") and process-process communication (distributed computation). [<a href="http://www.ietf.org/rfc/rfc0854.txt?number=854">http://www.ietf.org/rfc/rfc0854.txt?number=854</a>]</li> <li>This document specifies a method of option code assignment and standards for documentation of options. [<a href="http://www.ietf.org/rfc/rfc0855.txt?number=855">http://www.ietf.org/rfc/rfc0855.txt?number=855</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|--|---|--|---|
|                            | IETF Standard 13/ RFC-1034/ RFC- 1035, Domain Name System, November 1987 | Application Platform Entity- Communications Services and 3L Interface | This standard maps to Communication Services because it describes how applications use DNS to access information about objects stored in the DNS database. It also maps to the 3L Interface because it defines what a query into the DNS looks like but doesn't actually define any API's. | <ul style="list-style-type: none"> <li>This RFC introduces domain style names, their use for Internet mail and host address support, and the protocols and servers used to implement domain name facilities. [http://www.ietf.org/rfc/rfc1034.txt?number=1034]</li> <li>This RFC describes the details of the domain system and protocol, and assumes that the reader is familiar with the concepts discussed in a companion RFC, "Domain Names - Concepts and Facilities" [RFC-1034]. The domain system is a mixture of functions and data types which are an official protocol and functions and data types which are still experimental. [http://www.ietf.org/rfc/rfc1035.txt?number=1035]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | IETF RFC- 951, Bootstrap Protocol, 1 September 1985                      | Application Platform Entity- Communication Services and 3L Interface  | This standard maps to the Communication Services and 3L Interface because it describes how a client machine uses the bootstrap protocol to retrieve its IP and bootfile from a server machine on the network.  | <ul style="list-style-type: none"> <li>This RFC describes an IP/UDP bootstrap protocol (BOOTP) which allows a diskless client machine to discover its own IP address, the address of a server host, and the name of a file to be loaded into memory and executed. The bootstrap operation can be thought of as consisting of TWO PHASES. This RFC describes the first phase, which could be labeled 'address determination and bootfile selection'. After this address and filename information is obtained, control passes to the second phase of the bootstrap where a file transfer occurs. [http://www.ietf.org/rfc/rfc0951.txt?number=951]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF RFC- 2132, DHCP Options and BOOTP Vendor Extensions, March 1997     | Application Platform Entity- Communication Services and 3L Interface  | This standard describes options for use with BOOTP and DHCP. This standard maps the same as these two standards.   | <ul style="list-style-type: none"> <li>This document specifies options for use with both the Dynamic Host Configuration Protocol and the Bootstrap Protocol. [http://www.ietf.org/rfc/rfc2132.txt?number=2132]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes  |
|----------------------------|--|---|--|--|
|                            | IETF RFC- 2131, Dynamic Host Configuration Protocol, March 1997  | Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>3L Interface | This standard maps to the Communication Services and 3L Interface because it describes how DHCP servers allocate IP addresses and deliver configuration information to clients over the network. | <ul style="list-style-type: none"> <li>• The Dynamic Host Configuration Protocol (DHCP) provides a framework for passing configuration information to hosts on a TCPIP network. DHCP is based on the Bootstrap Protocol (BOOTP) [7], adding the capability of automatic allocation of reusable network addresses and additional configuration options. [http://www.ietf.org/rfc/rfc2131.txt?number=2131]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF RFC- 1542, Clarifications and Extensions for the Bootstrap Protocol, October 1993                 | Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>3L Interface | This standard describes options for use with BOOTP. This standard maps the same as that standard.  | <ul style="list-style-type: none"> <li>• Some aspects of the BOOTP protocol were rather loosely defined in its original specification. In particular, only a general description was provided for the behavior of "BOOTP relay agents" (originally called BOOTP forwarding agents"). The client behavior description also suffered in certain ways. This memo attempts to clarify and strengthen the specification in these areas. [http://www.ietf.org/rfc/rfc1542.txt]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | IETF Standard 33/ RFC-1350, The TFTP Protocol Revision2, July 1992, to be used for initialization only | Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>3L Interface | This standard is similar to the FTP standard except it can only read and write files from/to a remote server. It maps to the Communication Services and 3L Interface.                            | <ul style="list-style-type: none"> <li>• TFTP is a very simple protocol used to transfer files. It is from this that its name comes, Trivial File Transfer Protocol or TFTP. Each nonterminal packet is acknowledged separately. This document describes the protocol and its types of packets. The document also explains the reasons behind some of the design decisions. [http://www.ietf.org/rfc/rfc1350.txt]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area       | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------------|--|--|---|--|
| 2.3.2.2.1.1<br>Internet Protocol | IETF Standard 5/ RFC-791/ RFC- 950/ RFC-919/ RFC- 922/ RFC-792/ RFC- 1112, Internet Protocol, September 1981 | Application Platform Entity- Communications Services and<br>Application Platform Entity- Physical Environment Services and<br>3L, 2L Interface | These standards map to the Communication Services and the 3L Interface because they support the transfer or routing of data over a network. They also map to the Physical Environment Services and 2L Interface in the cases where there isn't a link layer underneath the network layer (e.g. radio will often use IP as a link layer)       | <ul style="list-style-type: none"> <li>• This document specifies the DoD Standard Internet Protocol. ... This edition revises aspects of addressing, error handling, option codes, and the security, precedence, compartments, and handling restriction features of the internet protocol. [http://www.ietf.org/rfc/rfc0791.txt?number=791]</li> <li>• The Internet Protocol (IP) [1] is used for host-to-host datagram service in a system of interconnected networks called the Catenet [2]. [ftp://ftp.isi.edu/in-notes/rfc792.txt]</li> <li>• ROADCASTING INTERNET DATAGRAMS ... We propose simple rules for broadcasting Internet datagrams on local networks that support broadcast, for addressing broadcasts, and for how gateways should handle them. [ftp://ftp.isi.edu/in-notes/rfc919.txt]</li> <li>• ROADCASTING INTERNET DATAGRAMS IN THE PRESENCE OF SUBNETS... We propose simple rules for broadcasting Internet datagrams on local networks that support broadcast, for addressing broadcasts, and for how gateways should handle them. [http://www.ietf.org/rfc/rfc0922.txt?number=922]</li> <li>• This memo specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. [ftp://ftp.isi.edu/in-notes/rfc1112.txt]</li> <li>• This memo discusses the utility of "subnets" of Internet networks, which are logically visible sub-sections of a single Internet network. [http://www.ietf.org/rfc/rfc0950.txt?number=950]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                                  | IETF Informational RFC-1770, IPv4 Option for Sender Directed Multi-Destination Delivery, March 1995          | Application Platform Entity- Communications Services and<br>3L Interface   | These standards map to the Communication Services because it describes the network communication services (multicast type services). This standard maps to the 3L Interface because it describes the format of an SDBM datagram that applications at the Application Platform level can use to access the multi-destination delivery service. | <ul style="list-style-type: none"> <li>• This memo defines an IPv4 option to provide a sender directed multi-destination delivery mechanism called Selective Directed Broadcast Mode (SDBM). The SDBM provides unreliable UDP delivery to a set of IP addresses included in the option field of an IPv4 datagram. [http://www.ietf.org/rfc/rfc1770.txt]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area               | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes  |
|--|---|---|---|--|
| 2.3.2.2.1.2.1<br>Interior Routers        | IETF Standard 54/ RFC-2328, Open Shortest Path First Routing Version 2, April 1998, for unicast routing   | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communication Services because it applies to network communication and internet routing. This standard maps to the 3L Interface because it describes a routing protocol that can be used by entities (routers) at the Application Platform level.             | <ul style="list-style-type: none"> <li>• This memo documents version 2 of the OSPF protocol. OSPF is a link-state routing protocol. It is designed to be run internal to a single Autonomous System. Each OSPF router maintains an identical database describing the Autonomous System's topology. From this database, a routing table is calculated by constructing a shortest-path tree. [<a href="http://www.ietf.org/rfc/rfc2328.txt">http://www.ietf.org/rfc/rfc2328.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>           |
| 2.3.2.2.1.2.2<br>Exterior Routers        | IETF RFC- 1771, Border Gateway Protocol 4, (BGP- 4) 21 March 1995   | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communication Services because it applies to network communication and internet routing. This standard maps to the 3L Interface because it describes a routing protocol that can be used by entities (gateways or routers) at the Application Platform level. | <ul style="list-style-type: none"> <li>• This document, together with its companion document, "Application of the Border Gateway Protocol in the Internet", define an inter-autonomous system routing protocol for the Internet. [<a href="http://www.ietf.org/rfc/rfc1771.txt">http://www.ietf.org/rfc/rfc1771.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|  | IETF RFC- 1772, Application of BGP- 4 In the Internet, March 1995   | Design Considerations   | This standard maps to Design Considerations because it describes the usage of BGP-4 in the Internet.  | <ul style="list-style-type: none"> <li>• This document, together with its companion document, "A Border Gateway Protocol 4 (BGP-4)", define an inter-autonomous system routing protocol for the Internet. "A Border Gateway Protocol 4 (BGP-4)" defines the BGP protocol specification, and this document describes the usage of the BGP in the Internet. [<a href="http://www.ietf.org/rfc/rfc1772.txt">http://www.ietf.org/rfc/rfc1772.txt</a>]</li> </ul>   |
| 2.3.2.2.2.1<br>Local Area Network Access | ISO/ IEC 8802- 3: 1996, Carrier Sense Multiple Access with Collision Detection (CSMA/ CD) Access Method and Physical Layer Specifications, 10BASE-T Medium- Access Unit (MAU) | External Environment Entity - Networks and 2D Interface               | This standard describes 10 Base-T. It maps to the External Environment and 2D Interface because it describes the services and interfaces that CSMA/CD provides to entities at the Application Platform level.   | <ul style="list-style-type: none"> <li>• While no specific Local Area Network (LAN) technology is mandated, the following is required for interoperability in a joint environment. This requires provision for a LAN interconnection. Ethernet, the implementation of Carrier Sense Multiple Access with Collision Detection (CSMA/ CD), is the most common LAN technology in use with TCP/IP. The hosts use a CSMA/CD scheme to control access to the transmission medium. An extension to Ethernet, Fast Ethernet provides interoperable service at both 10 Mbps and 100 Mbps. Higher-speed interconnections are provided by 100BASE-TX [JTA]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes   |
|----------------------------|--|---|---|---|
|                            | IEEE 802.3u- 1995, Supplement to ISO/ IEC 8802- 3: 1993, Local and Metropolitan Area Networks: Media Access Control (MAC) Parameters, Physical Layer, Medium Attachment Units, and Repeater for 100 Mbp/s Operation, Type 100BASE- T (Clauses 21-30) | External Environment Entity - Networks and 2D Interface               | This standard describes 100 Base-T. It maps to the External Environment and 2D Interface because it describes services and interfaces provided to entities at the Application Platform level.   | <ul style="list-style-type: none"> <li>While no specific Local Area Network (LAN) technology is mandated, the following is required for interoperability in a joint environment. This requires provision for a LAN interconnection. Ethernet, the implementation of Carrier Sense Multiple Access with Collision Detection (CSMA/ CD), is the most common LAN technology in use with TCP/IP. The hosts use a CSMA/CD scheme to control access to the transmission medium. An extension to Ethernet, Fast Ethernet provides interoperable service at both 10 Mbps and 100 Mbps. Higher-speed interconnections are provided by 100BASE-TX [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|                            | IETF Standard 41/ RFC-894, Standard for the Transmission of IP Datagrams Over Ethernet Networks, April 1984  | 3L Interface  | This standard maps to the 3L Interface because it describes an interface for either transmitting or accepting IP datagrams. This interface is used only by applications at the Application Platform level.  | <ul style="list-style-type: none"> <li>This RFC specifies a standard method of encapsulating Internet Protocol (IP) [1] datagrams on an Ethernet. [<a href="http://www.ietf.org/rfc/rfc0894.txt">http://www.ietf.org/rfc/rfc0894.txt</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF Standard 37/ RFC-826, An Ethernet Address Resolution Protocol, November 1982  | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communication Services and 3L Interface because describes the format of packets sent to the address resolution module and the procedure used in the address resolution module to convert to and from an Ethernet address. | <ul style="list-style-type: none"> <li>The implementation of protocol P on a sending host S decides, through protocol P's routing mechanism, that it wants to transmit to a target host T located some place on a connected piece of 10Mbit Ethernet cable. To actually transmit the Ethernet packet a 48.bit Ethernet address must be generated. The addresses of hosts within protocol P are not always compatible with the corresponding Ethernet address (being different lengths or values). Presented here is a protocol that allows dynamic distribution of the information needed to build tables to translate an address A in protocol P's address space into a 48.bit Ethernet address. [<a href="http://www.ietf.org/rfc/rfc0826.txt">http://www.ietf.org/rfc/rfc0826.txt</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area              | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|---|--|--|--|---|
| 2.3.2.2.2.2<br>Point to Point Standards | IETF Standard 51/ RFC-1661/ RFC- 1662, Point-to- Point Protocol (PPP), July 1994 | Application Platform Entity- Communications Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces | This standard maps to the Physical Environment because it describes a service at the physical resource layer. This standard maps to the Communications Services in the case where PPP runs over Ethernet. It also maps to the 3L, 2L Interfaces because it defines peer to peer interfaces used at these levels. | <ul style="list-style-type: none"> <li>• This document defines the PPP organization and methodology, and the PPP encapsulation, together with an extensible option negotiation mechanism which is able to negotiate a rich assortment of configuration parameters and provides additional management functions. [<a href="http://www.ietf.org/rfc/rfc1661.txt">http://www.ietf.org/rfc/rfc1661.txt</a>]</li> <li>• This document describes the use of HDLC-like framing for PPP encapsulated packets. [<a href="http://www.ietf.org/rfc/rfc1662.txt">http://www.ietf.org/rfc/rfc1662.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |
|   | IETF RFC- 1332, PPP Internet Protocol Control Protocol (IPCP), May 1992          | Application Platform Entity- Communications Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces | This standard is part of the PPP standard and maps the same as that standard.  | <ul style="list-style-type: none"> <li>• The Point-to-Point Protocol (PPP) [1] provides a standard method of encapsulating Network Layer protocol information over point-to-point links. PPP also defines an extensible Link Control Protocol, and proposes a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols. This document defines the NCP for establishing and configuring the Internet Protocol [2] over PPP, and a method to negotiate and use Van Jacobson TCP/IP header compression [3] with PPP. [<a href="http://www.ietf.org/rfc/rfc1332.txt">http://www.ietf.org/rfc/rfc1332.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|--|---|--|---|
|                            | IETF RFC- 1989, PPP Link Quality Monitoring (LQM), 16 August 1996                      | Application Platform Entity- Communications Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces  | This standard is part of the PPP standard and maps the same as that standard.  | <ul style="list-style-type: none"> <li>• The Point-to-Point Protocol (PPP) [1] provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP also defines an extensible Link Control Protocol, which allows negotiation of a Quality Protocol for continuous monitoring of the viability of the link. This document defines a protocol for generating Link-Quality-Reports. [<a href="http://www.ietf.org/rfc/rfc1989.txt">http://www.ietf.org/rfc/rfc1989.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |
|                            | IETF RFC- 1994, PPP Challenge Handshake Authentication Protocol (CHAP), 30 August 1996 | Application Platform Entity- Communications Services and Application Platform Entity- Security Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces | This standard is part of the PPP standard and maps the same as that standard. It also maps to the Security Services because it describes authentication. | <ul style="list-style-type: none"> <li>• The Point-to-Point Protocol (PPP) [1] provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP also defines an extensible Link Control Protocol, which allows negotiation of an Authentication Protocol for authenticating its peer before allowing Network Layer protocols to transmit over the link. This document defines a method for Authentication using PPP, which uses a random Challenge, with a cryptographically hashed Response which depends upon the Challenge and a secret key. [<a href="http://www.ietf.org/rfc/rfc1994.txt">http://www.ietf.org/rfc/rfc1994.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|--|--|---|---|
|                            | IETF RFC- 1570, PPP Link Control Protocol (LCP) Extensions, January 1994   | Application Platform Entity- Communications Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces | This standard is part of the PPP standard and maps the same as that standard.   | <ul style="list-style-type: none"> <li>• The Point-to-Point Protocol (PPP) [1] provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP defines an extensible Link Control Protocol (LCP) for establishing, configuring, and testing the data-link connection. This document defines several additional LCP features which have been suggested over the past few years. [<a href="http://www.ietf.org/rfc/rfc1570.txt">http://www.ietf.org/rfc/rfc1570.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                            | EIA/ TIA 232- F, Interface Between Data Terminal Equipment and Data Circuit Terminating Equipment Employing Serial Binary Data Interchange, October 1997.  | External Environment Entity – Networks and 1D Interface  | This standard maps to the External Environment Entity and 1D Interface because it describes the physical interface to computer hardware (e.g. RS232). | <ul style="list-style-type: none"> <li>• For the serial line interface, one of the following is mandated [JTA]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>   |
|                            | EIA/ TIA 530- A, High Speed 25- Position Interface for Data Terminal Equipment and Data Circuit- Terminating Equipment, Including Alternative 26- Position Connector, December 1998 (This calls out EIA/ TIA 422- B and 423- B.) | External Environment Entity – Networks and 1D Interface  | This standard maps to the External Environment Entity and 1D Interface because it describes the physical interface to computer hardware.              | <ul style="list-style-type: none"> <li>• For the serial line interface, one of the following is mandated [JTA]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                       | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|--|---|---|---|---|
| 2.3.2.2.3<br>Combat Net Radio Networking         | MIL- STD- 188- 220B, Interoperability Standard for Digital Message Transfer Device (DMTD) Subsystems, 20 January 1998                           | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communication Services and 4D Interface because it applies to standards and interfaces for computer networks.             | <ul style="list-style-type: none"> <li>This MIL-STD promulgates the minimum essential technical parameters in the form of mandatory system standards and optional design objectives for interoperability and compatibility among DMTDs, and between DMTDs and applicable C4I systems. These technical parameters are based on the data communications protocol standards specified herein to ensure interoperability. [<a href="http://astimage.daps.dla.mil/online/parms/mainframe.cfm">http://astimage.daps.dla.mil/online/parms/mainframe.cfm</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.3.2.2.4<br>Integrated Services Digital Network | ANSI T1. 601, ISDN Basic Access Interface for Use on Metallic Loops for Application on the Network Side of the NT (Layer 1 Specification), 1992 | External Environment Entity - Networks and 1D Interface               | This standard maps to the External Environment Entity Services and 1D Interface because it describes the physical characteristics of ISDN networks. | <ul style="list-style-type: none"> <li>Provides the minimal set of requirements necessary to provide for satisfactory transmission between the network and the NT, while conforming, wherever possible, with the I-Series of CCITT Recommendations, while not compromising the principles of evolution expressed therein. Equipment may be implemented with additional functions and procedures. This standard presents the electrical characteristics of the ISDN Basic Access signals appearing at the network side of the NT. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%E601%2D1992">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%E601%2D1992</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|  | ANSI T1. 605, ISDN Basic Access Interface for S and T Reference Points – Layer 1 Specification, 1991  | External Environment Entity - Networks and 2D Interface               | This standard maps to the External Environment Entity and 2D Interface because it describes the physical characteristics of ISDN networks.          | <ul style="list-style-type: none"> <li>Defines layer-1 characteristics of the user-network interface to be applied at the S or T reference points for the basic interface structure. Specifies the means of connecting a user's terminals to an ISDN basic access network termination function CISDN, NT1, or NT2. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%E605%2D1991">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%E605%2D1991</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|  | ANSI T1. 408, ISDN Primary Rate - Customer Installation Metallic Interfaces (Layer 1 Specification), 1990                                       | External Environment Entity - Networks and 1D Interface               | This standard maps to the External Environment Entity and 1D Interface because it describes the physical characteristics of ISDN networks.          | <ul style="list-style-type: none"> <li>Provides the requirements for ISDN primary rate electrical interface specifications for a network to customer installation and between various customer premises equipment. Requirements include electrical characteristics, format parameters and physical characteristics. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%E403%2E01%2D1999">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%E403%2E01%2D1999</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|--|--|---|---|
|                            | ANSI T1. 602, ISDN Data Link Signaling Specification for Application at the User Network Interface, 1996                                   | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the signaling specification for ISDN and the interfaces between the user and the network. | <ul style="list-style-type: none"> <li>Specifies the Link Access Procedure on the D-Channel LAPD. The purpose of LAPD is to convey information between layer-3 entities across the ISDN user-network interface using the D-channel. LAPD is a protocol operating at the data-link layer of the OSI architecture. Frame structure, elements of procedure, format of fields, and procedures for the proper operation of LAPD are specified. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E602%2D1996">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E602%2D1996</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                            | ANSI T1. 607, Digital Subscriber Signaling System No. 1 (DSS1) - Layer 3 Signaling Specification for Circuit Switched Bearer Service, 1998 | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the ISDN networks and the interface between the user and the network.                     | <ul style="list-style-type: none"> <li>Specifies the procedures for the establishing, maintaining, and clearing of network connections at the Integrated Services Digital Network (ISDN) user-network interface for support of circuit-switched calls. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E607%2D1998">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E607%2D1998</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |
|                            | ANSI T1. 610, DSS1 - Generic Procedures for the Control of ISDN Supplementary Services, 1994   | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the ISDN networks and the interface between the user and the network.                     | <ul style="list-style-type: none"> <li>Specifies the generic procedures applicable for the control of ISDN supplementary services at the user-network interface. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E610%2D1998">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E610%2D1998</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |
|                            | ANSI T1. 619, Multi-Level Precedence and Preemption (MLPP) Service, ISDN Supplementary Service Description, 1992                           | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the ISDN networks and the interface between the user and the network.                     | <ul style="list-style-type: none"> <li>Allows maximum compatibility among network- and user-owned telecommunications equipment in order to increase the attractiveness and usefulness of ISDN-based capabilities. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E619%2D1992">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E619%2D1992</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|----------------------------|---|--|--|---|
|                            | ANSI T1. 619a, Supplement, 1994.  | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the ISDN networks and the interface between the user and the network.. | <ul style="list-style-type: none"> <li>Allows maximum compatibility among network- and user-owned telecommunications equipment in order to increase the attractiveness and usefulness of ISDN-based capabilities. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E619a%2D1994">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E619a%2D1994</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>   |
|                            | ANSI T1. 111, Signaling System No. 7, Message Transfer Part, 1996.                                    | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes a signaling protocol (e.g. used in phone systems)                      | <ul style="list-style-type: none"> <li>Based on, and generally compatible with, the 1988 Blue Book specification of Signaling System No. 7 for international use issued by CCITT. Appropriately modified for use within and between US networks to meet anticipated needs and applications. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E111%2D1996">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E111%2D1996</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>   |
|                            | ANSI T1. 112, Signaling System No. 7, Signaling Connection Control Part Functional Description, 1996. | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it contains standards for communicating over ISDN networks                          | <ul style="list-style-type: none"> <li>Provides additional functions to the Message Transfer Part (MTP) to provide both connectionless as well as connection-oriented network services to transfer circuit-related and non-circuit-related signaling information and other types of information between exchanges and specialized centers in telecommunication networks (e.g., for management and maintenance purposes) via a Signaling System No. 7 (SS7) network. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E112%2D1996">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E112%2D1996</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                            | ANSI T1. 113, Signaling System No. 7, ISDN User Part, 1995.   | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the ISDN networks and the interface between the user and the network.  | <ul style="list-style-type: none"> <li>Defines the protocol that supports the signaling functions required to provide voice and non-voice services in an Integrated Services Digital Network (ISDN). [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E113%2D1995">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E113%2D1995</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------|---|--|---|--|
|                            | ANSI T1. 114, Signaling System No. 7, Transaction Capability Application Part, 1996.  | Application Platform Entity – Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and the 2L Interface because it describes the ISDN networks and the interface between the user and the network.                     | <ul style="list-style-type: none"> <li>• Specifies Transaction Capabilities (TC) for Signaling System Number 7 (SS7). The term, Transaction Capabilities refers to the Application layer protocol, called Transaction Capabilities Application Part (TCAP), plus the supporting Presentation, Session, and Transport layers, called the Application Service Part (ASP). To date, only SS7 MTP plus SCCP transport has been considered. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E114%2D1996">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E114%2D1996</a>]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul>   |
|                            | SR- 3875, National ISDN 2000, Telcordia (formerly Bellcore), May 1999.  | Application Platform Entity- Physical Environment Services and 2L Interface  | This standard maps to the Physical Environment Services and the 2L Interface because it contains standards for communicating over ISDN networks.  | <ul style="list-style-type: none"> <li>• National ISDN-2000 (NI-2000) is a program comprised of features and capabilities that are generally available from two or more of the three National ISDN switch suppliers by the end of the first quarter of 2000. Since the National ISDN program is cumulative, capabilities that are first available in NI-95, -96, -97, -98, or -99 are also part of NI-2000. SR-3875, "National ISDN 2000," provides an overview of NI-2000 capabilities, as well as a summary of changes to the feature content of the previous NI programs. [<a href="http://telecom-info.telcordia.com/site-cgi/ido/index.html">http://telecom-info.telcordia.com/site-cgi/ido/index.html</a>]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                            | SR- 4620, 1999 Version of National ISDN Basic Rate Interface Customer Premise Equipment Generic Guidelines, Telcordia, December 1998. | Design Considerations  | This standard maps to the Design Considerations because it contains guidelines for the use of Terminal Equipment (TE) that subscribe to public network Integrated Services Digital Network. | <ul style="list-style-type: none"> <li>• SR-4995 provides the Telcordia view of proposed generic guidelines for Terminal Equipment (TE) that subscribe to public network Integrated Services Digital Network (ISDN) capabilities over a Basic Rate Interface (BRI). These generic guidelines cover ISDN call control and supplementary services for circuit-mode and packet-mode calls from the terminal's perspective. The purpose of this document is to provide the Telcordia view of proposed generic guidelines intended to describe terminal compatibility issues with the network-provided ISDN BRI offering for National ISDN capabilities that will be available in 2000. This document completely replaces the guidelines that were provided in SR-4620, "1999 Version of National ISDN Basic Rate Interface Terminal Equipment Generic Guidelines." [<a href="http://telecom-info.telcordia.com/site-cgi/ido/index.html">http://telecom-info.telcordia.com/site-cgi/ido/index.html</a>]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------|--|--|---|--|
|                            | SR- 4619, 1998 Version of National ISDN Primary Rate Interface Customer Premise Equipment Generic Guidelines, Telecordia, December 1998. | Design Considerations  | This standard maps to the Design Considerations because it contains guidelines for the use of Customer Premises Equipment (CPE) that subscribe to public network Integrated Services Digital Network. | <ul style="list-style-type: none"> <li>SR-4994 provides the Telcordia view of proposed generic guidelines for Customer Premises Equipment (CPE) that subscribe to public network Integrated Services Digital Network (ISDN) capabilities over a Primary Rate Interface (PRI). These generic guidelines cover ISDN call control and supplementary services for circuit-mode and packet-mode calls from the CPE's perspective. The purpose of this document is to provide the Telcordia view of proposed generic guidelines intended to describe CPE compatibility issues with the network-provided ISDN PRI offering for National ISDN capabilities that will be available in 2000. This document completely replaces SR-4619, "1999 Version of National ISDN Primary Rate Interface Customer Premises Equipment Generic Guidelines." [<a href="http://telecom-info.telcordia.com/site-cgi/ido/index.html">http://telecom-info.telcordia.com/site-cgi/ido/index.html</a>]</li> </ul>                                    |
|                            | ITU- T E. 164, Numbering Plan for the ISDN Era, May 1997   | Design Consideration   | This standard provides a numbering structure scheme for international telecommunications using ISDN. This standard maps to Design Consideration.  | <ul style="list-style-type: none"> <li>This Recommendation provides the number structure and functionality for the three categories of numbers used for international public telecommunication - they are geographic areas, global services and Networks. For each of the categories, it details the components of the numbering structure and the digit analysis required to successfully route the calls. [<a href="http://www.itu.int/itudoc/itu-t/rec/e/s_e164.txt">http://www.itu.int/itudoc/itu-t/rec/e/s_e164.txt</a>]</li> </ul>   |
|                            | DISA Circular (DISAC) 310- 225- 1, Defense Switched Network (DSN) User Services Guide, 2 April 1998                                      | Design Consideration   | This standard maps to Design Considerations because it prescribes policies, procedures and responsibility for the use of DSN.   | <ul style="list-style-type: none"> <li>This Circular prescribes policy, provides procedures, and assigns responsibility for ordering and for using the features and services of the Defense Switched Network (DSN). [<a href="http://www.disa.mil/pubs/circulars/dc3102251.html">http://www.disa.mil/pubs/circulars/dc3102251.html</a>]</li> </ul>   |
|                            | IETF RFC- 1356, Multiprotocol Interconnect on X. 25 and ISDN in the Packet Mode, 6 August 1992   | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 3L, 2L Interface | This standard maps to the Communications Services, Physical Environment Services and the 3L, 2L Interfaces because it contains standards for using IP and other protocols over ISDN networks.         | <ul style="list-style-type: none"> <li>This document specifies the encapsulation of IP and other network layer protocols over X.25 networks, in accordance and alignment with ISO/IEC and CCITT standards. It is a replacement for RFC 877, "A Standard for the Transmission of IP Datagrams Over Public Data Networks" [<a href="http://www.ietf.org/rfc/rfc1356.txt">http://www.ietf.org/rfc/rfc1356.txt</a>]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area           | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|--------------------------------------|---|--|--|---|
|                                      | IETF RFC- 1618, PPP over ISDN, 13 May 1994  | Application Platform Entity- Communications Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces | This standard maps to the Communications Services, Physical Environment Services and the 3L, 2L Interfaces because it contains standards for using PPP over ISDN networks. | <ul style="list-style-type: none"> <li>The Point-to-Point Protocol (PPP) [1] provides a standard method for transporting multi-protocol datagrams over point-to-point links. This document describes the use of PPP over Integrated Services Digital Network (ISDN) switched circuits. [<a href="http://www.ietf.org/rfc/rfc1618.txt">http://www.ietf.org/rfc/rfc1618.txt</a>]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
| 2.3.2.2.5 Asynchronous Transfer Mode | ATM Forum, af- phy- 0040.000, Physical Interface Specification for 25.6 Mbps over twisted pair, November 1995               | External Environment Entity - Networks and 1D, 1L Interface  | This standard maps to the External Environment Entity and 1D, 1L Interface because it describes the physical layer of ATM networks.  | <ul style="list-style-type: none"> <li>This document specifies the physical layer for the 25.6 Mbit/s Private UNI. The physical layer is divided into a Physical Media Dependent sublayer (PMD) and a Transmission Convergence (TC) sublayer. The PMD sublayer provides the specifications for the transmitter, the receiver, timing recovery, media interface connector and the channel transmission media. The TC sublayer defines the line coding, scrambling, data framing and synchronization. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0040.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0040.000.pdf</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul>  |
|                                      | ATM Forum, af- uni- 0010.002, ATM UNI Specification V3.1, Section 1 and 2.4, September 1994                                 | Application Platform Entity- Communications Services and 3L Interface  | This standard describes the connection between an ATM host and an ATM switch. It maps to the Communications Services and the 3L Interface.                                 | <ul style="list-style-type: none"> <li>The ATM Forum's User-Network Interface (UNI) Specification defines the primary specification for end-system connection to ATM networks. [JTA]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                                      | ATM Forum, af- phy- 0015.000, ATM Physical Medium Dependent Interface for 155 Mbps over Twisted Pair Cable, September 1994. | External Environment Entity - Networks and 1D, 1L Interface  | This standard maps to the External Environment Entity and 1D, 1L Interface because it describes the physical layer of ATM networks.  | <ul style="list-style-type: none"> <li>This specification describes the Physical Medium Dependent (PMD) sublayer for a 155.52 Mb/s private User Network Interface (UNI) over twisted pair cabling. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0015.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0015.000.pdf</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|----------------------------|---|---|---|---|
|                            | ATM Forum, af- phy-0016.000, DS1 Physical Layer Specification, September 1994         | External Environment Entity - Networks and 1D, 1L Interface | This standard maps to the External Environment Entity and 1D, 1L Interface because it describes the physical layer of ATM networks. | <ul style="list-style-type: none"> <li>• This DS1 ATM UNI specification for a 1.544 Mbps interface rate is based on ANSI T1 (T1E1 LB 93-05) and ITU (G.804) documents to maintain consistency with existing standards for ATM over DS1. [ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0016.000.pdf]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>  |
|                            | ATM Forum, af- phy-0054.000, DS3 Physical Layer Interface Specification, January 1996 | External Environment Entity - Networks and 1D, 1L Interface | This standard maps to the External Environment Entity and 1D, 1L Interface because it describes the physical layer of ATM networks. | <ul style="list-style-type: none"> <li>• It describes the Physical Layer specifications for DS3 transmission systems used for ATM. [ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0054.000.pdf]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>   |
|                            | ATM Forum, af- phy-0046.000, 622.08 Mbp/ s Physical Layer Specification, January 1996 | External Environment Entity - Networks and 1D, 1L Interface | This standard maps to the External Environment Entity and 1D, 1L Interface because it describes the physical layer of ATM networks. | <ul style="list-style-type: none"> <li>• The 622.08 Mbps physical layer specification is based on the Synchronous Optical Network (SONET) and the Synchronous Digital Hierarchy (SDH) standards. These standards provide, through a framing structure, the payload envelope necessary for the transport of ATM cells as well as overhead bytes for the carriage of OAM information. The SONET/SDH OAM functions residing in the physical layer management (M-plane) are covered in section 4. The functions of the physical layer (U-plane) are grouped into the physical media dependent (PMD) sublayer (covered in section 2) and the transmission convergence (TC) sublayer (covered in section 3). This specification shall apply for 622.08 Mbps interfaces at the public UNI, the private UNI and the private NNI. [ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0046.000.pdf]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
|                            | ATM Forum, af- phy-0064.000, E1 Physical Interface Specification, September 1996.     | External Environment Entity - Networks and 1D, 1L Interface | This standard maps to the External Environment Entity and 1D, 1L Interface because it describes the physical layer of ATM networks. | <ul style="list-style-type: none"> <li>• This document specifies the requirements for the ATM Forum E1 Physical Layer interface operating at 2048 kbit/s. [ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0064.000.pdf]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|----------------------------|--|--|--|---|
|                            | ATM Forum, af- phy-0043.000, A Cell-based Transmission Convergence Sublayer for Clear Channel Interfaces, November 1995. | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and the 3L Interface because it contains standards and interfaces for ATM networks.      | <ul style="list-style-type: none"> <li>• The cell-based transmission convergence sublayer specified in this document is derived from the one defined in ITU-T Recommendation I.432 [1] for 155.52 and 622.08 Mbps optical interfaces but with modifications to make cell scrambling and physical layer OAM facilities optional. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0043.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-phy-0043.000.pdf</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | ATM Forum, af- uni-0010.002, ATM UNI Specification V 3.1, September 1994   | Application Platform Entity-Communications Services and 3L Interface | This standard describes the connection between an ATM host and an ATM switch. It maps to the Communications Services and the 3L Interface. | <ul style="list-style-type: none"> <li>• The ATM Forum's User-Network Interface (UNI) Specification defines the primary specification for end-system connection to ATM networks. [JTA]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ATM Forum, af- sig-0061.000, ATM UNI Signaling Specification, Version 4.0, July 1996                                     | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and the 3L Interface because it describes standards and interfaces for ATM networks.     | <ul style="list-style-type: none"> <li>• This Specification provides the signalling procedures for dynamically establishing, maintaining and clearing ATM connections at the ATM User-Network Interface. The procedures are defined in terms of messages and the information elements used to characterize the ATM connection. The procedures included in this Specification apply to the interface between terminal or endpoint equipment and a public network, referred to as Public UNI, and terminal or endpoint equipment connected to a private network, referred to as Private UNI. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-sig-0061.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-sig-0061.000.pdf</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|----------------------------|---|--|--|---|
|                            | ATM Forum, af- ilmi-0065.000, Integrated Local Management (ILMI) Specification, Version 4.0, September 1996 | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interface because it contains standards for communicating network management information over ATM networks.     | <ul style="list-style-type: none"> <li>This document specifies how the Simple Network Management Protocol (SNMP) and an ATM Interface Management Information Base (MIB) are used to provide any ATM device (e.g. End-systems, Switches, etc.) with status and configuration information concerning the Virtual Path Connections, Virtual Channel Connections, registered ATM Network Prefixes, registered ATM Addresses, registered services, and capabilities available at its ATM Interfaces. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-ilmi-0065.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-ilmi-0065.000.pdf</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | ATM Forum, af- uni-0010.002, ATM UNI Specification V 3.1, (Section 4: ILMI for UNI 3.1), September 1994     | Application Platform Entity-Communications Services and 3L Interface | This standard describes the connection between the end-system and the ATM network. It maps to the Communications Services and 3L Interface.                              | <ul style="list-style-type: none"> <li>The ATM Forum's User-Network Interface (UNI) Specification defines the primary specification for end-system connection to ATM networks. [JTA]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ATM Forum, af- tm-0056-000, Traffic Management Specification, Version 4.0, April 1996                       | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and the 3L Interface because it contains standards for communicating network management information over ATM networks. | <ul style="list-style-type: none"> <li>ATM technology is intended to support a wide variety of services and applications. The control of ATM network traffic is fundamentally related to the ability of the network to provide appropriately differentiated Quality of Service (QoS) for network applications. This specification defines procedures and parameters related to Traffic Management and Quality of Service. A primary role of traffic management is to protect the network and the end-system from congestion in order to achieve network performance objectives. An additional role is to promote the efficient use of network resources. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-tm-0056.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-tm-0056.000.pdf</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|---|---|--|---|
|                            | ATM Forum, af- vtoa-0078.000, Circuit Emulation Service Interoperability Specification 2. 0, January 1997     | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communications Services and the 3L Interface because it contains standards for communicating network management information over ATM networks.           | <ul style="list-style-type: none"> <li>• This document -- referred to as the Circuit Emulation Service Interoperability Specification (CES-IS) -- specifies the ATM Forum's interoperability agreements for supporting CBR traffic over ATM networks that comply with the Forum's other interoperability agreements. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-vtoa-0078.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-vtoa-0078.000.pdf</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ITU- T I. 363.1, B- ISDN ATM Adaptation Layer Specification: Type 1 ATM Adaptation Layer (AAL1), August 1996. | Application Platform Entity- Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interfaces because it contains standards and interfaces for how ATM configures itself to carry constant bit-rate traffic. | <ul style="list-style-type: none"> <li>• Asynchronous-Transfer Mode (ATM) is a high-speed switched data transport technology that takes advantage of primarily low bit error rate transmission media to accommodate intelligent multiplexing of voice, data, video, and composite inputs over high-speed trunks and dedicated user links. ATM is a layered type of transfer protocol with the individual layers consisting of an ATM Adaptation Layer (AAL), the ATM layer, and the Physical Layer. The function of the AAL layer is to adapt any traffic (video streams, data packets from upper layer protocols) into the ATM format of 48-octet payload. It also receives the cells from the ATM layer and reassembles the protocol data units. [JTA]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|---|--|--|--|
|                            | ITU- T I. 363.5, B- ISDN ATM Adaptation Layer Specification: Type 5 ATM Adaptation Layer (AAL5), August 1996.     | Application Platform Entity- Communications Services and 3L Interface        | This standard maps to the Communications Services and 3L Interfaces because it contains standards and interfaces for how ATM configures itself to carry variable bit-rate traffic. | <ul style="list-style-type: none"> <li>The ATM Adaptation Layer (AAL) type 5 enhances the service provided by the ATM layer to support functions required by the next higher layer. This AAL performs functions required by the user, control and management planes and supports the mapping between the ATM layer and the next higher layer. The AAL type 5 supports the non-assured transfer of user data frames. The data sequence integrity is maintained and transmission errors are detected. The AAL type 5 is characterized by transmitting in every ATM cell (but the last) of a PDU 48 octets of user data, i.e., in most of the cells there is no overhead encountered. [<a href="http://www.itu.int/itudoc/itu-t/rec/I/s_j363-5.txt">http://www.itu.int/itudoc/itu-t/rec/I/s_j363-5.txt</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM] Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | ATM Forum, af- pnni-0055.000, Private Network to Network Interface (PNNI) Specification, Version 1.0, March 1996. | Application Platform Entity - Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and 2L Interface because it contains standards and interfaces for ATM switches so that they work well together             | <ul style="list-style-type: none"> <li>This document defines the PNNI protocol for use between private ATM switches, and between groups of private ATM switches. The abbreviation PNNI stands for either Private Network Node Interface or Private Network-to-Network Interface, reflecting these two possible usages. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-pnni-0055.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-pnni-0055.000.pdf</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM] Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |
|                            | ATM Forum, af- pnni-0066.000, PNNI Specification, Version 1.0 Addendum (Soft PVC MIB), September 1996.            | Application Platform Entity - Physical Environment Services and 2L Interface | This standard maps to the Physical Environment Services and 2L Interface because it contains standards and interfaces for ATM switches so that they work well together.            | <ul style="list-style-type: none"> <li>This document is an Addendum to the Private Network-Network Interface Specification Version 1.0 (af-pnni-0055.000). This addendum only introduces clarification for implementors of Soft PVCCs and Soft PVPCs and provides a MIB definition. This document does not replace af-pnni-0055.000 and must be used in conjunction with af-pnni-0055.000. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-pnni-0066.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-pnni-0066.000.pdf</a>]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM] Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|----------------------------|---|--|--|---|
|                            | ATM Forum, af-lane-0021.000, Local Area Network Emulation (LANE) Over ATM, Version 1.0, January 1995. | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interface because it contains standards for LAN emulation over ATM networks (i.e. how to make ATM look like Ethernet) | <ul style="list-style-type: none"> <li>In order to use the vast base of existing LAN application software, it is necessary to define an ATM service, herein called "LAN Emulation," that emulates services of existing LANs across an ATM network and can be supported via a software layer in end systems. Indeed, if such a LAN Emulation service is provided for an ATM network, then end systems (e.g. workstations, servers, bridges, etc.) can connect to the ATM network while the software applications interact as if they are attached to a traditional LAN. Also, this service will support interconnection of ATM networks with traditional LANs by means of today's bridging methods. This will allow interoperability between software applications residing on ATM-attached end systems and on traditional LAN end systems. [ftp://ftp.atmforum.com/pub/approved-specs/af-lane-0021.000.pdf]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | ATM Forum, af-lane-0038.000, LAN Emulation Client Management Specification, September 1995.           | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interface because it contains standards for LAN emulation over ATM networks (i.e. how to make ATM look like Ethernet) | <ul style="list-style-type: none"> <li>This document defines network management for LAN Emulation Clients. [ftp://ftp.atmforum.com/pub/approved-specs/af-lane-0038.000.pdf]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ATM Forum, af-lane-0050.00, LANE Over ATM, Version 1.0 Addendum, December 1995.                       | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interface because it contains standards for LAN emulation over ATM networks (i.e. how to make ATM look like Ethernet) | <ul style="list-style-type: none"> <li>This document is an Addendum to the LAN Emulation Over ATM: Version 1.0 Specification. Section and paragraph numbers reference the released Version 1.0 specification (af-lane-0021.000). This is a "delta" document to af-lane-0021.000, and does <i>not</i> replace it. This Addendum only introduces clarifications for implementors and additional explanatory text. [ftp://ftp.atmforum.com/pub/approved-specs/af-lane-0050.000.pdf]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|--|--|---|---|
|                            | ATM Forum, af-lane-0057.000, LANE Servers Management Specification 1.0, March 1996 | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interface because it contains standards for LAN emulation over ATM networks (i.e. how to make ATM look like Ethernet). | <ul style="list-style-type: none"> <li>ATM LAN Emulation emulates services of existing LANs across an ATM network. It provides a MAC layer service, specifically Ethernet/IEEE 802.3 and IEEE 802.5, over an ATM network. LAN emulation is described in the ATM Forum document "LAN Emulation Over ATM Specification - Version 1.0" [1]. This document describes how to manage some of the components in the LAN Emulation. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-lane-0057.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-lane-0057.000.pdf</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ATM Forum, af-mpoa-0087.000, Multi-Protocol Over ATM, Version 1.0, July 1997.      | Application Platform Entity-Communications Services and 3L Interface | This standard maps to the Communications Services and 3L Interface because it contains standards for moving IP over ATM networks.   | <ul style="list-style-type: none"> <li>The ATM Forum's LAN Emulation LANE provides Emulated LANs (ELANs) that emulate the services of Ethernet and Token Ring LANs across an ATM network. LANE provides many benefits including interoperation with Ethernet and Token Ring hardware and software, allowing a subnet to be bridged across an ATM/LAN boundary. LANE allows a single ATM network to support multiple ELANs. By using ELANs, internetwork layer protocols may operate over an ATM network in essentially the same way that they operate over Ethernet and Token Ring LANs. While LANE provides an effective means for bridging intra-subnet data across an ATM network, inter-subnet traffic still needs to be forwarded through routers. The IETF Internetworking Over NBMA Networks (ION) Working Group's Next Hop Resolution Protocol (NHRP) [NHRP] and Multicast Address Resolution Server (MARS) [MARS] protocols also allow internetwork layer protocols to operate over an ATM network. [<a href="ftp://ftp.atmforum.com/pub/approved-specs/af-mpoa-0087.000.pdf">ftp://ftp.atmforum.com/pub/approved-specs/af-mpoa-0087.000.pdf</a>]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | DoD ATM Addressing Plan, 17 April  | Design Considerations  | This standard maps to Design Considerations because it provides a plan for the implementation of ATM communications structures related to DISN.                                 | <ul style="list-style-type: none"> <li>The purpose of the DoD ATM Addressing Plan is to provide direction to relevant DoD authorities responsible for implementation of ATM communications infrastructures related to the DISN. [<a href="http://disa11.disa.atd.net/Atm_Spec/atmaddress_10.pdf">http://disa11.disa.atd.net/Atm_Spec/atmaddress_10.pdf</a>]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                  | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|---|--|---|---|--|
| 2.3.2.2.2.6                                 | IEEE 802.3-1998, Edition Information Technology (Clauses 34-42) – Telecommunications and Information Exchange Between Systems-Local and Metropolitan Area Networks-Specific Requirements—Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, (originally developed as IEEE 802.3z-1998). | External Environment Entity - Networks and 2D Interface | This standard describes gigabit Ethernet. It maps to the External Environment and 2D Interface because it describes the services and interfaces that CSMA/CD provides to entities at the Application Platform level.  | <ul style="list-style-type: none"> <li>While no specific LAN/CAN technology is mandated, where Gigabit Ethernet (1,000 Mbps service) over fiber on a campus environment, the following physical layer and framing requirements standard is mandated [JTA]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
| 2.3.2.3.1.1.1<br>5- and 25- kHz Service     | MIL-STD-188-181B, Interoperability Standard for Single Access 5- kHz and 25- kHz UHF Satellite Communications Channels, 20 March 1999.   | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For 5-KHz or 25-KHz single-channel access service supporting the transmission of either voice or data, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.3.2.3.1.1.2<br>5- kHz DAMA Service        | MIL-STD-188-182A, Interoperability Standard for 5 kHz UHF DAMA Terminal Waveform, 31 March 1997; with Notice of Change 1, 9 September 1998; and Notice of Change 2, 22 January 1999.   | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For 5-KHz Demand Assigned Multiple Access (DAMA) service, supporting the transmission of data at 75 to 2400 bps and digitized voice at 2400 bps, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.3.2.3.1.1.3<br>25- kHz TDMA/ DAMA Service | MIL-STD-188-183A, Interoperability Standard for 25 kHz TDMA/ DAMA Terminal Waveform (Including 5- and 25- Khz Slave Channels), 20 March 1998; with Notice of Change 1, dated 9 September 1998.   | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For 25-KHz Time Division Multiple Access (TDMA)/DAMA service, supporting the transmission of voice at 2,400, 4,800, or 16,000 bps and data at rates of 75 to 16,000 bps, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                 | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes  |
|--|---|---|---|--|
| 2.3.2.3.1.1.4<br>Data Control Waveform     | MIL-STD-188-184, Interoperability and Performance Standard for the Data Control Waveform, 20 August 1993; with Notice of Change 1, 9 September 1998.  | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For data controllers operating over single-access 5-KHz and 25-KHz UHF SATCOM channels, the following standard (a robust link protocol that can transfer error-free data efficiently and effectively over channels that have high error rates) is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
| 2.3.2.3.1.1.5<br>DAMA Control System       | MIL-STD-188-185, DoD Interface Standard, Interoperability of UHF MILSATCOM DAMA Control System, 29 May 1996; with Notice of Change 1, 1 December 1997; and Notice of Change 2, 9 September 1998.                            | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For the minimum mandatory interface requirements for MILSATCOM equipment that control access to DAMA UHF 5-KHz and 25-KHz MILSATCOM channels, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
| 2.3.2.3.1.2.1<br>Earth Terminals           | MIL-STD-188-164, Interoperability and Performance Standards for C- Band, X- Band, and Ku- Band SHF Satellite Communications Earth Terminals, 13 January 1995; with Notice of Change 1, 9 September 1998.                    | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For minimum mandatory Radio Frequency (RF) and Intermediate Frequency (IF) requirements to ensure interoperability of SATCOM Earth terminals operating over C-, X-, and Ku-band channels, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>                               |
| 2.3.2.3.1.2.2<br>Phase-Shift Keying Modems | MIL-STD-188-165, Interoperability and Performance Standards for SHF Satellite Communications PSK Modems (Frequency Division Multiple Access (FDMA) Operations), 13 January 1995; with Notice of Change 1, 9 September 1998. | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For minimum mandatory requirements to ensure interoperability of Phase-Shift Keying (PSK) modems operating in Frequency Division Multiple Access (FDMA) mode, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                           | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes  |
|--|---|---|---|--|
| 2.3.2.3.1.3.1<br>Low Data Rate                       | MIL-STD-1582D, EHF LDR Uplinks and Downlinks, 30 September 1996; with Notice of Change 1, 14 February 1997; Notice of Change 2, 17 February 1999                | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For waveform, signal processing, and protocol requirements for acquisition, access control, and communications for Low Data Rate (LDR) (75 to 2,400 bps) Extremely High Frequency (EHF) satellite data links, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
| 2.3.2.3.1.3.2<br>Medium Data Rate                    | MIL-STD-188-136A, EHF MDR Uplinks and Downlinks, 8 June 1998  | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For waveform, signal processing, and protocol requirements for acquisition, access control, and communications for Medium Data Rate (MDR) (4.8 Kbps to 1.544 Mbps) EHF satellite data links, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.3.2.3.2.1<br>Low Frequency and Very Low Frequency  | MIL-STD-188-140A, Equipment Technical Design Standards for Common Long Haul/ Tactical Radio Communications in the LF Band and Lower Frequency Bands, 1 May 1990 | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>This standard establishes minimum performance requirements in the form of Technical Design Standards and Design Objectives (D.O.) that will ensure interoperability of future radio subsystems equipment in the VLF and LF bands.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.3.2.3.2.2.1<br>HF and Automated Link Establishment | MIL-STD-188-141B, Interoperability and Performance Standards for Medium and High Frequency Radio Systems, 1 March 1999.   | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>The purpose of this document is to establish technical parameters, in the form of mandatory standards and optional design objectives (DOs), that are considered necessary to ensure interoperability of new long-haul and tactical radio equipment in the medium frequency (MF) band and in the high frequency (HF) band. It is also the purpose of this document to establish a level of performance for new radio equipment as is considered necessary to satisfy the requirements of the majority of users.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
| 2.3.2.3.2.2.2<br>Anti-Jamming Capability             | MIL-STD-188-148A, Interoperability Standard for Anti-Jam Communications in the HF Band (2- 30 MHz), 18 March 1992   | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For anti-jamming capabilities for HF radio equipment, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area               | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|--|---|---|---|---|
| 2.3.2.3.2.3<br>Data Modems               | MIL-STD-188-110A, Data Modems, Interoperability and Performance Standards, 30 September 1991  | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>This document established mandatory technical standards and design objectives (DO) that are necessary to ensure interoperability and to promote performance among data modulators-demodulators (modems) used in the voice frequency (VF) band of long-haul and tactical communications systems.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
| 2.3.2.3.2.3<br>Very High Frequency       | MIL-STD-188-242, Tactical Single Channel (VHF) Radio Equipment, 20 June 1985  | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>The purpose of this document is to promulgate technical design and engineering parameters in the form of mandatory system standards and optional design objectives that are considered necessary to ensure interoperability and to promote compatibility and commonality among tactical single channel very high frequency (VHF) radio equipment.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
| 2.3.2.3.2.4.1<br>UHF Radio               | MIL-STD-188-243, Tactical Single Channel (UHF) Radio Communications, 15 March 1989  | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>The purpose of this document is to establish the minimum essential interoperability and performance requirements necessary for tactical single channel UHF radio communications equipment. This standard addresses ground-to-air, air-to-air, ship-to-shore, and ship-to-ship tactical single channel UHF radio communications equipment.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>         |
| 2.3.2.3.2.4.2<br>Anti-Jamming Capability | STANAG 4246, Edition 2, HAVE QUICK UHF Secure and Jam-Resistant Communications Equipment, 17 June 1987; with Amendment 3, August 1991 | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>For anti-jamming capabilities for UHF radio equipment, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
| 2.3.2.3.2.5<br>Super High Frequency      | MIL-STD-188-145, Digital Line-of-Sight (LOS) Microwave Radio Equipment, 7 May 1987; with Notice of Change 1, 28 July 1992             | External Environment Entity - Networks and 1D Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications. | <ul style="list-style-type: none"> <li>The purpose of this document is to set forth mandatory interoperability and performance standards, as well as design objectives for new long-haul and tactical digital line-of-sight (LOS) microwave radio equipment.<br/>[http://astimage.daps.dla.mil/online/parms/mainframe.cfm]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                          | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|---|--|---|---|--|
| 2.3.2.3.2.6<br>Link 16<br>Transmission<br>Standards | STANAG 4175, Edition 1, Technical Characteristics of the Multifunctional Information Distribution System (MIDS), 29 August 1991  | External Environment Entity - Networks and 1D Interface     | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications.   | <ul style="list-style-type: none"> <li>For communicating with the Joint Tactical Information Distribution System (JTIDS)/Multi-Functional Information Distribution System (MIDS) radios, the following standard is mandated [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
| 2.3.2.3.3<br>SONET<br>Transmission<br>Facilities    | ANSI T1. 105, Telecommunications – Synchronous Optical Network (SONET) Basic Description Including Multiplex Structure, Rates and Formats (ATIS) (Revision and Consolidation of ANSI T1. 105- 1991 and ANSI T1.105A- 1991), 1995 | External Environment Entity - Networks and 1D, 1L Interface | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. This standard maps to the 1D Interface because it describes the physical interface used for military satellite communications. This standard maps to the 1L Interface because it includes a description of the formats available for use with optical interfaces. | <ul style="list-style-type: none"> <li>Describes a base rate and format along with a multiplexing scheme that will result in a modular family of rates and formats available for use in optical interfaces. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E105%2D1995">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E105%2D1995</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul>                           |
|   | ANSI T1.107, Digital Hierarchy – Formats Specifications, 1995  | 1L Interface  | This standard maps to the 1L Interface because it contains format specifications.   | <ul style="list-style-type: none"> <li>Provides standard descriptions for the digital hierarchy format specifications. Compliance is necessary if the various networks that comprise the hierarchy are to be interconnected with each other. The standard includes requirements on selected digital hierarchical format parameters at a cross-connect point. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E107%2D1995">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E107%2D1995</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 1: Physical Resources layer [TRM]</li> </ul> |
|   | ANSI T1.117, Digital Hierarchy – Optical Interface Specifications (SONET) (Single Mode – Short Reach), 1991  | External Environment Entity - Networks and 1D Interface     | This standard maps to the External Environment Entity because it describes the communication infrastructure used to support satellite and ground communication exchanges. It maps to the 1D Interface because it describes the physical interface used for military satellite communications.   | <ul style="list-style-type: none"> <li>Establishes optical parameter specifications optimized for a short reach optical transmission interface. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E117%2D1991+%28R1997%29">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E117%2D1991+%28R1997%29</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                  | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes  |
|---|---|---|---|--|
| 2.3.2.4.1<br>Data Communications Management | IETF Standard 15/ RFC-1157, Simple Network Management Protocol (SNMP), May 1990     | Application Platform Entity – Communication Services and Application Platform Entity – System Management Services and 4D,3L Interface | This standard maps to the Communications Services because it describes a protocol for network management communication. This standard maps to the System Management Services because it describes network management services. This standard maps to the 4D, 3L Interface because it contains interfaces for communicating management information of a network element to remote users. | <ul style="list-style-type: none"> <li>• This memo defines a simple protocol by which management information for a network element may be inspected or altered by logically remote users. In particular, together with its companion memos which describe the structure of management information along with the management information base, these documents provide a simple, workable architecture and system for managing TCP/IP-based internets and in particular the Internet. [<a href="http://www.ietf.org/rfc/rfc1157.txt">http://www.ietf.org/rfc/rfc1157.txt</a>]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Performance management services allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
|   | IETF Standard 16/ RFC-1155/ RFC-1212, Structure of Management Information, May 1990 | 4L Interface  | This standard maps to the 4L Interface because it defines common structures for identifying and accessing network management information.   | <ul style="list-style-type: none"> <li>• This memo provides the common definitions for the structure and identification of management information for TCP/IP-based internets. [<a href="http://www.ietf.org/rfc/rfc1155.txt">http://www.ietf.org/rfc/rfc1155.txt</a>]</li> <li>• This memo describes a straight-forward approach toward producing concise, yet descriptive, MIB modules. It is intended that all future MIB modules be written in this format. [<a href="http://www.ietf.org/rfc/rfc1212.txt">http://www.ietf.org/rfc/rfc1212.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|   | IETF Standard 17/ RFC-1213, Management Information Base, March 1991                 | 4L Interface  | This standard maps to the 4L Interface because it describes the managed objects contained in the MIB.   | <ul style="list-style-type: none"> <li>• This memo defines the second version of the Management Information Base (MIB-II) for use with network management protocols in TCP/IP- based internets. ... MIB-II, this memo, which describes the managed objects contained in the MIB. [<a href="http://www.ietf.org/rfc/rfc1213.txt">http://www.ietf.org/rfc/rfc1213.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                         | Currently Mandated Standard  | TRM Mapping   | Mapping Justification  | Notes  |
|--|--|---|--|--|
|  | IETF RFC- 1514, Host Resources MIB, September 1993 same IETF Standard 50/ RFC-1643, Definitions of Managed Objects for the Ethernet- like Interface Types, July 1994 | 4L Interface  | This standard maps to the 4L Interface because it describes the objects for managing host systems and ethernet-like objects in the MIB.  | <ul style="list-style-type: none"> <li>This memo defines a MIB for use with managing host systems. The term "host" is construed to mean any computer that communicates with other similar computers attached to the internet and that is directly used by one or more human beings. [<a href="http://www.ietf.org/rfc/rfc1514.txt">http://www.ietf.org/rfc/rfc1514.txt</a>]</li> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines objects for managing ethernet-like objects. [<a href="http://www.ietf.org/rfc/rfc1643.txt">http://www.ietf.org/rfc/rfc1643.txt</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|  | IETF RFC- 1757, Remote Network Monitoring Management Information Base (RMON Version 1), February 1995  | 4L Interface  | This standard maps to the 4L Interface because it describes the objects for managing remote network monitoring devices.  | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines objects for managing remote network monitoring devices. [<a href="http://www.ietf.org/rfc/rfc1757.txt">http://www.ietf.org/rfc/rfc1757.txt</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|  | IETF RFC- 1850, Open Shortest Path First (OSPF) Version 2 Management Information Base, November 1995   | 4L Interface  | This standard maps to the 4L Interface because it describes the objects for managing the Open Shortest Path First Routing Protocol   | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines objects for managing the Open Shortest Path First Routing Protocol. [<a href="http://www.ietf.org/rfc/rfc1850.txt">http://www.ietf.org/rfc/rfc1850.txt</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
| 2.3.2.4.2<br>Telecommuni-<br>cations<br>Management | ANSI T1. 204, OAM& P – Lower Layer Protocols for TMN Interfaces Between Operations Systems and Network Elements, 1997.   | Application Platform Entity –<br>Communication Services and<br>3L Interface | This standard maps to the Communications Services because it describes the lower-layer protocols for use with the Telecommunications Management Network (TMN). This standard maps to the 3L Interface because it addresses interfaces between operations systems and network elements. | <ul style="list-style-type: none"> <li>Addresses the lower-layer protocols for use with Telecommunications Management Network (TMN) entities. This standard is part of a series of American National Standards specifying TMN requirements. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E204%2D1997">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E204%2D1997</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|----------------------------|---|---|--|--|
|                            | ANSI T1. 208, OAM& P – Upper Layer Protocols for TMN Interfaces Between Operations Systems and Network Elements, 1997 | Application Platform Entity – Communication Services and 3L Interface     | This standard maps to the Communications Services because it describes the upper-layer protocols for use with the Telecommunications Management Network (TMN). This standard maps to the 3L Interface because it addresses interfaces between operations systems and network elements. | <ul style="list-style-type: none"> <li>Provides for the exchange of messages between Operations Systems (OSs) and Network Elements (NEs) in the connection-oriented mode of operations for control, coordination, and monitoring of the Telecommunications Network. [<a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E208%2D1997">http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI+T1%2E208%2D1997</a>]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | ITU- T M. 3207.1, TMN management service: maintenance aspects of B- ISDN management, 1996                             | Application Platform Entity – System Management Services and 3L Interface | This standard maps to the System Management Services because it describes a management service for the maintenance of ISDN networks. This standard maps to the 3L Interface because it addresses transferring management information for a network to remote users.                    | <ul style="list-style-type: none"> <li>This Recommendation describes the TMN management service for the maintenance aspect of B ISDN management with using GDMS (Guideline for the Definition of TMN Management Services). [<a href="http://www.itu.int/itudoc/itu-t/rec/m/s_m32071.txt">http://www.itu.int/itudoc/itu-t/rec/m/s_m32071.txt</a>]</li> <li>Performance management services allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ITU- T M. 3211. 1, TMN management service: Fault and performance management of the ISDN access, 1996                  | Application Platform Entity – System Management Services and 3L Interface | This standard maps to the System Management Services because it contains standards for network management. This standard maps to the 3L Interface because it addresses transferring management information for a network to remote users.  | <ul style="list-style-type: none"> <li>This Recommendation describes the TMN management services for the maintenance of the ISDN access. These management services provide both the generic and specialized functionalities needed for the fault and performance management of the ISDN access. [<a href="http://www.itu.int/itudoc/itu-t/rec/m/s_m3211.txt">http://www.itu.int/itudoc/itu-t/rec/m/s_m3211.txt</a>]</li> <li>Fault management services allow a system to react to the loss or incorrect operation of system components at various levels (hardware, software, etc.). Fault management involves event management and network error recovery. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | ITU- T M. 3400, TMN Management Functions, 1997  | Application Platform Entity – System Management Services and 3L Interface | This standard maps to the System Management Services because it contains standards for network management. This standard maps to the 3L Interface because it addresses transferring management information for a network to remote users.  | <ul style="list-style-type: none"> <li>To perform information exchange within a telecommunications network, the following TMN framework standards are mandated [JTA]</li> <li>Performance management services allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------|--|--|---|--|
|                            | ISO/ IEC 9595: 1998: Information Technology – Open Systems Interconnection Common Management Information Services.   | Application Platform Entity – System Management Services and 3L Interface  | This standard maps to the System Management Services because it contains standards for network management. This standard maps to the 3L Interface because it addresses transferring management information for a network to remote users.   | <ul style="list-style-type: none"> <li>• To perform information exchange within a telecommunications network, the following TMN framework standards are mandated [JTA]</li> <li>• Performance management services allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | ISO/ IEC 9596- 1: 1998 Information Technology – Open Systems Interconnection – Common Management Information Protocol (CMIP) – Part 1: Specification                                 | Application Platform Entity – Communication Services and Application Platform Entity – System Management Services and 3L Interface | This standard maps to the Communications Services because it describes a protocol for network management communication. This standard maps to the System Management Services because it describes network management services. This standard maps to the 3L Interface because it addresses transferring management information for a network to remote users. | <ul style="list-style-type: none"> <li>• To perform information exchange within a telecommunications network, the following TMN framework standards are mandated [JTA]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Performance management services allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | ISO/ IEC 9596- 2: 1993 Information Technology – Open Systems Interconnection – Common Management Information Protocol: Protocol Implementation Conformance Statement (PICS) proforma | Application Platform Entity – Communication Services and Application Platform Entity – System Management Services and 3L Interface | This standard maps to the Communications Services because it describes a protocol for network management communication. This standard maps to the System Management Services because it describes network management services. This standard maps to the 3L Interface because it addresses transferring management information for a network to remote users. | <ul style="list-style-type: none"> <li>• To perform information exchange within a telecommunications network, the following TMN framework standards are mandated [JTA]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Performance management services allow information technology resources to be managed efficiently. Performance aspects of hardware, software, and network components must be monitored and subsequently made available to the system manager. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area   | Emerging Standard   | TRM Mapping  | Mapping Justification   | Notes  |
|------------------------------|---|--|---|--|
| 2.3.3.1.1 Internet Standards | IETF RFC 2374, IPv6 Aggregatable Global Unicast Address Format, July 1998                                     | 4L Interface   | This standard maps to the 4L Interface because it describes an address format for use over the Internet.  | <ul style="list-style-type: none"> <li>• This document defines an IPv6 aggregatable global unicast address format for use in the Internet. The address format defined in this document is consistent with the IPv6 Protocol [IPv6] and the "IPv6 Addressing Architecture" [ARCH]. It is designed to facilitate scalable Internet routing. [<a href="http://www.ietf.org/rfc/rfc2374.txt">http://www.ietf.org/rfc/rfc2374.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                              | IETF RFC 2452, IP Version 6 Management Information Base for the Transmission Control Protocol, December 1998. | 4L Interface   | This standard maps to the 4L Interface because it describes the objects for managing TCP over IPv6.   | <ul style="list-style-type: none"> <li>• This document is one in the series of documents that define various MIB objects for IPv6. Specifically, this document is the MIB module which defines managed objects for implementations of the Transmission Control Protocol (TCP) over IP Version 6 (IPv6). [<a href="http://www.ietf.org/rfc/rfc2452.txt">http://www.ietf.org/rfc/rfc2452.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                              | IETF RFC 2454, IP Version 6 Management Information Base for the User Datagram Protocol, December 1998.        | 4L Interface   | This standard maps to the 4L Interface because it describes the objects for managing UDP over IPv6.   | <ul style="list-style-type: none"> <li>• This document is one in the series of documents that define various MIB objects for IPv6. Specifically, this document is the MIB module which defines managed objects for implementations of the User Datagram Protocol (UDP) over IP Version 6 (IPv6). [<a href="http://www.ietf.org/rfc/rfc2454.txt">http://www.ietf.org/rfc/rfc2454.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                              | IETF RFC 2460, Internet Protocol, Version 6 (IPv6) Specification, December 1998.                              | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 3L, 2L Interface | This standard maps the same as the IPv4 standard (IETF Standard 5/ RFC-791/ RFC-950/ RFC-919/ RFC-922/ RFC-792/ RFC-1112, Internet Protocol) since it is the newest release of the IP standard. | <ul style="list-style-type: none"> <li>• This document specifies version 6 of the Internet Protocol (IPv6), also sometimes referred to as IP Next Generation or IPng. [<a href="http://www.ietf.org/rfc/rfc2460.txt">http://www.ietf.org/rfc/rfc2460.txt</a>]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|----------------------------|---|--|--|---|
|                            | IETF RFC 2461, Neighbor Discovery for IP Version 6, (IPv6), December 1998   | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 3L, 2L Interface | This standard maps the same as the IPv6 standard (IETF RFC 2460, Internet Protocol, Version 6 Specification) because it's an integral part of that protocol. | <ul style="list-style-type: none"> <li>This document specifies the Neighbor Discovery protocol for IP Version 6. IPv6 nodes on the same link use Neighbor Discovery to discover each other's presence, to determine each other's link-layer addresses, to find routers and to maintain reachability information about the paths to active neighbors. [http://www.ietf.org/rfc/rfc2461.txt]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                            | IETF RFC 2462, IPv6 Stateless Address Autoconfiguration, December 1998.   | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 3L, 2L Interface | This standard maps the same as the IPv6 standard (IETF RFC 2460, Internet Protocol, Version 6 Specification) because it's an integral part of that protocol. | <ul style="list-style-type: none"> <li>This document specifies the steps a host takes in deciding how to autoconfigure its interfaces in IP version 6. [http://www.ietf.org/rfc/rfc2462.txt]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>   |
|                            | ETF RFC 2463, Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification, December 1998. | Application Platform Entity- Communications Services and Application Platform Entity- Physical Environment Services and 3L, 2L Interface | This standard maps the same as the IPv6 standard (IETF RFC 2460, Internet Protocol, Version 6 Specification) because it's an integral part of that protocol. | <ul style="list-style-type: none"> <li>This document specifies a set of Internet Control Message Protocol (ICMP) messages for use with version 6 of the Internet Protocol (IPv6). [http://www.ietf.org/rfc/rfc2463.txt]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> <li>Layer 2: Resource Access Services layer. [TRM]</li> </ul>  |
|                            | IETF RFC 2464, Transmission of Ipv6 Packet Over Ethernet Networks, December 1998  | 3L Interface   | This standard maps to the 3L Interface because it specifies the frame format and method for forming IP addresses.  | <ul style="list-style-type: none"> <li>This document specifies the frame format for transmission of IPv6 packets and the method of forming IPv6 link-local addresses and statelessly autoconfigured addresses on Ethernet networks. [http://www.ietf.org/rfc/rfc2464.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|---|--|---|---|
|                            | IETF RFC 2466, Management Information Base for IP Version 6: I CMPv6 Group, December 1998 | 4L Interface   | This standard maps to the 4L Interface because it describes the objects for managing ICMPv6.                              | <ul style="list-style-type: none"> <li>• This document is one in the series of documents that define various MIB object groups for IPv6. Specifically, the ICMPv6 group is defined in this document. [<a href="http://www.ietf.org/rfc/rfc2466.txt">http://www.ietf.org/rfc/rfc2466.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                            | IETF RFC 2472, IPv6 Over PPP, December 1998   | Application Platform Entity- Communications Services and Application Platform Entity - Physical Environment Services and 3L, 2L Interfaces | This standard maps the same as the IPv4 version (IETF RFC-1332, PPP Internet Protocol Control Protocol) of this standard. | <ul style="list-style-type: none"> <li>• The Point-to-Point Protocol (PPP) [1] provides a standard method of encapsulating Network Layer protocol information over point-to-point links. PPP also defines an extensible Link Control Protocol, and proposes a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols. This document defines the method for transmission of IP Version 6 [2] packets over PPP links as well as the Network Control Protocol (NCP) for establishing and configuring the IPv6 over PPP. It also specifies the method of forming IPv6 link-local addresses on PPP links. [<a href="http://www.ietf.org/rfc/rfc2472.txt">http://www.ietf.org/rfc/rfc2472.txt</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|---|---|--|---|
|                            | IETF RFC 2492, IPv6 Over ATM Networks, January 1999.                        | Application Platform Entity- Communications Services And Application Platform Entity - Physical Environment Services and 3L, 2L Interface | Since this standard is similar to an IPv4 standard (ATM Forum, af-mpoa-0087.000, Multi-Protocol Over ATM), it maps the same as the IPv4 standard.  | <ul style="list-style-type: none"> <li>• This document is a companion to the ION working group's architecture document, "IPv6 over Non Broadcast Multiple Access (NBMA) networks". It provides specific details on how to apply the IPv6 over NBMA architecture to ATM networks. This architecture allows conventional host-side operation of the IPv6 Neighbor Discovery protocol, while also supporting the establishment of 'shortcut' ATM forwarding paths (when using SVCs). [<a href="http://www.ietf.org/rfc/rfc2492.txt">http://www.ietf.org/rfc/rfc2492.txt</a>]</li> <li>• Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> <li>• Layer 2: Resource Access Services layer. [TRM]</li> </ul> |
|                            | IETF RFC 2205 Resource ReSerVation Protocol RSVP Version 1, September 1997. | Application Platform Entity – Communication Services and 3L Interface   | This standard maps to the Communication Services because it applies to network communication. This standard maps to the 3L Interface because it describes interfaces used between peer entities. | <ul style="list-style-type: none"> <li>• This document defines RSVP, a resource reservation setup protocol designed for an integrated services Internet. The RSVP protocol is used by a host to request specific qualities of service from the network for particular application data streams or flows. RSVP is also used by routers to deliver quality-of-service (QoS) requests to all nodes along the path(s) of the flows and to establish and maintain state to provide the requested service. [<a href="http://www.ietf.org/rfc/rfc2205.txt">http://www.ietf.org/rfc/rfc2205.txt</a>]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|--|---|--|---|
|                            | IETF RFC 2207, RSVP Extensions for IPSEC Data Flows, September 1997.   | Application Platform Entity – Communication Services and 3L Interface | This standard maps the same as the RSVP standard (IETF RFC 2205 Resource ReSerVation Protocol RSVP Version 1) because it is an extension of RSVP.  | <ul style="list-style-type: none"> <li>• This document presents extensions to Version 1 of RSVP. These extensions permit support of individual data flows using RFC 1826, IP Authentication Header (AH) or RFC 1827, IP Encapsulating Security Payload (ESP). RSVP Version 1 as currently specified can support the IPSEC protocols, but only on a per address, per protocol basis not on a per flow basis. The presented extensions can be used with both IPv4 and IPv6. [<a href="http://www.ietf.org/rfc/rfc2207.txt">http://www.ietf.org/rfc/rfc2207.txt</a>]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | IETF RFC 2380, RSVP over ATM Implementation Requirements, August 1998. | Application Platform Entity – Communication Services and 3L Interface | This standard maps the same as the RSVP standard (IETF RFC 2205 Resource ReSerVation Protocol RSVP Version 1) because it is an extension of RSVP.  | <ul style="list-style-type: none"> <li>• This memo presents specific implementation requirements for running RSVP over ATM switched virtual circuits (SVCs). It presents requirements that ensure interoperability between multiple implementations and conformance to the RSVP and Integrated Services specifications. [<a href="http://www.ietf.org/rfc/rfc2380.txt">http://www.ietf.org/rfc/rfc2380.txt</a>]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IEEE 802.1p and IEEE 802.1Q  | External Environment Entity - Networks and 1D Interface               | This standard maps to the External Environment Entity because it specifies traffic classification method used by Ethernet switches. It maps to the 1D Interface because it provides interfaces to Ethernet switches. | <ul style="list-style-type: none"> <li>• These IEEE standards specify the traffic classification method used by Ethernet switches, to expedite delivery of time critical traffic. IEEE 802.1p governs the prioritization of packets, offering eight discrete priority levels from the default (best effort) through reserved (highest priority). IEEE 802.1q defines an additional 4-octet field in the LAN header to support Virtual LANs. [JTA]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area                  | Emerging Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|---|---|---|--|--|
| 2.3.3.1.2 Video Tele-conferencing Standards | ITU-T H. 310  | External Environment Entity - Networks and 1D Interface               | This standard maps to the External Environment Entity because it defines the technical requirements for the systems and terminals of broadband audiovisual communication services. This standard maps to the 1D Interface because it describes the interworking between different type of H.310 terminals.           | <ul style="list-style-type: none"> <li>This Recommendation covers the technical requirements for the systems and terminals of broadband audiovisual communication services defined in H.200/AV.100-series Recommendations. Both H.310 unidirectional and bidirectional broadband audiovisual terminals are defined. The classification of H.310 terminals into different terminal types is based on a set of audiovisual, network adaptation, and signalling capabilities. With these capabilities, H.310 terminals support a wide range of conversational and distributive applications and services. This revision enhances the interworking between different type of H.310 terminals. [<a href="http://www.itu.int/itudoc/itu-t/rec/h/s_h310.htm">http://www.itu.int/itudoc/itu-t/rec/h/s_h310.htm</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul> |
|   | ITU-T H. 321  | External Environment Entity - Networks and 1D Interface               | This standard maps to the External Environment Entity because it defines the technical requirements for the systems and terminals of broadband audiovisual communication services. This standard maps to the 1D Interface because it describes the interworking between different type of H.321 and H.320 terminals. | <ul style="list-style-type: none"> <li>This Recommendation describes technical specifications for adapting narrow-band audiovisual communications terminals, as defined in Recommendation H.320, to broadband ISDN environments. The terminal conforming to this Recommendation interworks with the same type of terminals (i.e. other H.321 terminals) accommodated in B-ISDN as well as existing H.320 terminals accommodated in N-ISDN. [<a href="http://www.itu.int/itudoc/itu-t/rec/h/s_h321.htm">http://www.itu.int/itudoc/itu-t/rec/h/s_h321.htm</a>]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
|   | ITU-T H. 323  | External Environment Entity - Networks and 1D Interface               | Since this standard is similar to ITU-T H. 310 and ITU-T H. 321 it maps the same as those two standards.   | <ul style="list-style-type: none"> <li>There are three emerging standards for VTC over ATM [JTA]</li> <li>Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.3.3.1.3 Space Communications Protocol     | MIL-STD-2045-44000 Department of Defense Interface Standard: Transport Protocol for High- Stress, Resource-Constrained Environments, 30 September 1997. | Application Platform Entity – Communication Services and 3L Interface | This standard maps to the Communication Services because it defines a transport protocol derived from TCP. This standard maps to the 3L Interface because it contains interfaces for use by applications.  | <ul style="list-style-type: none"> <li>The Transport Protocol (TP) is a transport-layer protocol (Layer 4 in the OSI model) derived from the Internet Transmission Control Protocol (TCP). [JTA]</li> <li>Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|   | MIL-STD-2045-43000: Department of Defense Interface Standard: Network Protocol for High- Stress, Resource-Constrained Environments, 30 September 1997   | Application Platform Entity – Communication Services and 3L Interface | This standard maps to the Communication Services because it defines a network protocol. This standard maps to the 3L Interface because it contains interfaces for use by applications.   | <ul style="list-style-type: none"> <li>The Network Protocol (NP) is a network-layer protocol (Layer 3 in the OSI model) developed to be a bit-efficient, scaleable protocol for a broad range of spacecraft environments. [JTA]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping   | Mapping Justification  | Notes  |
|----------------------------|--|---|--|--|
|                            | MIL-STD-2045-47000: Department of Defense Interface Standard: File and Record Transfer Protocol for Resource-Constrained Environments, 30 September 1997 | Application Platform Entity – Communication Services and 3L Interface   | This standard maps to the Communication Services because it defines a file handling protocol. This standard maps to the 3L Interface because it contains interfaces for use by applications.   | <ul style="list-style-type: none"> <li>The File Handling Protocol (FP) is an application-layer protocol (Layer 7 in the OSI model) derived from the Internet file transfer protocol (FTP). [JTA]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | MIL-STD-2045-43001: Department of Defense Interface Standard: Network Security Protocol for Resource-Constrained Environments, 30 September 1997         | Application Platform Entity - Communication Services and Application Platform Entity - Security Services and 3L Interface | This standard maps to the Communication Services because it defines a security protocol. This standard maps to the Security Services because it applies to network layer security. This standard maps to the 3L Interface because it contains interfaces for use by System Services. | <ul style="list-style-type: none"> <li>The Security Protocol (SP) is based on the security protocol at Layer 3 (SP3) and the network-layer security protocol (NLSP) with reduced overhead. SP does not have a corresponding layer in the OSI sense. It operates between the network and transport layers (Layers 3 and 4). [JTA]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Multilevel security cuts across all aspects of the system and adds an additional complexity to the hardware and software that interacts with the rest of the system. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>                                   |
| 2.3.3.2 Network Standards  | af- vtoa-0119.00, Low Speed Circuit Emulation Service, May 1999.   | Application Platform Entity - Communication Services and 3L Interface   | This standard maps to the Communication Services and the 3L interface because it specifies the ATM Forum's interoperability agreements for supporting unstructured CBR traffic at user-defined rates over ATM networks.  | <ul style="list-style-type: none"> <li>This document - referred to as the Low Speed Circuit Emulation Service Interoperability Specification (LSCES-IS) - specifies the ATM Forum's interoperability agreements for supporting unstructured CBR traffic at user-defined rates over ATM networks that comply with the Forum's other interoperability agreements. This document is targeted to support low speed applications (less than 64 kbit/s), but can also support higher rates. [ftp://ftp.atmforum.com/pub/approved-specs/af-vtoa-0119.000.pdf]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.3.3.5 Network Management | IETF RFC 1695 Asynchronous Transfer Mode (ATM) MIB   | 4L Interface  | This standard maps to the 4L Interface because it describes the objects for managing ATM-based interfaces, devices, networks and services.   | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes objects used for managing ATM-based interfaces, devices, networks and services. [http://www.ietf.org/rfc/rfc1695.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|--|--------------|--|--|
|                            | IETF RFC 1657<br>Definitions of Management Objects for the Fourth Version of the Border Gateway Protocol (BGP- 4) using SMIv2, July 1994 | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Border Gateway Protocol Version.  | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing the Border Gateway Protocol Version 4 or lower. [http://www.ietf.org/rfc/rfc1657.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 1611, DNS Server MIB Extensions, May 1994   | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the DNS name server functions.  | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes a set of extensions which instrument DNS name server functions. [http://www.ietf.org/rfc/rfc1611.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 1612, DNS Resolver MIB Extensions, May 1994.  | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the DNS resolver functions.   | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes a set of extensions which instrument DNS resolver functions. [http://www.ietf.org/rfc/rfc1612.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                            | IETF RFC- 2006<br>Definitions of Managed objects for IP Mobility Support using SMIv2, October 1996.                                      | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Mobile Node, Foreign Agent and Home Agent of the Mobile IP Protocol.  | <ul style="list-style-type: none"> <li>This memo defines the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it describes managed objects used for managing the Mobile Node, Foreign Agent and Home Agent of the Mobile IP Protocol. [http://www.ietf.org/rfc/rfc2006.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 2011, SNMPv2 Management Information Base for the Internet Protocol, November 1996.  | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Internet Protocol and its associated Internet Control Message Protocol.   | <ul style="list-style-type: none"> <li>This document is the MIB module which defines managed objects for managing implementations of the Internet Protocol (IP) [3] and its associated Internet Control Message Protocol (ICMP) [4]. [http://www.ietf.org/rfc/rfc2011.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 1471<br>Definitions of Managed Objects for the Link Control Protocol of the Point- Point Protocol, June 1993.                   | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Link Control Protocol and Link Quality Monitoring on subnetwork interfaces that use the family of Point-to-Point Protocols. | <ul style="list-style-type: none"> <li>This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it describes managed objects used for managing the Link Control Protocol and Link Quality Monitoring on subnetwork interfaces that use the family of Point-to-Point Protocols. [http://www.ietf.org/rfc/rfc1471.txt]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|----------------------------|--|--------------|---|--|
|                            | IETF RFC 1472, Definitions of Managed Objects for the Security Protocol of the Point-to-Point Protocol, June 1993.               | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Security Protocols on subnetwork interfaces using the family of Point-to-Point Protocols.              | <ul style="list-style-type: none"> <li>• This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it describes managed objects used for managing the Security Protocols on subnetwork interfaces using the family of Point-to-Point Protocols. [<a href="http://www.ietf.org/rfc/rfc1472.txt">http://www.ietf.org/rfc/rfc1472.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>                   |
|                            | IETF RFC 1473, Definitions of Managed Objects for the IP Network Control Protocol of the Point-to-Point Protocol, June 1993.     | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the IP Network Control Protocol on subnetwork interfaces using the family of Point-to-Point Protocols.     | <ul style="list-style-type: none"> <li>• This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it describes managed objects used for managing the IP Network Control Protocol on subnetwork interfaces using the family of Point-to-Point Protocols. [<a href="http://www.ietf.org/rfc/rfc1473.txt">http://www.ietf.org/rfc/rfc1473.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>          |
|                            | IETF RFC 1474, Definitions of Managed Objects for the Bridge Network Control Protocol of the Point-to-Point Protocol, June 1993. | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the bridge Network Control Protocol on subnetwork interfaces using the family of Point-to-Point Protocols. | <ul style="list-style-type: none"> <li>• This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it describes managed objects used for managing the bridge Network Control Protocol [10] on subnetwork interfaces using the family of Point-to-Point Protocols. [<a href="http://www.ietf.org/rfc/rfc1474.txt">http://www.ietf.org/rfc/rfc1474.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |
|                            | IETF RFC 2021, Remote Network Monitoring Management Information Base Version 2, using SMIPv2, January 1997.                      | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing remote network monitoring devices.   | <ul style="list-style-type: none"> <li>• This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines objects for managing remote network monitoring devices. [<a href="http://www.ietf.org/rfc/rfc2021.txt">http://www.ietf.org/rfc/rfc2021.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 2012, SNMPv2 Management Information Base for the Transmission Control Protocol (TCP), November 1996.                    | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Transmission Control Protocol.   | <ul style="list-style-type: none"> <li>• This document is the MIB module which defines managed objects for managing implementations of the Transmission Control Protocol (TCP). [<a href="http://www.ietf.org/rfc/rfc2012.txt">http://www.ietf.org/rfc/rfc2012.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                            | IETF RFC 2013, SNMPv2 Management Information Base for the User Datagram Protocol (UDP), November 1996.                           | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the User Datagram Protocol.  | <ul style="list-style-type: none"> <li>• This document is the MIB module which defines managed objects for managing implementations of the User Datagram Protocol (UDP). [<a href="http://www.ietf.org/rfc/rfc2013.txt">http://www.ietf.org/rfc/rfc2013.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.3 - Information Transfer Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|---|--------------|---|---|
|                            | IETF RFC 1567, X. 500 Directory Monitoring MIB, January 1994. | 4L Interface | This standard maps to the 4L Interface because it describes the objects for managing the Directory System Agents. | <ul style="list-style-type: none"> <li>• This document defines a portion of the Management Information Base (MIB). It defines the MIB for monitoring Directory System Agents (DSA), a component of the OSI Directory. [<a href="http://www.ietf.org/rfc/rfc1567.txt">http://www.ietf.org/rfc/rfc1567.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 2248, Network Services Monitoring MIB, January 1998. | 4L Interface | This standard maps to the 4L Interface because it describes the objects for monitoring network services.          | <ul style="list-style-type: none"> <li>• This document defines a MIB which contains the elements common to the monitoring of any network service application. [<a href="http://www.ietf.org/rfc/rfc2248.txt">http://www.ietf.org/rfc/rfc2248.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|                            | IETF RFC 2249, Mail Monitoring MIB, January 1998.             | 4L Interface | This standard maps to the 4L Interface because it describes the objects for monitoring Message Transfer Agents.   | <ul style="list-style-type: none"> <li>• This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. Specifically, this memo extends the basic Network Services Monitoring MIB [8] to allow monitoring of Message Transfer Agents (MTAs). [<a href="http://www.ietf.org/rfc/rfc2249.txt">http://www.ietf.org/rfc/rfc2249.txt</a>]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |

# Mapping of JTA 3.1 to TRM V1.0

## Section 2.4 – Information Modeling, Metadata and Information Exchange Standards

| JTA Section & Service Area               | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|--|--|--|---|--|
| 2.4.2.1<br>Activity Modeling             | IEEE 1320.1- 1998, IEEE Standard for Functional Modeling Language— Syntax and Semantics for IDEF0.           | Application Software Entity - Engineering Support and 4L Interface | This standard describes a modeling language. Modeling is included in the Engineering Support service of the TRM. This standard does not map to any direct interfaces because its services are not used directly by Mission Applications components. This standard maps to the 4L Interface because it describes modeling language semantics and syntax for developing structured graphical representations to assist in the analysis of the system. | <ul style="list-style-type: none"> <li>• IEEE P1320.1, IDEF0 Function Modeling, is the standard that describes the IDEF0 modeling language semantics and syntax, as well as associated rules and techniques, for developing structured graphical representations of a system or enterprise. [JTA]</li> <li>• Modeling and simulation services provide the capability to capture or set object characteristics or attributes and parameters of a system of objects, and to portray the relationships and interactions of the objects to assist in the analysis of the system. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |
| 2.4.2.2<br>Data Modeling                 | DoD Manual 8320.1- M-1, DoD Data Standardization Procedures, April 1998 (which mandates the use of the DDM). | Design Considerations  | This standard maps to Design Considerations because it contains guidelines and procedures related to the approval, development and maintenance of common data standards.  | <ul style="list-style-type: none"> <li>• The activities addressed in this manual include the identification, development, review, approval, implementation, and maintenance of data standards. [<a href="http://www-datadmni.itsi.disa.mil/8320_1m1.html">http://www-datadmni.itsi.disa.mil/8320_1m1.html</a>]</li> </ul>  |
|  | FIPS PUB 184, Integration Definition for Information Modeling (IDEF1X), December 1993                        | Application Software Entity - Engineering Support and 4L Interface | This standard describes a modeling language. Modeling is included in the Engineering Support service of the TRM. This standard does not map to any direct interfaces because its services are not used directly by Mission Applications components. This standard maps to the 4L Interface because it describes modeling language semantics and syntax for developing a logical model of data to assist in the analysis of the system.              | <ul style="list-style-type: none"> <li>• FIPS PUB 184 is the standard that describes the IDEF1X modeling language (semantics and syntax) and associated rules and techniques for developing a logical model of data. [JTA]</li> <li>• Modeling and simulation services provide the capability to capture or set object characteristics or attributes and parameters of a system of objects, and to portray the relationships and interactions of the objects to assist in the analysis of the system. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul>  |
| 2.4.2.3<br>DoD Data Model Implementation | DoD Manual 8320.1- M-1, DoD Data Standardization Procedures, April 1998                                      | Design Considerations  | This standard maps to Design Considerations because it contains guidelines and procedures related to the approval, development and maintenance of common data standards.  | <ul style="list-style-type: none"> <li>• The activities addressed in this manual include the identification, development, review, approval, implementation, and maintenance of data standards. [<a href="http://www-datadmni.itsi.disa.mil/8320_1m1.html">http://www-datadmni.itsi.disa.mil/8320_1m1.html</a>]</li> </ul>  |
| 2.4.2.4<br>DoD Data Definitions          | DoD Manual 8320.1- M-1, DoD Data Standardization Procedures, April 1998                                      | Design Considerations  | This standard maps to Design Considerations because it contains guidelines and procedures related to the approval, development and maintenance of common data standards.  | <ul style="list-style-type: none"> <li>• The activities addressed in this manual include the identification, development, review, approval, implementation, and maintenance of data standards. ... Expansion of the DDM and development of DoD data standards through functional area data modeling require participation across all functional communities. [<a href="http://www-datadmni.itsi.disa.mil/8320_1m1.html">http://www-datadmni.itsi.disa.mil/8320_1m1.html</a>]</li> </ul>  |

# Mapping of JTA 3.1 to TRM V1.0

## Section 2.4 – Information Modeling, Metadata and Information Exchange Standards

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| JTA Section & Service Area   | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|------------------------------|--|--------------|---|---|
|                              | Defense Data Dictionary System (DDDS)  | 4L Interface | This standard maps to 4L interface because it provides unique definitions of the data types necessary for the creation and maintenance of DoD data.   | <ul style="list-style-type: none"> <li>The purpose of the Defense Data Dictionary System (DDDS) is to assist the DOD in creating and maintaining a repository for the collection and approval of standard information which is used and passed between DOD agencies and Components. The DDDS provides for: Collection and storage of standard elements and their attributes. Identification of DOD organizations and systems using the standard elements. Query and Reporting of standard elements. A central location for the review and approval of standard elements by Functional Data Administrators, Component Data Administrators and DOD Data Administration staff. Capability to identify and impact changes to standard elements. [<a href="http://www-datadm.itsi.disa.mil/ddds/asect1.html">http://www-datadm.itsi.disa.mil/ddds/asect1.html</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
|                              | Secure Intelligence Data Repository (SIDR)   | 4L Interface | This standard is similar to the DDDS, but for classified data. This standard maps to 4L interface because it provides unique definitions of the data types necessary for the creation and maintenance of classified DoD data. | <ul style="list-style-type: none"> <li>A classified version of the DDDS, Secure Intelligence Data Repository (SIDR), has been developed to support standardization of classified data elements and domains. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
| 2.4.2.4.1 DoD Date Standards | Calendar Date: DDDS Counter ID # 195 Format: YYYYMMDD (8- digit contiguous) Where: YYYY = year; MM = month; DD = day (Also referenced in ISO 8601, ANSI X3.30-1985, and FIPS PUB 4- 1) | 4L Interface | This standard maps to the 4L Interface because it contains a standardized date format to support the exchange of calendar date information.   | <ul style="list-style-type: none"> <li>For external exchange of character dates... [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                              | Ordinal Date: DDDS Counter ID # 165 Format: YYYYDDD (7- digit contiguous) Where: YYYY = year; DDD = ordinal day within year (Also referenced in ISO 8601)                              | 4L Interface | This standard maps to the 4L Interface because it contains a standardized date format to support the exchange of ordinal date information.  | <ul style="list-style-type: none"> <li>For external exchange of character dates... [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|                              | Year Date: DDDS Counter ID #166 Format: YYYY (4- digit contiguous) Where: YYYY = year (Also referenced in ISO 8601)  | 4L Interface | This standard maps to the 4L Interface because it contains a standardized date format to support the exchange of year date information.   | <ul style="list-style-type: none"> <li>For external exchange of character dates... [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |

## Mapping of JTA 3.1 to TRM V1.0

### Section 2.4 – Information Modeling, Metadata and Information Exchange Standards

| JTA Section & Service Area                         | Currently Mandated Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|--|--|--------------|---|---|
| 2.4.2.5.2.1<br>Bit-Oriented Formatted Messages     | MIL- STD- 6016A, Tactical Digital Information Link (TADIL) J Message Standard, 30 April 1999.                    | 4L Interface | This standard maps to a 4L Interface because it describes common data element structures and message formats to exchange military information among peer entities at the Applications Software layer. | <ul style="list-style-type: none"> <li>The J-Series Family of TADILs allows information exchange using common data element structures and message formats that support time-critical information. They include Air Operations/Defense Maritime, Fire Support, and Maneuver Operations. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | STANAG 5516, Edition 1, Tactical Data Exchange - LINK 16, Ratified 15 January 1997                               | 4L Interface | This standard maps to a 4L Interface because it describes common data element structures and message formats to exchange military information among peer entities at the Applications Software layer. | <ul style="list-style-type: none"> <li>The J-Series Family of TADILs allows information exchange using common data element structures and message formats that support time-critical information. They include Air Operations/Defense Maritime, Fire Support, and Maneuver Operations. ... The family consists of LINK 16, LINK 22, and the Joint Variable Message Format (VMF), ...[JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
|  | Variable Message Format (VMF) Technical Interface Design Plan - Test Edition (TIDP-TE), Reissue 3, 17 June 1998. | 4L Interface | This standard maps to a 4L Interface because it describes common data element structures and message formats to exchange military information among peer entities at the Applications Software layer. | <ul style="list-style-type: none"> <li>The J-Series Family of TADILs allows information exchange using common data element structures and message formats that support time-critical information. They include Air Operations/Defense Maritime, Fire Support, and Maneuver Operations. ... The family consists of LINK 16, LINK 22, and the Joint Variable Message Format (VMF), ...[JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
| 2.4.2.5.2.2<br>Character- Based Formatted Messages | MIL- STD- 6040, United States Message Text Format (USMTF), 31 March 1999.  | 4L Interface | This standard maps to the 4L Interface because it describes a fixed-format for message exchange among peer entities at the Applications Software layer.   | <ul style="list-style-type: none"> <li>United States Message Text Format (USMTF) messages are jointly agreed, fixed-format, character-oriented messages that are human-readable and machine-processable. USMTFs are the mandatory standard for record messages when communicating with the Joint Staff, Combatant Commands, and Service Components. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>                                 |

# Mapping of JTA 3.1 to TRM V1.0

## Section 2.4 – Information Modeling, Metadata and Information Exchange Standards

| JTA Section & Service Area             | Emerging Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|--|---|--|--|---|
| 2.4.3.1 Object Modeling                | IEEE 1320. 2- 1998, IEEE Standard Conceptual Modeling Language- Syntax and Semantics for IDEF1X97 (IDEFobject). | Application Software Entity - Engineering Support and 4L Interface | This standard describes a modeling language. Modeling is included in the Engineering Support service of the TRM. This standard does not map to any direct interfaces because its services are not used directly by Mission Applications components. This standard maps to the 4L Interface because it describes modeling language semantics and syntax for developing an object model of data to assist in the analysis of the system. | <ul style="list-style-type: none"> <li>The emerging standards for object modeling are IDEF1X97 ...[JTA]</li> <li>Modeling and simulation services provide the capability to capture or set object characteristics or attributes and parameters of a system of objects, and to portray the relationships and interactions of the objects to assist in the analysis of the system. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |
|  | Object Management Group (OMG) Unified Modeling Language (UML) Specification, Version 1.3, June 1999.            | Application Software Entity - Engineering Support and 4L Interface | This standard describes a modeling language. Modeling is included in the Engineering Support service of the TRM. This standard does not map to any direct interfaces because its services are not used directly by Mission Applications components. This standard maps to the 4L Interface because it describes modeling language semantics and syntax for developing an object model to assist in the analysis of the system.         | <ul style="list-style-type: none"> <li>The emerging standards for object modeling are ... and the Unified Modeling Language (UML) Version 1.3. [JTA]</li> <li>Modeling and simulation services provide the capability to capture or set object characteristics or attributes and parameters of a system of objects, and to portray the relationships and interactions of the objects to assist in the analysis of the system. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |
| 2.4.3.3 Information Exchange Standards | Multi- functional Information Distribution System (MIDS).   | 4L Interface   | This standard maps to the 4L Interface because it describes message format standards for sharing information.  | <ul style="list-style-type: none"> <li>MIDS will provide secure jam-resistant communications, utilizing tactical digital data and voice. Message format standards for MIDS will not change from those of the JTIDS. [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>   |
|  | STANAG 5522, Edition 1, Tactical Data Exchange - LINK 22 (Undated), 15 September 1995.                          | 4L Interface   | Link 22 is part of the J-Series Family and maps the same as the LINK 16.   | <ul style="list-style-type: none"> <li>The J-Series Family of TADILs allows information exchange ... The family consists of LINK 16, LINK 22 ... [JTA]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul>  |

## Mapping of JTA 3.1 to TRM V1.0

### Section 2.5 – Human-Computer Interface Standards

| JTA Section & Service Area                            | Currently Mandated Standard  | TRM Mapping           | Mapping Justification   | Notes  |
|---|--|-----------------------|---|--|
| 2.5.2.1.1<br>Character- Based Interfaces              | DoD Human Computer Interface HCI Style Guide, 30 April 1996  | Design Considerations | This standard maps to the Design Considerations because it addresses design issues related to the user interface.   | <ul style="list-style-type: none"> <li>The <i>DoD HCI Style Guide</i> provides an additional source of interface design input along with commercial style guides that can be used by a system developer/designer. The <i>Style Guide</i> addresses common user interface design issues, contains guidance derived from research on human performance, and provides a focus on elements applicable to DoD systems. [<a href="http://www-library.itsi.disa.mil/tafim/tafim3.0/pages/download/v8.pdf">http://www-library.itsi.disa.mil/tafim/tafim3.0/pages/download/v8.pdf</a>]</li> </ul> |
| 2.5.2.2.1.1<br>X- Window Style Guides                 | Open Software Foundation (OSF) M027: CDE 2.1/ Motif 2.1 – Style Guide and Glossary, ISBN 1- 85912- 104- 7, October 1997            | Design Considerations | This standard maps to the Design Considerations because it provides developers with a framework of behavior specifications applicable to user interfaces.                                 | <ul style="list-style-type: none"> <li>This guide provides developers who design and implement new products with a framework of behavior specifications that is consistent with the Motif and Common Desktop Environment (CDE) user interface. This behavior is established by drawing out the common elements from a variety of current behavioral models. [<a href="http://www.opengroup.org/publications/catalog/m027.htm">http://www.opengroup.org/publications/catalog/m027.htm</a>]</li> </ul>   |
|   | Open Software Foundation (OSF) M028: CDE 2.1/ Motif 2.1 – Style Guide Certification Check List, ISBN 1- 85912- 1098, October 1997. | Design Considerations | This standard maps to Design Considerations because it contains a checklist for evaluating application software for a consistent desktop style.   | <ul style="list-style-type: none"> <li>This document is a supplement to the CDE 2.1/Motif 2.1 - Style Guide and Glossary and the CDE 2.1/Motif 2.1 - Style Guide Reference. It provides detailed checklists for the style guidelines covered in its two companion volumes, allowing developers to evaluate their products for consistent Desktop style. [<a href="http://www.opengroup.org/publications/catalog/m028.htm">http://www.opengroup.org/publications/catalog/m028.htm</a>]</li> </ul>   |
|   | Open Software Foundation (OSF) M029: CDE 2.1/ Motif 2.1 – Style Guide Reference, ISBN 1- 85912- 114- 4, October 1997.              | Design Considerations | This standard maps to the Design Considerations because it contains a complete set of Desktop Style guidelines to be used by the developer as an aid in designing user interfaces.        | <ul style="list-style-type: none"> <li>This reference volume is a supplement to the CDE 2.1/Motif 2.1 - Style Guide and Glossary. It presents a complete set of specific Desktop style guidelines for the new product developer. [<a href="http://www.opengroup.org/pubs/catalog/m029.htm">http://www.opengroup.org/pubs/catalog/m029.htm</a>]</li> </ul>  |
| 2.5.2.2.1.2<br>Windows Style Guide                    | The Windows Interface Guidelines for Software Design, Microsoft Press, 1995  | Design Considerations | This standard maps to the Design Considerations because it contains guidelines for Windows based user interfaces and can be used by the developer as an aid in designing user interfaces. | <ul style="list-style-type: none"> <li>Mandated if a Windows-based environment is selected. [<a href="http://mspress.microsoft.com">http://mspress.microsoft.com</a>]</li> </ul>   |
| 2.5.2.2.2<br>DoD Human-Computer Interface Style Guide | DoD HCI Style Guide, 30 April 1996   | Design Considerations | This standard maps to the Design Considerations because it address design issues related to the user interface.   | <ul style="list-style-type: none"> <li>The <i>DoD HCI Style Guide</i> provides an additional source of interface design input along with commercial style guides that can be used by a system developer/designer. The <i>Style Guide</i> addresses common user interface design issues, contains guidance derived from research on human performance, and provides a focus on elements applicable to DoD systems. [<a href="http://www-library.itsi.disa.mil/tafim/tafim3.0/pages/download/v8.pdf">http://www-library.itsi.disa.mil/tafim/tafim3.0/pages/download/v8.pdf</a>]</li> </ul> |

## Mapping of JTA 3.1 to TRM V1.0

### Section 2.5 – Human-Computer Interface Standards

| JTA Section & Service Area                 | Currently Mandated Standard   | TRM Mapping              | Mapping Justification   | Notes  |
|--|---|--------------------------|---|--|
| 2.5.2.2.3<br>Domain- Level<br>Style Guides | User Interface<br>Specification for the<br>Defense Information<br>Infrastructure (DII),<br>Version 3.0, February<br>1998. | Design<br>Considerations | This standard maps to the Design<br>Considerations because it address style<br>specifications related to graphical user<br>interfaces or browser-based user<br>interface. | <ul style="list-style-type: none"> <li>This document provides style specifications for applications that have a graphical user interface (GUI) or a browser-based user interface. [<a href="http://dod-ead.mont.disa.mil/cm/general.html">http://dod-ead.mont.disa.mil/cm/general.html</a>]</li> </ul>   |
| 2.5.2.3<br>Symbology                       | MIL- STD- 2525B,<br>Common Warfighting<br>Symbology, 30 January<br>1999   | 4L Interface             | This standard maps to the 4L Interfaces<br>because it provides criteria for the<br>development and display of standard C4I<br>warrior symbols.                            | <ul style="list-style-type: none"> <li>This standard is designed to provide the guidelines and criteria necessary for the development and display of standard C4I warrior symbology. [<a href="http://astimage.daps.dla.mil/online/parms/mainframe.cfm">http://astimage.daps.dla.mil/online/parms/mainframe.cfm</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 4: Applications Software layer. [TRM]</li> </ul> |

# Mapping of JTA 3.1 to TRM V1.0

## Section 2.5 – Human-Computer Interface Standards

| JTA Section & Service Area  | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|-----------------------------|--|--------------|--|--|
| 2.5.3<br>Emerging Standards | MIL- PRF- 89045, DoD Performance Specification Geospatial Symbols for Digital Displays (GeoSym™) , 20 February 1998. | 4L Interface | This standard maps to the 4L Interface because it defines the format and content of symbol graphics. | <ul style="list-style-type: none"> <li>• The Geospatial Symbols for Digital Displays (GeoSym) specification defines the format and content of symbol graphics and symbol assignment tables. GeoSym symbols were created for use with VPF products and are designed to complement Common Warfighting Symbology (MIL-STD-2525B). For nonwarfighting, geospatial symbology, ... [JTA]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 4: Applications Software layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                                  | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes   |
|---|--|---|---|---|
| 2.6.2.2.1<br>Application Software Entity Security Standards | DoD 5200.28- STD, The Department of Defense Trusted Computer System Evaluation Criteria, December 1985 | Application Platform Entity- Security Services and Design Considerations  | The TCSEC provides a standard for security features, and more importantly, system assurance. It covers product development and influences application software development. It maps to the Security Services because it addresses security requirements for application software from the acquisition stage through the development phase. This standard maps to the Design Considerations because it provides a metric for evaluating the degree of trust that can be placed computer systems. | <ul style="list-style-type: none"> <li>To provide a standard to manufacturers as to what security features to build...To provide DoD components with a metric with which to evaluate the degree of trust that can be placed in computer systems for the secure processing... To provide a basis for specifying security requirements in acquisition specifications. ... The trusted computer system evaluation criteria will be used directly and indirectly in the certification process.<br/>[http://www.radium.ncsc.mil/tpep/library/rainbow/5200.28-STD.pdf]</li> <li>The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> </ul>  |
|   | NCSC-TG- 021, Version 1, Trusted Database Management System Interpretation, April 1991                 | Application Software Entity - Database Utilities and Application Platform Entity- Security Services and Design Considerations | This standard maps to the Security Services because it provides technical guidance in specifying and identifying system security, particularly for database management systems. It is mapped to the Database Utilities for this paragraph since it defines aspects of the services in this service area. Since it defines criteria and guidelines for implementing a secure database system, it is also mapped to Design Considerations.  | <ul style="list-style-type: none"> <li>The interpretations in this document are intended to be used in conjunction with the TCSEC itself; they apply to application-oriented software systems in general, and database management systems (DBMSs) in particular. Although the interpretations, as noted, are general enough to apply to any software system which supports sharing and needs to enforce access control (e.g., transaction processing systems, electronic mail systems), in the interest of simplicity, the discussion, and thus the terminology, will be directed toward DBMSs.<br/>[http://www.radium.ncsc.mil/tpep/library/rainbow/NCSC-TG-021.txt]</li> <li>Database utility services provide the capability to retrieve, organize, and manipulate data extracted from a database management system. [TRM]</li> <li>The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area           | Currently Mandated Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|--------------------------------------|---|---|--|--|
|                                      | FORTEZZA Application Implementers' Guide, MD4002101- 1. 52, 5 March 1996                | Application Platform Entity - Security Services and 4D Interface  | This guide defines security services as defined in the TRM, so it is mapped to Security Services. This standard maps to the 4D Interface because it defines interfaces that can be used by an application to invoke the services provided by the Fortezza card.  | <ul style="list-style-type: none"> <li>This document appears to be a guide and complements the FORTEZZA Cryptologic Interface Programmers' Guide. Since the document is export-controlled, no direct quotes were taken from the document.</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>   |
|                                      | FORTEZZA Cryptologic Interface Programmers' Guide, MD4000501- 1. 52, 20 October 1997.   | Application Platform Entity - Security Services and 4D Interface  | This standard maps to the Security Services because the Fortezza technology uses cryptography to provide a confidentiality service. This standard maps to the 4D Interface because it describes a set of C based interfaces that can be used to access the services of the Fortezza card.  | <ul style="list-style-type: none"> <li>This document defines the commands of the Fortezza Cryptologic Interface (CI) Library. The CI Library provides the software developer with an interface to the Fortezza Crypto Card (hereafter referred to as the "Card") while isolating the developer from the cryptologic details of the Card. [<a href="http://www.armadillo.huntsville.al.us/Fortezza_docs/cipg152.pdf">http://www.armadillo.huntsville.al.us/Fortezza_docs/cipg152.pdf</a>]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.6.2.2.2.1 Data Management Services | NCSC- TG- 021, Version 1, Trusted Database Management System Interpretation, April 1991 | Application Platform Entity- Security Services and Application Platform Entity - Data Management Services and Design Considerations | This standard maps to the Security Services because it provides technical guidance in specifying and identifying system security, particularly for database management systems. It maps to the Data Management Services because this JTA paragraph defines services for database management. This standard maps to the Design Considerations because it defines criteria and guidelines for implementing a secure database system. | <ul style="list-style-type: none"> <li>The interpretations in this document are intended to be used in conjunction with the TCSEC itself; they apply to application-oriented software systems in general, and database management systems (DBMSs) in particular. Although the interpretations, as noted, are general enough to apply to any software system which supports sharing and needs to enforce access control (e.g., transaction processing systems, electronic mail systems), in the interest of simplicity, the discussion, and thus the terminology, will be directed toward DBMSs. [<a href="http://www.radium.ncsc.mil/tpep/library/rainbow/NCSC-TG-021.txt">http://www.radium.ncsc.mil/tpep/library/rainbow/NCSC-TG-021.txt</a>]</li> <li>The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>Central to most systems is the management of data that can be defined independently of the processes that create or use it, maintained indefinitely, and shared among many processes. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                           | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes   |
|--|--|---|---|---|
| 2.6.2.2.2<br>Operating System Services Security      | DoD 5200.28- STD, The DoD Trusted Computer System Evaluation Criteria, December 1985 | Application Platform Entity - Security Services and Application Platform Entity - Operating System Services and Design Considerations | This standard maps to the Security Services because it provides technical guidance in specifying and providing system security. Since this particular section of the JTA deals with security at the Operating System level, this standard maps to the Operating System Services. This standard maps to the Design Considerations because it provides a metric for evaluating the degree of trust that can be placed computer systems. | <ul style="list-style-type: none"> <li>To provide a standard to manufacturers as to what security features to build...To provide DoD components with a metric with which to evaluate the degree of trust that can be placed in computer systems for the secure processing... To provide a basis for specifying security requirements in acquisition specifications. ... The trusted computer system evaluation criteria will be used directly and indirectly in the certification process. [http://www.radium.ncsc.mil/tpep/library/rainbow/5200.28-STD.pdf]</li> <li>The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> </ul> |
| 2.6.2.2.2.1<br>Security Auditing and Alarm Standards | DoD 5200.28- STD, The DoD Trusted Computer System Evaluation Criteria, December 1985 | Application Platform Entity - Security Services and Design Considerations   | This standard maps to the Security Services because it provides technical guidance in specifying and providing system security and in particular guidance for security auditing and alarms. This standard maps to the Design Considerations because it provides a metric for evaluating the degree of trust that can be placed computer systems.  | <ul style="list-style-type: none"> <li>To provide a standard to manufacturers as to what security features to build...To provide DoD components with a metric with which to evaluate the degree of trust that can be placed in computer systems for the secure processing... To provide a basis for specifying security requirements in acquisition specifications. ... The trusted computer system evaluation criteria will be used directly and indirectly in the certification process. [http://www.radium.ncsc.mil/tpep/library/rainbow/5200.28-STD.pdf]</li> <li>System management services encompass those security functions required to maintain an operationally secure system. These services include analysis areas such as certification and accreditation and risk management, as well as operationally motivated concerns such as alarm-reporting, audit, and cryptographic key management. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                       | Currently Mandated Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|--|---|---|---|---|
| 2.6.2.2.2.2<br>Authentication Security Standards | IETF RFC- 1510, The Kerberos Network Authentication Service, Version 5, 10 September 1993 | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 4D Interface | This standard maps to the Security Services because it provides authentication and confidentiality services. This standard maps to the Communication Services and 4D Interfaces because it defines a network communication protocol with interfaces to client applications.   | <ul style="list-style-type: none"> <li>• Kerberos provides a means of verifying the identities of principals, (e.g., a workstation user or a network server) on an open (unprotected) network. ... This document gives an overview and specification of Version 5 of the protocol for the Kerberos network authentication system. [<a href="http://www.rfc-editor.org/rfc/rfc1510.txt">http://www.rfc-editor.org/rfc/rfc1510.txt</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |
|  | FIPS PUB 112, Password Usage, 30 May 1985   | Application Platform Entity- Security Services and Design Considerations  | This standard maps to the Security Services because it provides a guideline for providing an authentication service. This standard maps to Design Considerations because it defines 10 factors to be considered during the design, implementation and use of systems that use a password scheme to restrict access. | <ul style="list-style-type: none"> <li>• Defines 10 factors to be considered in the design, implementation and use of access control systems that are based on passwords. It specifies minimum security criteria for such systems and provides guidance for selecting additional security criteria for password systems which must meet higher security requirements.[<a href="http://www.itl.nist.gov/fipspubs/0-toc.htm#cs">http://www.itl.nist.gov/fipspubs/0-toc.htm#cs</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area             | Currently Mandated Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|--|---|---|--|--|
| 2.6.2.3.1.1<br>Host Security Standards | FORTEZZA Interface Control Document, Revision P1.5, 22 December 1994                | Application Platform Entity- Security Services and Application Platform Entity- Physical Environment Services and External Environment Entity – Devices and 3D, 2D Interfaces | This standard maps to the Security Services because it provides authentication and confidentiality services. This standard maps to the Physical Environment Services, External Environment Entity and the 3D, 2D Interface because it provides the detailed technical operations of the Card which enable third party vendors to develop drivers or adapters that utilize the resources of the card. | <ul style="list-style-type: none"> <li>• The purpose of this document is to provide the technical level of detail needed for third party vendors to understand the application of the FORTEZZA Crypto Card to their requirements and subsequently design operating system drivers and/or hardware adapters to use the resources provided by the FORTEZZA Crypto Card. ... The remainder of this document will describe the technical operating details of the Card. This includes an overview of the Card's operating states, its hardware and software design, the shared memory interface and finally the specific command set. [<a href="http://www.armadillo.huntsville.al.us/Fortezza_docs/ficd_p15.pdf">http://www.armadillo.huntsville.al.us/Fortezza_docs/ficd_p15.pdf</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Physical environment services are hardware-based services that include the interfacing software services provided by device drivers that support digital/analog signals between components. [TRM]</li> <li>• Devices include hardware interconnect services components and processing resources required to support application platforms [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul> |
|  | FIPS- PUB 140- 1, Security Requirements for Cryptographic Modules, 11 January 1994. | Application Platform Entity- Security Services and Design Considerations  | This standard maps to the Security Services because it provides confidentiality services. This standard maps to the Design Considerations because it provides security requirements that are to be met by a cryptographic module.  | <ul style="list-style-type: none"> <li>• Provides the security requirements that are to be satisfied by a cryptographic module implemented within a security system and provides four increasing, qualitative levels of security intended to cover a wide range of potential applications and environments. [<a href="http://www.itl.nist.gov/fipspubs/0-toc.htm#cs">http://www.itl.nist.gov/fipspubs/0-toc.htm#cs</a>] and [<a href="http://www.itl.nist.gov/fipspubs/bul-1401.htm">http://www.itl.nist.gov/fipspubs/bul-1401.htm</a>]</li> <li>• Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> </ul>  |
| 2.6.2.3.1.1.1<br>Security Algorithms   | FIPS PUB 180- 1, Secure Hash Algorithm- 1, April 1995.                              | Application Platform Entity- Security Services and 3L Interface   | This standard maps to the Security Services because it provides a hashing algorithm, which is included in non-repudiation services as electronic hashing. It maps to the 3L Interface because it defines the algorithm.  | <ul style="list-style-type: none"> <li>• In FORTEZZA applications the following standards are mandated. [JTA]</li> <li>• Non-repudiation services include open systems non-repudiation, electronic signature, and electronic hashing. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|---|--|---|---|
|                            | FIPS PUB 186- 1, Digital Signature Standard (DSS) Digital Signature Algorithm (DSA), December 1998. | Application Platform Entity- Security Services and 3L Interface  | This standard maps to the Security Services because it provides an electronic signature algorithm, which is included in non-repudiation services as electronic signature. It maps to the 3L Interface because it defines the algorithm. | <ul style="list-style-type: none"> <li>The DSS provides the capability of generating and verifying digital signatures for applications requiring a digital rather than a written signature. The change allows for the use of the Digital Signature Algorithm (DSA) as specified by American National Standards Institute (ANSI) X9.30 and the Rivest-Shamir-Adleman (RSA) digital signature technique as specified by ANSI X9.31. [<a href="http://www.itl.nist.gov/fipspubs/0-toc.htm#cs">http://www.itl.nist.gov/fipspubs/0-toc.htm#cs</a>]</li> <li>Non-repudiation services include open systems non-repudiation, electronic signature, and electronic hashing. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>                                 |
|                            | FIPS PUB 185, SKIPJACK algorithm, February 1994, NSA, R21- TECH- 044- 91, 21 May 1991.              | Application Platform Entity- Security Services and 3L Interface  | This standard maps to the Security Services because it provides encryption/decryption services. It maps to the 3L Interface because it defines the algorithm.   | <ul style="list-style-type: none"> <li>This Standard specifies use of a symmetric-key encryption (and decryption) algorithm (SKIPJACK) and a Law Enforcement Access Field (LEAF) creation method (one part of a key escrow system) which provides for decryption of encrypted telecommunications when interception of the telecommunications is lawfully authorized. [<a href="http://www.itl.nist.gov/fipspubs/fip185.htm">http://www.itl.nist.gov/fipspubs/fip185.htm</a>]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | R21- TECH- 23- 94, Key Exchange Algorithm (KEA), NSA, 12 July 1994                                  | Application Platform Entity - Security Services and 3L Interface | This standard maps to the Security Services because it provides cryptographic services. It maps to the 3L Interface because it defines the algorithm.   | <ul style="list-style-type: none"> <li>The following paragraphs identify security standards that shall be used for the identified types of cryptographic algorithms. [JTA]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area          | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes  |
|-------------------------------------|---|--|--|--|
| 2.6.2.3.1.1.2<br>Security Protocols | MIL-STD-2045-48501, Common Security Label, 25 January 1995                                    | Application Platform Entity - Security Services<br>And<br>Application Platform Entity - Communications Services<br>and<br>3L Interface | This standard maps to the Security Services because the TRM states that security labels is a security service. This standard maps to Communications Services because it applies to information transfer security standards. This standard maps to the 3L interface because it describes formats for security labels. | <ul style="list-style-type: none"> <li>• This document establishes the specifications for the Common Security Label (CSL). This protocol data unit enables the labeling of information as it passes through communications systems. The format of the CSL option makes it possible to include the CSL in the options section of communications protocols and for end and intermediate devices to parse the option and utilize the security information in the label.<br/>[<a href="http://astimage.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=115367">http://astimage.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=115367</a>]</li> <li>• Security labels are used to manage access and privileges, which are managed for all entities, whether they are individual users, groups of users, resources, or processes. ... Security labeling is the data bound to a resource (which may be a data unit) that names or designates the security attributes of that resource. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                                     | ITU-T Rec. X.509 (ISO/IEC 9594-8.2), Version 3, The Directory: Authentication Framework, 1997 | Application Platform Entity - Security Services<br>and<br>3L Interface   | This standard maps to the Security Services because it relates to key management, a function within the confidentiality services, and it maps to the 3L interface because it describes data format.  | <ul style="list-style-type: none"> <li>• Establishment of a certificate and key management infrastructure for digital signature is required for the successful implementation of the security architecture. This infrastructure is responsible for the proper creation, distribution, and revocation of end-users' public-key certificates. [JTA]</li> <li>• Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                          | Currently Mandated Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|---|---|--|---|---|
|   | ACP- 120, Allied Communications Publication 120, Common Security Protocol (CSP), Rev. A, 7 May 1998.  | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L Interface  | This standard maps to the Security Services because it provides data confidentiality. This standard maps to the Commination Services because it specifies a protocol. This standard maps to 4D and 3L Interface because it is considered to be a System Service at the Application Platform Entity level. | <ul style="list-style-type: none"> <li>This document specifies the services and protocol implemented in a CSP User Agent (CSP UA). The CSP UA provides these services by encapsulating the message content and adding a CSP heading before submission to the MTS. CSP is used to protect data regardless of the format of the encapsulated content.[<a href="http://www.armadillo.huntsville.al.us/Fortezza_docs/acp120.doc">http://www.armadillo.huntsville.al.us/Fortezza_docs/acp120.doc</a>]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul> |
|   | SDN.903, revision 3.2, Secure Data Network System (SDNS) Key Management Protocol (KMP), 1 August 1989 | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L Interfaces | This standard maps to the Security Services because the TRM states that key management is a security service. It maps to Communication Services and 4D, 3L Interface because it defines a network protocol and services.  | <ul style="list-style-type: none"> <li>key management protocol [JTA]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul>   |
| 2.6.2.3.1.13 Evaluation Criteria Security Standards | DoD 5200.28- STD, The DoD Trusted Computer System Evaluation Criteria, December 1985                  | Application Platform Entity- Security Services and Design Considerations   | This standard maps to the Security Services because it addresses security requirements for application software starting at the acquisition stage and on into the development phase. It also maps to Design Considerations because it provides developers with criteria for a system's security features. | <ul style="list-style-type: none"> <li>The purpose of the TCSEC is to provide a standard to manufacturers as to what security features to build...To provide DoD components with a metric with which to evaluate the degree of trust that can be placed in computer systems for the secure processing... to provide a basis for specifying security requirements in acquisition specifications. ... The trusted computer system evaluation criteria will be used directly and indirectly in the certification process. [<a href="http://www.radium.ncsc.mil/tpep/library/rainbow/5200.28-STD.pdf">http://www.radium.ncsc.mil/tpep/library/rainbow/5200.28-STD.pdf</a>]</li> <li>The DGSA identifies the following security services that may need to be provided through implementations in information system components... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> </ul>                 |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area           | Currently Mandated Standard   | TRM Mapping  | Mapping Justification  | Notes   |
|--------------------------------------|---|--|--|---|
|                                      | NCSC- TG- 005, Version 1, Trusted Network Interpretation, July 1987                       | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and Design Considerations | This standard maps to the Security Services and Communication Services because it describes security features for networks. This standard maps to the Communication Services because it applies to network communication. This standard maps to the Design Considerations because it provides developers with criteria for evaluating a network's security features. | <ul style="list-style-type: none"> <li>• As with the TCSEC itself, this Interpretation has been prepared for the following purposes: 1. To provide a standard to manufacturers as to what security features and assurance levels to build into their new and planned, commercial network products in order to provide widely available systems that satisfy trust requirements for sensitive applications 2. To provide a metric by which to evaluate the degree of trust that can be placed in a given network system for processing sensitive information 3. To provide a basis for specifying security requirements in acquisition specifications. [<a href="http://csrc.nist.gov/secpubs/rainbow/tg005.txt">http://csrc.nist.gov/secpubs/rainbow/tg005.txt</a>]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. Transport services... end-to-end transmission of data across a network and end-to-end reliability. ... transport and session layers (layers 4 and 5) of the OSI Reference Model. Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> </ul> |
| 2.6.2.3.2 Network Security Standards | SDN.301, Revision 1.5, Secure Data Network System (SDNS) Security Protocol 3 (SP3), 1989. | Application Platform Entity - Security Services and External Environment Entity - Networks and 1D, 1L Interfaces                   | This standard maps to the Security Services because it provides network layer security. It maps to 1L and 1D interfaces because it defines a protocol and it is considered to be a System Service at the External Environment Entity level.  | <ul style="list-style-type: none"> <li>• Systems processing classified information must use Type 1 NSA-approved encryption products to provide both confidentiality and integrity security services within the network. When network-layer security is required, the following security protocol is mandated. [JTA]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>• Networks include telephone lines, local area networks, cabling, and packet-switching equipment. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>   |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.6 – Information Security Standards

| JTA Section & Service Area                           | Currently Mandated Standard                                | TRM Mapping  | Mapping Justification  | Notes   |
|--|--|--|--|---|
|  | MIL-STD-2045-48501, Common Security Label, 25 January 1995 | Application Platform Entity - Security Services and Application Platform Entity - Communications Services and 3L Interface | This standard maps to the Security Services because the TRM states that security labels is a security service. This standard maps to Communications Services because it applies to information transfer security standards. This standard maps to the 3L interface because it describes formats for security labels. | <ul style="list-style-type: none"> <li>• This document establishes the specifications for the Common Security Label (CSL). This protocol data unit enables the labeling of information as it passes through communications systems. The format of the CSL option makes it possible to include the CSL in the options section of communications protocols and for end and intermediate devices to parse the option and utilize the security information in the label.<br/>[http://astimage.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=115367]</li> <li>• Security labels are used to manage access and privileges, which are managed for all entities, whether they are individual users, groups of users, resources, or processes. ... Security labeling is the data bound to a resource (which may be a data unit) that names or designates the security attributes of that resource. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
| 2.6.2.5 Human- Computer Interface Security Standards | DoD Human- Computer Interface Style Guide, 30 April 1996   | Application Platform Entity - Security Services and Design Considerations  | This standard maps to the Security Services because it contains information concerning user interface security standards. It also maps to the Design Considerations because it addresses design issues related to the user interface.  | <ul style="list-style-type: none"> <li>• HCI security-related requirements may include authentication, screen classification display, and management of access control workstation resources. For systems employing graphical user interfaces, the following guideline is mandated [JTA]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services. [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area     | Currently Mandated Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|--------------------------------|--|---|---|--|
| 2.6.2.6 Web Security Standards | Secure Sockets Layer (SSL) Protocol Version 3.0, 18 November 1996. | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L Interface | This standard maps to the Security Services because it provides authentication, integrity, and confidentiality services. This standard maps to Communication Services because it applies to network communications. It also maps to the 4D and 3L Interface because it allows applications (i.e. browsers and email packages) to access its services. | <ul style="list-style-type: none"> <li>• The Secure Sockets Layer (SSL) protocol allows client/server applications to communicate in a way designed to prevent eavesdropping, tampering, or message forgery. It is currently the de facto standard used by most browsers and popular e-mail packages that are associated with the browser. [JTA]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. This ensures that data are not altered or destroyed in an unauthorized manner.... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.6 – Information Security Standards

| JTA Section & Service Area                                  | Emerging Standard  | TRM Mapping  | Mapping Justification   | Notes  |
|---|--|--|---|--|
| 2.6.3.2.1.1<br>Evaluation<br>Criteria Security<br>Standards | ISO/IEC JTC1/SC27/<br>WG3 N304, 23 April 1996,<br>Evaluation Criteria for<br>Information Technology<br>Security (Common<br>Criteria) | Application Platform<br>Entity - Security<br>Services<br>and<br>Design<br>Considerations   | The Common Criteria standard maps to the Security Services because it is to be used for evaluating security properties. Since it defines criteria rather than services or interfaces, it maps to Design Considerations.   | <ul style="list-style-type: none"> <li>This multipart standard ... defines criteria, ... referred to ... as the Common Criteria (CC), to be used as the basis for evaluation of security properties of IT products and systems. [<a href="http://csrc.nist.gov/cc/ccv20/ccv2list.htm">http://csrc.nist.gov/cc/ccv20/ccv2list.htm</a>]</li> <li>... two categories of software are identified: trusted and untrusted. Both categories may have been acquired for an information-system implementation as NDI products. However, the trusted software will have been evaluated in accordance with criteria established by responsible agencies for information-system security and will need to be maintained under strict configuration management control. [TRM]</li> </ul>  |
|   | FDIS 15408, Common<br>Criteria, Version 2.0,<br>October 1998.  | Application Platform<br>Entity- Security<br>Services<br>and<br>Design<br>Considerations  | The standard maps to Design Considerations because it is a guide that provides a set of criteria for evaluating the security properties of IT products and systems. This standard maps to Security Services because it applies to security.   | <ul style="list-style-type: none"> <li>This standard defines criteria, which for historical and continuity purposes are referred to herein as the Common Criteria (CC), to be used as the basis for evaluation of security properties of IT products and systems. [<a href="http://csrc.nist.gov/cc/ccv10/ccv1list.htm">http://csrc.nist.gov/cc/ccv10/ccv1list.htm</a>]</li> <li>... two categories of software are identified: trusted and untrusted. Both categories may have been acquired for an information-system implementation as NDI products. However, the trusted software will have been evaluated in accordance with criteria established by responsible agencies for information-system security and will need to be maintained under strict configuration management control. [TRM]</li> </ul>  |
| 2.6.3.2.1.2<br>Web Security<br>Standards                    | IETF- RFC 2246, The<br>Transfer Layer Security<br>(TLS) Protocol Version<br>1.0,<br>January 1999.                                    | Application Platform<br>Entity- Security<br>Services<br>and<br>Application Platform<br>Entity-<br>Communication<br>Services<br>and<br>4D, 3L Interface | This standard maps to the Security Services because it provides data integrity. This standard also maps to the Communication Services because it applies to network communications. This standard maps to the 4D, 3L Interface because it allows client/server communication in a way that is designed to prevent eavesdropping, tampering, or message forgery. | <ul style="list-style-type: none"> <li>The primary goal of the TLS Protocol is to provide privacy and data integrity between two communicating applications. ... The TLS protocol provides communications privacy over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery. [<a href="http://www.ietf.org/rfc/rfc2246.txt?number=2246">http://www.ietf.org/rfc/rfc2246.txt?number=2246</a>]</li> <li>Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. This ensures that data are not altered or destroyed in an unauthorized manner. [TRM]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area   | Emerging Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|--|---|---|--|--|
|  | IETF- RFC 2487, SMTP Service Extension for Secure SMTP over TLS, January 1999.                  | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 4D, 3L Interface | This standard maps to the Security Services because it provides authentication services for use by client/server applications. This standard also maps to the Communication Services because it applies to network communication. It also maps to the 4D, 3L Interface because it contains the commands, arguments and return codes that a mailer program uses to interface to the SMTP extensions described in this standard. | <ul style="list-style-type: none"> <li>• This document describes an extension to the SMTP service that allows an SMTP server and client to use transport-layer security to provide private, authenticated communication over the Internet. [<a href="http://www.ietf.org/rfc/rfc2487.txt?number=2487">http://www.ietf.org/rfc/rfc2487.txt?number=2487</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. Direct Interface: transfer of information [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>   |
| 2.6.3.2.2.1.1<br>Generic Security Service – Application Program Interface Security | IETF RFC 2078, Generic Security Service Application Program Interface, Version 2, January 1997. | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 4D, 3L Interface | This standard maps to the Security Services because it provides authentication, integrity, and/or confidentiality security services. This standard maps to the Communication Services because it applies to network communication. This standard also maps to the 4D, 3L Interface because it provides an Application Program Interface for use by applications to access its services.  | <ul style="list-style-type: none"> <li>• The Generic Security Service Application Program Interface (GSS-API), as defined in RFC-1508, provides security services to callers in a generic fashion, supportable with a range of underlying mechanisms and technologies and hence allowing source-level portability of applications to different environments. [<a href="http://www.ietf.org/rfc/rfc2078.txt?number=2078">http://www.ietf.org/rfc/rfc2078.txt?number=2078</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. This ensures that data are not altered or destroyed in an unauthorized manner.... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |

# Mapping of JTA V3.1 to TRM V1.0

## Section 2.6 – Information Security Standards

| JTA Section & Service Area                     | Emerging Standard   | TRM Mapping   | Mapping Justification   | Notes  |
|--|---|---|---|--|
|  | Independent Data Unit Protection Generic Security Service Application Program Interface (DUP- GSS-API), < draft-ietf-cat-idup-gss-07.txt>, 25 March 1997. | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 4D, 3L Interface | Since this standard is similar to the IETF RFC 2078, Generic Security Service Application Program Interface, it maps to the same services and interfaces as the IETF RFC 2078 standard.   | <ul style="list-style-type: none"> <li>• The IETF Draft, "Independent Data Unit Protection Generic Security Service Application Program Interface (IDUP-GSS-API)," C. Adams, 25 March 1997, &lt;draft-ietf-cat-idup-gss-07.txt&gt;, extends the GSS-API (RFC-1508) for non-session protocols and applications requiring protection of a generic data unit (such as a file or message) independent of the protection of any other data unit and independent of any concurrent contact with designated "receivers" of the data unit. [JTA]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. This ensures that data are not altered or destroyed in an unauthorized manner.... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |
| 2.6.3.2.2.22 Authentication Security Standards | IETF- RFC- 2289, A One-Time Password System, February 1998.   | Application Platform Entity - Security Services and 4D, 3L Interface  | This service maps to the Security Service because the TRM includes authentication in security services. This standard maps to the 4D, 3L Interface because it provides authentication for system access (login) and other applications. | <ul style="list-style-type: none"> <li>• This document describes a one-time password authentication system (OTP). The system provides authentication for system access (login) and other applications requiring authentication that is secure against passive attacks based on replaying captured reusable passwords. [<a href="http://www.ietf.org/rfc/rfc2289.txt?number=2289">http://www.ietf.org/rfc/rfc2289.txt?number=2289</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>  |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                                    | Emerging Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|---|--|---|--|---|
|   | IETF RFC 2138, Remote Authentication Dial In User Service (RADIUS), April 1997 | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L interface         | This standard is used in a client/server model. A radius client passes user information to a radius server. The radius sever authenticates the user, and returns configuration information necessary for the client to deliver service to the user. This standard maps to the Security Service because it provides authentication. It also maps to the Communication Services and 4D interface because it describes the communication and interfaces between a client and a server. Since this standard describes a protocol for use between a Network Access Server and an authentication server, it also maps to a 3L Interface. | <ul style="list-style-type: none"> <li>This document describes a protocol for carrying authentication, authorization, and configuration information between a Network Access Server which desires to authenticate its links and a shared Authentication Server.<br/>[http://www.ietf.org/rfc/rfc2138.txt?number=2138]</li> <li>Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated.[TRM]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul>  |
| 2.6.3.2.2.3 Distributed Computing Services Security Standards | C311, DCE Authentication and Security Specification, August 1997.              | Application Platform Entity - Security Services and Application Platform Entity - Distributed Computing Services and 4D, 3L Interface | This standard maps to the Security Services because it describes DCE security services. This standard maps to the Distributed Computing Services because it is intended to be used as a guide for distributed computing applications. This standard maps to the 4D, 3L Interface because it provides application level interfaces for DCE security implementations.  | <ul style="list-style-type: none"> <li>This document specifies the DCE security model, services, interfaces and protocols. Its purpose is to provide a portability guide for security programs and a conformance specification for DCE implementations. It is written for security application programmers and developers of DCE security implementations<br/>[http://www.opengroup.org/pubs/catalog/c311.htm]</li> <li>The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>Distributed computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area       | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------------|--|--|--|--|
|                                  | OMG document formal/ 98-12-10, CORBA Security Service 1.2, December 1998.                                  | Application Platform Entity - Security Services<br>and<br>Application Platform Entity - Distributed Computing Services<br>and<br>Application Platform Entity - Operating System Services<br>and<br>4D, 3X Interfaces | This standard maps to the Security Services because it describes CORBA security services. This standard maps to the Distributed Computing Services, Operating System Services and 4D, 3X Interfaces because it provides the security services and interfaces for distributed object based systems.         | <ul style="list-style-type: none"> <li>• The Common Object Request Broker Architecture (CORBA) Security Services define a software infrastructure that supports access control, authorization, authentication, auditing, delegation, non-repudiation, and security administration for distributed object-based systems. [JTA]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Access control services prevent the unauthorized use of information system resources. This service also prevents the use of a resource in an unauthorized way. [TRM]</li> <li>• Distributed computing services provide specialized support for applications that may be physically or logically dispersed among computer systems in a network yet wish to maintain a cooperative processing environment. [TRM]</li> <li>• Operating system services are the core services needed to operate and administer the application platform and provide an interface between the application software and the platform. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> </ul>            |
| 2.6.3.3.1.1.1 Security Protocols | IEEE 802. 10, Standards for Local and Metropolitan Networks: Interoperable LAN/ MAN Security (SILS), 1998. | Application Platform Entity – Security Services<br>and<br>Application Platform Entity - Communication Services<br>and<br>4D, 3L Interfaces   | This standard maps to the Security Services because it provides security for LANs and MANs. This standard maps to the Communication Services because it provides network services. This standard maps to the 4D, 3L Interfaces because it provides and defines interfaces and protocols for LANs and MANs. | <ul style="list-style-type: none"> <li>• This IEEE standard provides specification for an interoperable data link layer security protocol and associated security services. It discusses services, protocols, data formats, and interfaces to allow IEEE products confidentiality. A security label option is specified that enables rule-based access control to be implemented using the Security Data Exchange (SDE) protocol. [JTA]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>• Communications services are provided to support distributed applications requiring data access and applications interoperability in networked environments. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|--|--|--|--|
|                            | IEEE 802.10c-1998, Interoperable LAN/ MAN Security (SILS) Key Management (Clause 3). | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L Interfaces | This standard maps to the Security Services because the TRM states that key usage and management is a security service. This standard maps to the Communication Services because it provides network services. This standard maps to the 4D, 3L Interfaces because it provides and defines interfaces and protocols for LANs and MANs. | <ul style="list-style-type: none"> <li>• Key management on IEEE 802Local Area Networks (LANs) and Metropolitan Area Networks (MANs) is described and published separately as IEEE 802.10c-1998. This is a supplement to IEEE 802.10- 1992 and is still recognized as valid in the 1998 version of 802.10- 1998. Clause 3 specifies a cryptographic key management model and Key Management Protocol (KMP) ... for Local Area Network (LAN) security and Metropolitan Area Networks (MANs) security [JTA]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>• Communications services are provided to support distributed applications requiring data access and applications interoperability in networked environments. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area               | Emerging Standard   | TRM Mapping   | Mapping Justification   | Notes   |
|--|---|---|---|---|
| 2.6.3.3.1.1.2. 2<br>Certificate Profiles | International Telecommunications Union - Telecommunications (ITU- T) Recommendation X.509, "Information Technology – Open Systems Interconnection – The Directory: Authentication Framework," June 1997 as profiled by RFC 2459, "Internet X. 509 Public Key Infrastructure Certificate and CRL Profile," January 1999, IETF Proposed Standard, Federal Public Key Infrastructure Technical Working Group (FPKITWG) document TWG- 98- 07, "Federal PKI X. 509 Certificate and CRL Extensions Profile," 9 March 1998; and DOD Certificate Profile, as defined in MITRE Technical Report 98W, "Department of Defense (DOD) Medium Assurance Public Key Infrastructure (PKI) Functional Specification (Draft)," Version 0.3, 20 October 1998, Appendices A- D. | Application Platform Entity - Security Services and 4D, 3L Interfaces | This standard maps to the Security Services because it describes authentication services. Since this standard defines a framework for user password verification and authentication services, describing both formats and services, it is mapped to both logical and direct interfaces. | <ul style="list-style-type: none"> <li>• This Recommendation   International Standard defines a framework for the provision of authentication services by Directory to its users. It describes two levels of authentication: simple authentication, using a password as a verification of claimed identity; and strong authentication, involving credentials formed using cryptographic techniques. While simple authentication offers some limited protection against unauthorized access, only strong authentication should be used as the basis for providing secure services. [<a href="http://www.itu.int/itudoc/itu-t/rec/x/x500up/s_x509.htm">http://www.itu.int/itudoc/itu-t/rec/x/x500up/s_x509.htm</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area   | Emerging Standard   | TRM Mapping  | Mapping Justification   | Notes   |
|--|---|--|---|---|
| 2.6.3.3.1.1.2.3<br>Operational<br>Protocols and<br>Exchange<br>Formats | IETF RFC2559, Internet X.509 Public Key Infrastructure Operational Protocols: LDAPv2," April 1999, IETF Proposed Standard                   | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 4D, 3L Interfaces | This standard maps to the Security Services because it applies to key management and usage. This standard maps to the Communication Services and the 4D, 3L Interfaces because it describes network access and the associated interfaces required to retrieve information from and manage PKI repositories. | <ul style="list-style-type: none"> <li>Specifically, this document addresses requirements to provide access to Public Key Infrastructure (PKI) repositories for the purposes of retrieving PKI information and managing that same information. [<a href="http://www.ietf.org/rfc/rfc2559.txt?number=2559">http://www.ietf.org/rfc/rfc2559.txt?number=2559</a>]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul> |
|  | IETF RFC2587, Internet X.509 Public Key Infrastructure LDAPv2 Schema," June 1999, IETF Proposed Standard.                                   | Application Platform Entity- Security Services and Design Considerations   | This standard maps to the Security Services because it applies to PKI technology. This standard maps to Design Considerations because it only describes attributes and object classes to be used by LDAP client/server communications.  | <ul style="list-style-type: none"> <li>This specification defines the attributes and object classes to be used by LDAP servers acting as PKIX repositories and to be understood by LDAP clients communicating with such repositories to query, add, modify and delete PKI information. [<a href="http://www.ietf.org/rfc/rfc2587.txt?number=2587">http://www.ietf.org/rfc/rfc2587.txt?number=2587</a>]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> </ul>  |
|  | RSA Laboratories Public Key Cryptography Standard #12, "Personal Information Exchange Syntax Standard," version 1.0 (Draft), 30 April 1997. | 3L Interface   | This standard maps to 3L Interface because it describes a syntax for transferring personal information at the Application Platform Entity level.  | <ul style="list-style-type: none"> <li>This standard describes a transfer syntax for personal identity information, including private keys, certificates, miscellaneous secrets, and extensions. [<a href="ftp://ftp.rsasecurity.com/pub/pkcs/pkcs-12/pkcs-12v1.pdf">ftp://ftp.rsasecurity.com/pub/pkcs/pkcs-12/pkcs-12v1.pdf</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
| 2.6.3.3.1.1.2.4<br>Managemnt<br>Protocols                              | IETF RFC 2315, Public Key Cryptography Standard (PKCS) #7, Cryptographic Message Syntax, Version 1.5, March 1998, Informational RFC.        | 3L Interface   | This standard maps to the 3L Interface because it describes a syntax to use for data that has cryptography applied to it.   | <ul style="list-style-type: none"> <li>This document describes a general syntax for data that may have cryptography applied to it, such as digital signatures and digital envelopes. [<a href="http://www.ietf.org/rfc/rfc2315.txt?number=2315">http://www.ietf.org/rfc/rfc2315.txt?number=2315</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>  |
|  | IETF RFC 2314, PKCS #10, Certification Request Syntax, Version 1. 5, March 1998, Informational RFC.   | 3L Interface   | This standard maps to the 3L Interface because it describes the syntax for constructing a certification request.  | <ul style="list-style-type: none"> <li>This document describes a syntax for certification requests. [<a href="http://www.ietf.org/rfc/rfc2314.txt?number=2314">http://www.ietf.org/rfc/rfc2314.txt?number=2314</a>]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                               | Emerging Standard   | TRM Mapping   | Mapping Justification  | Notes  |
|--|---|---|--|--|
| 2.6.3.3.1.1.2.5<br>Application Program Interfaces (APIs) | RSA Laboratories Public Key Cryptography Standard (PKCS) #11, Cryptographic Token Interface Standard," version 1.0, 28 April 1995.  | Application Platform Entity- Security Services and 4D Interface     | This standard maps to the Security Services because it applies to authentication and confidentiality services. This standard maps to the 4D Interface because it specifies an API.   | <ul style="list-style-type: none"> <li>This standard specifies an API, called Cryptoki, to devices which hold cryptographic information and perform cryptographic functions. [<a href="http://www.rsasecurity.com/rsalabs/pkcs/pkcs-11/">http://www.rsasecurity.com/rsalabs/pkcs/pkcs-11/</a>]</li> <li>Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>The API is defined as the interface between the application software and the application platform across which all services are provided. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> </ul>  |
| 2.6.3.3.1.1.2.6<br>Cryptography                          | RSA Laboratories Public Key Cryptography Standard (PKCS) #1, RSA Cryptography Standard," Version 2. 0, 1 October 1998.  | Application Platform Entity - Security Services and 4D,3L Interface | This standard maps to the Security Services because it describes authentication and confidentiality services when applied to public-key cryptography. This standard maps to 4D, 3L Interface because it is considered to be a System Service at the Application Platform Entity level. | <ul style="list-style-type: none"> <li>This document provides recommendations for the implementation of public-key cryptography based on the RSA algorithm, covering the following aspects: cryptographic primitives; encryption schemes; signature schemes with appendix; ASN.1 syntax for representing keys and for identifying the schemes. [<a href="http://www.rsasecurity.com/rsalabs/pkcs/pkcs-1/index.html">http://www.rsasecurity.com/rsalabs/pkcs/pkcs-1/index.html</a>]</li> <li>Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Direct Interface: transfer of information [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> </ul> |
|  | FIPS PUB 140- 1 "Security Requirements for Cryptographic Modules," 11 January 1994. {DOD X. 509 Certificate Policy specifies the FIPS 140- 1 security levels required for PKI users, RAs, and CAs}. | Application Platform Entity - Security Services and 3L Interface    | This standard maps to the Security Services because it provides security requirements for confidentiality services. This standard maps to 3L Interface because it is considered to be a System Service at the Application Platform Entity level.                                       | <ul style="list-style-type: none"> <li>Provides the security requirements that are to be satisfied by a cryptographic module implemented within a security system and provides four increasing, qualitative levels of security intended to cover a wide range of potential applications and environments. [<a href="http://www.itl.nist.gov/fipspubs/0-toc.htm#cs">http://www.itl.nist.gov/fipspubs/0-toc.htm#cs</a>] and [<a href="http://www.itl.nist.gov/fipspubs/bul-1401.htm">http://www.itl.nist.gov/fipspubs/bul-1401.htm</a>]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area                     | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes   |
|--|--|--|--|---|
|  | Draft FIPS PUB 46- 3, "Data Encryption Standard," 8 January 1999. (This replaces DES with Triple DES, as specified in ANSI X9.52). | Application Platform Entity - Security Services and 3L Interface   | This standard maps to the Security Services because it describes data encryption algorithms. It maps to 3L Interface because it specifies the Data Encryption Algorithm.   | <ul style="list-style-type: none"> <li>The Data Encryption Standard (DES) provides specifications for the Data Encryption Algorithm [http://csrc.nist.gov/cryptval/des/fr990115.htm]</li> <li>Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
|  | FIPS PUB 180- 1, "Secure Hash Algorithm," April 1995.  | Application Platform Entity - Security Services and 3L Interface   | This standard maps to the Security Services because it specifies a hash algorithm. It maps to 3L Interface because it specifies the Secure Hash Algorithm.   | <ul style="list-style-type: none"> <li>To specify a Secure Hash Algorithm to be used by both the transmitter and intended receiver of a message in computing and verifying a digital signature. [http://www.itl.nist.gov/fipspubs/by-num.htm]</li> <li>Non-repudiation services include open systems non-repudiation, electronic signature, and electronic hashing. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul>   |
| 2.6.3.3.2.1 Internetworking Security Standards | IETF RFC 2401, Security Architecture for the Internet Protocol, November 1998.   | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 3L Interfaces | This standard maps to the Security Services because it describes authentication, access control, integrity and confidentiality services for traffic at the IP layer. This standard maps to the Communication Services because it describes extensions to the Internet Protocol. This standard maps to 3L Interface because it is considered to be a System Service at the Application Platform Entity level. | <ul style="list-style-type: none"> <li>This memo specifies the base architecture for IPsec compliant systems. The goal of the architecture is to provide various security services for traffic at the IP layer, in both the IPv4 and IPv6 environments. This document describes the goals of such systems, their components and how they fit together with each other and into the IP environment. [http://www.ietf.org/rfc/rfc2401.txt?number=2401]</li> <li>Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Access control services prevent the unauthorized use of information system resources. ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>Logical Interface: supports understanding of information [TRM]</li> <li>Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|--|--|--|--|
|                            | IETF RFC 2402, "IP Authentication Header," S. Kent and R. Atkinson, November 1998. | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 3L Interfaces | This standard maps to the Security Services because it provides authentication and integrity services for data at the IP layer. This standard maps to the Communication Services because it describes extensions to the Internet Protocol. This standard maps to 3L Interface because it is considered to be a System Service at the Application Platform Entity level.                      | <ul style="list-style-type: none"> <li>• The IP Authentication Header (AH) is used to provide connectionless integrity and data origin authentication for IP datagrams (hereafter referred to as just "authentication"), and to provide protection against replays. [http://www.ietf.org/rfc/rfc2402.txt?number=2402]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. [TRM]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF RFC 2406 "IP Encapsulating Security Payload (ESP)," November 1998.            | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 3L Interfaces | This standard maps to the Security Services because it describes confidentiality, authentication and integrity services for traffic at the IP layer. This standard maps to the Communication Services because it describes extensions to the Internet Protocol. This standard maps to 3L Interface because it is considered to be a System Service at the Application Platform Entity level. | <ul style="list-style-type: none"> <li>• The Encapsulating Security Payload (ESP) header is designed to provide a mix of security services in IPv4 and IPv6. ... ESP is used to provide confidentiality, data origin authentication, connectionless integrity, an anti-replay service (a form of partial sequence integrity), and limited traffic flow confidentiality. [http://www.ietf.org/rfc/rfc2406.txt?number=2406]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | IETF RFC 2104, HMAC: Keyed- Hashing for Message Authentication, February 1997      | Application Platform Entity - Security Services and 3L Interfaces  | This standard maps to the Security Services because it describes message authentication services in order to ensure the integrity of data transferred over unsecured medium. It maps to 3L interface because it defines algorithms.  | <ol style="list-style-type: none"> <li>1 This document describes HMAC, a mechanism for message authentication using cryptographic hash functions. [http://www.ietf.org/rfc/rfc2104.txt?number=2104]</li> <li>2 Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. [TRM]</li> <li>3 Logical Interface: supports understanding of information [TRM]</li> <li>4 Layer 3: System Services layer. [TRM]</li> </ol>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping   | Mapping Justification  | Notes  |
|----------------------------|--|---|--|--|
|                            | IETF RFC 1829, The ESP DES-CBC Transform, August 1995                              | Application Platform Entity - Security Services and 3L Interfaces | This standard maps to the Security Services because it describes the DES data encryption algorithm to be used with ESP. It maps to 3L interface because it defines algorithms.                     | <ul style="list-style-type: none"> <li>• This specification describes the ESP use of the Cipher Block Chaining (CBC) mode of the US Data Encryption Standard (DES) algorithm. [<a href="http://www.ietf.org/rfc/rfc1829.txt?number=1829">http://www.ietf.org/rfc/rfc1829.txt?number=1829</a>]</li> <li>• Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>   |
|                            | IETF RFC 2451, The ESP CBC- Mode Cipher Algorithms, November 1998.                 | Application Platform Entity - Security Services and 3L Interfaces | This standard maps to the Security Services because it describes data encryption algorithms to be used with ESP (other than DES). It maps to 3L interface because it defines algorithms.           | <ul style="list-style-type: none"> <li>• The Encapsulating Security Payload (ESP) [Kent98] provides confidentiality for IP datagrams by encrypting the payload data to be protected. This specification describes the ESP use of CBC-mode cipher algorithms. [<a href="http://www.ietf.org/rfc/rfc2451.txt?number=2451">http://www.ietf.org/rfc/rfc2451.txt?number=2451</a>]</li> <li>• Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | IETF RFC 2405, The ESP CBC- Mode Cipher Algorithm with Explicit IV, November 1998. | Application Platform Entity - Security Services and 3L Interfaces | This standard maps to the Security Services because it describes the DES data encryption algorithm using an explicit initialization vector. It maps to 3L interface because it defines algorithms. | <ul style="list-style-type: none"> <li>• This document describes the use of the DES Cipher algorithm in Cipher Block Chaining Mode, with an explicit IV, as a confidentiality mechanism within the context of the IPSec Encapsulating Security Payload (ESP). [<a href="http://www.ietf.org/rfc/rfc2405.txt?number=2405">http://www.ietf.org/rfc/rfc2405.txt?number=2405</a>]</li> <li>• Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping   | Mapping Justification   | Notes  |
|----------------------------|--|---|---|--|
|                            | Draft FIPS 46-3, Data Encryption Standard (DES).   | Application Platform Entity - Security Services and 3L Interfaces | This standard maps to the Security Services because it describes the Data Encryption Standard, which consists of Data Encryption Algorithm (DEA) and the Triple Data Encryption Algorithm (TDEA). These algorithms are used for maintaining the integrity and confidentiality of the data. It maps to 3L interface because it defines algorithms. | <ul style="list-style-type: none"> <li>• This publication specifies two cryptographic algorithms, the Data Encryption Algorithm (DEA) and the Triple Data Encryption Algorithm (TDEA) which may be used by Federal organizations to protect sensitive data. Protection of data during transmission or while in storage may be necessary to maintain the confidentiality and integrity of the information represented by the data. The algorithms uniquely define the mathematical steps required to transform data into a cryptographic cipher and also to transform the cipher back to the original form.<br/>[<a href="http://www.cerberussystems.com/INFOSEC/stds/fip46-3.htm">http://www.cerberussystems.com/INFOSEC/stds/fip46-3.htm</a>]</li> <li>• Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | IETF RFC 2420, The PPP Triple- DES Encryption Protocol (3DESE) as a complement to FIPS 46-3. | Application Platform Entity - Security Services and 3L Interfaces | This standard is similar to the DES encryption algorithm and for that reason maps the same as DES. It maps to 3L interface because it defines algorithms.   | <ul style="list-style-type: none"> <li>• The purpose of encrypting packets exchanged between two PPP implementations is to attempt to insure the privacy of communication conducted via the two implementations. There exists a large variety of encryption algorithms, where one is the DES algorithm. The DES encryption algorithm is a well studied, understood and widely implemented encryption algorithm. Triple-DES means that this algorithm is applied three times on the data to be encrypted before it is sent over the line. ... The DES-EDE3-CBC algorithm is a simple variant of the DES-CBC algorithm.<br/>[<a href="http://www.ietf.org/rfc/rfc2420.txt?number=2420">http://www.ietf.org/rfc/rfc2420.txt?number=2420</a>]</li> <li>• Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>      |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping   | Mapping Justification  | Notes   |
|----------------------------|--|---|--|---|
|                            | IETF RFC 2065, DNS Security Extensions, January 1997   | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 3L Interface | This standard maps to the Security Services because it describes security extensions to DNS. Since this standard is related to, IETF Standard 13/ RFC- 1034/ RFC- 1035, Domain Name System, it maps to the same service and interface (Communication Services and 3L Interface) as RFC-1034/ RFC-1035. | <ul style="list-style-type: none"> <li>• This document describes extensions of the Domain Name System (DNS) protocol to support DNS security and public key distribution. [<a href="http://www.ietf.org/rfc/rfc2065.txt?number=2065">http://www.ietf.org/rfc/rfc2065.txt?number=2065</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. [TRM]</li> <li>• Application services are the functions and interfaces that reside on the underlying network and communications system protocol software and are used by applications. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul>  |
|                            | IETF RFC 2408, "Internet Security Association and Key Management Protocol (ISAKMP)," 21 February 1998. | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 3L Interfaces  | This standard maps to the Security Services because it provides authentication and confidentiality services, and to Communication Services because it addresses internet protocols. It maps to 3L interface because it defines protocols.  | <ul style="list-style-type: none"> <li>• The Internet Security Association and Key Management Protocol (ISAKMP) defines procedures and packet formats to establish, negotiate, modify and delete Security Associations (SA). [<a href="http://www.ietf.org/rfc/rfc2408.txt?number=2408">http://www.ietf.org/rfc/rfc2408.txt?number=2408</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services are the functions and interfaces that reside on the underlying network and communications system protocol software and are used by applications. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard   | TRM Mapping  | Mapping Justification  | Notes  |
|----------------------------|---|--|--|--|
|                            | IETF RFC 2407, "The Internet IP Security Domain of Interpretation for ISAKMP," November 1998.                               | Application Platform Entity- Security Services and Application Platform Entity- Communication Services and 3L Interfaces       | Since this standard is related to IETF RFC 2408, it maps the same as IETF RFC 2408.  | <ul style="list-style-type: none"> <li>• The Internet Security Association and Key Management Protocol (ISAKMP) defines a framework for security association management and cryptographic key establishment for the Internet. This framework consists of defined exchanges, payloads, and processing guidelines that occur within a given Domain of Interpretation (DOI). This document defines the Internet IP Security DOI (IPSEC DOI), which instantiates ISAKMP for use with IP when IP uses ISAKMP to negotiate security associations. [http://www.ietf.org/rfc/rfc2407.txt?number=2407]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services are the functions and interfaces that reside on the underlying network and communications system protocol software and are used by applications. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> <li>• Layer 3: System Services layer. [TRM]</li> </ul> |
|                            | IEEE 802. 10, IEEE Standards for Local and Metropolitan Area Networks (MANs): Interoperable LAN/ MAN Security (SILS), 1998. | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L Interfaces | This standard maps to the Security Services because it provides network security. This standard maps to the Communication Services because it provides network services. This standard maps to the 4D Interface because it provides interfaces for LANs and MANs and to the 3L interface because it defines protocols. | <ul style="list-style-type: none"> <li>• This IEEE standard provides specification for an interoperable data link layer security protocol and associated security services. It discusses services, protocols, data formats, and interfaces to allow IEEE products confidentiality. A security label option is specified that enables rule-based access control to be implemented using the Security Data Exchange (SDE) protocol.[JTA]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>   |

## Mapping of JTA V3.1 to TRM V1.0

### Section 2.6 – Information Security Standards

| JTA Section & Service Area | Emerging Standard  | TRM Mapping  | Mapping Justification   | Notes   |
|----------------------------|--|--|---|---|
|                            | IEEE 802. 10a, Standard for Interoperable LAN Security – The Model, Draft January 1989 | Application Platform Entity - Security Services and Application Platform Entity - Communication Services and 4D, 3L Interfaces | Since this standard is related to IEEE 802.10, it maps the same as IEEE 802.10.   | <ul style="list-style-type: none"> <li>• ... shows the relationship of SILS to OSI and describes required interfaces. [JTA]</li> <li>• The DGSA identifies the following security services that may need to be provided through implementations in information system components.... Authentication service ... Access control ... Integrity service ... Confidentiality service ... Non-repudiation services ... Availability service ... System management services ... Security labeling ... Information security management services [TRM]</li> <li>• Subnetwork technologies ... support access to local area networks (LANs) ... based on the physical, data link, and network layers (layers 1, 2, and 3) of the OSI Reference Model. [TRM]</li> <li>• Direct Interface: transfer of information [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul>  |
|                            | IETF RFC- 2228, File Transfer Protocol, October 1997.                                  | Application Platform Entity- Security Services and Application Platform Entity - Communication Services and 3L Interfaces      | This standard maps to the Security Services because it provides authentication, integrity, and confidentiality services. Since this standard defines extensions to the FTP specification, it maps to the same services and interfaces (Communication Services and 3L Interfaces) as the FTP standard. | <ul style="list-style-type: none"> <li>• This document defines security extensions to the FTP specification STD 9, RFC 959, "FILE TRANSFER PROTOCOL (FTP)" (October 1985). These extensions provide strong authentication, integrity, and confidentiality on both the control and data channels with the introduction of new optional commands, replies, and file transfer encodings.<br/>[<a href="http://www.ietf.org/rfc/rfc2228.txt?number=2228">http://www.ietf.org/rfc/rfc2228.txt?number=2228</a>]</li> <li>• Authentication service ensures that system entities (processes, systems, and personnel) are uniquely identified and authenticated. ... Integrity service ensures protection of the system through open system integrity, network integrity, and data integrity. ... Confidentiality service ensures that data are not made available or disclosed to unauthorized individuals or computer processes through the use of data encryption, security association, and key management. [TRM]</li> <li>• Application services ... functions and interfaces that reside on the underlying network and communications system protocol software ... presentation and application layers (layers 6 and 7) of the OSI Reference Model. [TRM]</li> <li>• Logical Interface: supports understanding of information [TRM]</li> </ul> |