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Joint Tactical Radio System (JTRS) Standard
Frequency Reference Device
Application Program Interface

Version 1.0.3
22 October 2008

REVISION HISTORY

Version	Authorization	Description	Last Modified Date
1.0		Initial release **ICWG Approved**	27-March-2006
1.0.1 <Draft>		Preparation for Public Release. Errata: Removed CF reference from "FreqRefDevice.idl".	24-August-2007
1.0.1		-Removed Service State applicability -Incorporated minor "API" textual changes **ICWG Approved**	30-April-2008
1.0.2		Update document stamp for public release	30-May-2008
1.0.3		Change "Application Programming Interface" to "Application Program Interface"	22-October-2008

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A. FREQUENCY REFERENCE DEVICE API

A.1 INTRODUCTION

A *Frequency Reference Device* component realizes the *Frequency Reference Device API* and supports methods and attributes specific to the frequency reference hardware device it represents. The *Frequency Reference Device API* provides the ability to read frequency reference data and to set the Global Positioning System (GPS) Time Figure of Merit (TFOM) value.

This document defines a common set of *Frequency Reference Device* component provide services and interfaces required by most Joint Tactical Radio (JTR) Sets.

A.1.1 Overview

This document contains as follows:

a. Section A.1, *Introduction*, contains the introductory material regarding the Overview, Service Layer Description, Modes, States, and Referenced Documents of this document.

b. Section A.2, *Services*, specifies the interfaces for the component, port connections, and sequence diagrams.

c. Section A.3, *Service Primitives and Attributes,* specifies the operations that are provided by the *Frequency Reference Device API*.

d. Section A.4, *IDL*.

e. Section A.5, *UML*.

f. Appendix A.A – *Abbreviations and Acronyms*.

g. Appendix A.B – *Performance Specification*.

h. Appendix A.C – *Time Figure of Merit (TFOM)*.

A.1.2 Service Layer Description

A.1.2.1   Frequency Reference Device API Port Connections

Figure 1 shows the port connections for a *Frequency Reference Device* component that realizes the
Frequency Reference Device API.

Note: All port names are for reference only.
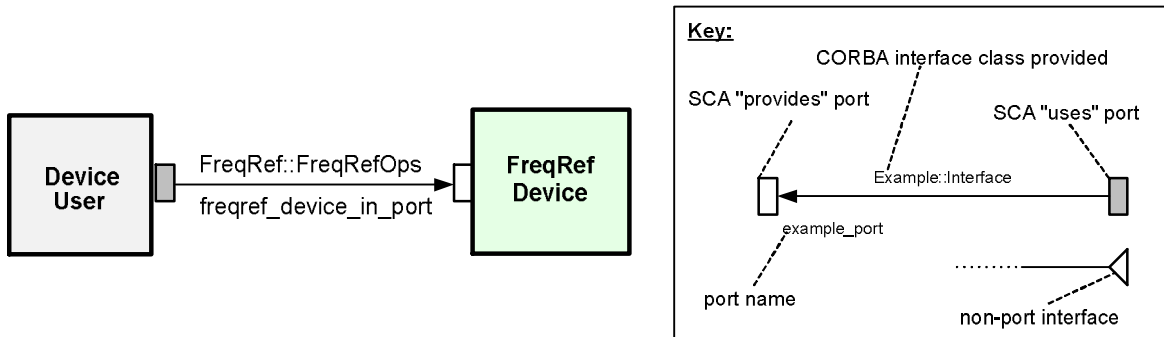
Figure 1 – Frequency Reference Device API Port Diagram

Frequency Reference Device API **Provides Ports Definitions**
> **freqref_device_in_port** is provided by the *Frequency Reference Device* to provide the ability to
> read frequency reference data and to set the GPS TFOM value by the *Device User*.

Frequency Reference Device API **Uses Ports Definitions**
> None

A.1.3 Modes of Service

Not applicable.

A.1.4 Service States

Not applicable.

A.1.5 Referenced Documents

The following documents of the exact issue shown form a part of this specification to the extent specified herein.

A.1.5.1 Government Documents

A.1.5.1.1 Specifications

A.1.5.1.1.1 Federal Specifications

None

A.1.5.1.1.2 Military Specifications

None

A.1.5.1.2 Other Government Agency Documents

None

A.1.5.2 Commercial Standards

None

A.2 SERVICES

A.2.1 Provide Services

The *Frequency Reference Device API* Provide Services consists of the following service ports, interfaces, and primitives, which can be called by other client components:

Table 1 – Frequency Reference Device API Provides Service Interface

Service Group (Port Name)	Service (Interface Provided)	Primitives (Provided)
freqref_device_in_port	FreqRef::FreqRefOps	get1PPSCounter()
		set1PPSGPSTFOM()

A.2.2 Uses Services

None

A.2.3 Interface Modules

A.2.3.1 FreqRef

The class diagram for the *Frequency Reference Device API* is shown in Figure 2.
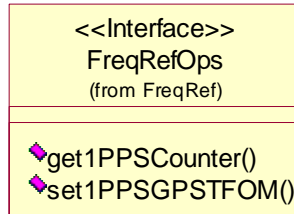
Figure 2 – `Frequency Reference Device API Class Diagram`

A.2.3.1.1 FreqRefOps Interface Description

The interface design of the *FreqRefOps* is shown in Figure 2. It provides the ability to read frequency reference data from the frequency reference device hardware and to set the GPS TFOM value.

A.2.4 Sequence Diagrams

None

A.3 SERVICE PRIMITIVES AND ATTRIBUTES

To enhance the readability of this API document and to avoid duplication of data, the type definitions of all structured types (i.e., data types, enumerations, exceptions, and structures) used by the Service Primitives or Attributes have been co-located in section A.5, UML. This cross-reference of types also includes any nested structures in the event of a structure of structures or an array of structures.

A.3.1 FreqRef::FreqRefOps

A.3.1.1 *get1PPSCounter* Operation

The *get1PPSCounter* operation is used to get the 1Pulse Per Second (PPS) offset counter value from the frequency reference device hardware.

A.3.1.1.1 Synopsis

unsigned long get1PPSCounter(out octet extra1PPSPulse,
                                 out octet miss1PPSPulse);

A.3.1.1.2 Parameters

Parameter Name	Type	Unit	Description
extra1PPSPulse	octet	1 pulse	extra 1PPS pulse count
miss1PPSPulse	octet	1 pulse	miss 1PPS pulse count

A.3.1.1.3 State

Not applicable.

A.3.1.1.4 New State

Not applicable.

A.3.1.1.5 Return Value

Type	Units	Description
unsigned long	nanoseconds	current 1PPS offset

A.3.1.1.6 Originator

Device User

A.3.1.1.7 Exceptions

None

A.3.1.2 *set1PPSGPSTFOM* Operation

The *set1PPSGPSTFOM* operation is used to set the 1PPS GPS TFOM data of the frequency reference device hardware.

A.3.1.2.1   Synopsis

void set1PPSGPSTFOM(in octet o1PPSGPSTFOM);

A.3.1.2.2   Parameters

Parameter Name	Type	Unit/Valid Range	Description
o1PPSGPSTFOM	octet	See Appendix A.C.	1PPS GPS TFOM data

A.3.1.2.3   State

Not Applicable

A.3.1.2.4   New State

Not Applicable

A.3.1.2.5   Return Value

None

A.3.1.2.6   Originator

Device User

A.3.1.2.7   Exceptions

None

A.4 IDL

A.4.1 FreqRefDevice

```
/*
** FreqRefDevice.idl
*/

#ifndef __FREQREFDEVICE_DEFINED
#define __FREQREFDEVICE_DEFINED

module FreqRef {

        interface FreqRefOps {

                unsigned long get1PPSCounter (
                        out octet extra1PPSPulse,
                        out octet miss1PPSPulse
                        );


                void set1PPSGPSTFOM (
                        in octet o1PPSGPSTFOM
                        );

        };

};

#endif
```

A.5 UML

This section contains the device component UML diagram and the definitions of all data types referenced (directly or indirectly) by the Service Primitives and Attributes in section A.3.
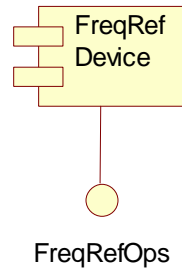

Figure 3 – `Frequency Reference Device Component Diagram`

A.5.1 Data Types

None

A.5.2 Enumerations

None

A.5.3 Exceptions

None

A.5.4 Structures

None

Appendix A.A – Abbreviations and Acronyms

API	Application Program Interface
ETE	Estimated Time Error
GPS	Global Positioning System
IDL	Interface Definition Language
JPEO	JTRS Program Executive Office
JTR	Joint Tactical Radio
JTRS	Joint Tactical Radio System
nsec	nanosecond
PPS	Pulse Per Second
TFOM	Time Figure of Merit
UML	Unified Modeling Language

Appendix A.B – Performance Specification

Table 2 provides a template for the generic performance specification for the *Frequency Reference Device* which will be documented in the service or device using the interface. This performance specification corresponds to the port diagram in Figure 1.

Table 2 – Frequency Reference Device Performance Specification

Specification	Description	Units	Value
Worst Case Command Execution Time for freqref_device_in_port	*	*	*

Note: (*) These values should be filled in by JTRS Product Line developers.

Appendix A.C – Time Figure of Merit (TFOM)

Table 3 – Time Figure of Merit

TFOM Value	Estimated Time Error (ETE)
0	Not Used
1	≤ 1 nanosecond (nsec)
2	> 1 nsec ≤ 10 nsec
3	> 10 nsec ≤ 100 nsec
4	> 100 nsec ≤ 1 μsec
5	> 1 μsec ≤ 10 μsec
6	> 10 μsec ≤ 100 μsec
7	> 100 μsec ≤ 1msec
8	> 1 msec ≤ 10 msec
9	> 10 msec