OPENSTAR™
Specifications Structure
TWG-0001R1.0

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Revision	Date	Revised By	Description
1.0	15 November 2004	TWG	*Initial STC Release*

Introduction

This document contains the explanation of the specification structure for the OPENSTAR™ architecture as well as an index of the current branch definitions and leaf specifications.. The actual specifications associated with leafs can be accessed by STC members from its web site as separate documents.

The content in this document will be changed whenever branches or leaves are updated.

Structure of the OPENSTAR™ Specifications

This chapter describes the organizational structure used for organizing the STC standards and specifications into a tree structure consisting of branches and leaves. We will start with a overview of the tree structure and then discuss how leafs can be logically combined into specification groups reducing the combinations of leafs which must be supported by compliant systems and parts of systems.

Tree Structure

The overall structure of the specifications is similar to a tree data structure. The specifications are classified using a top down approach much like the branches hanging from a tree. Top level branches currently cover classifications for hardware, software, device interfacing, probers and handlers. Each lower level becomes successively more specific until at the lowest level (the leafs) we have one or more equivalent specifications.

Branches are descriptions of a specific aspect of the system architecture. Branches are divided into lower level branches and finally to leafs, where specifications are defined. Attributes of branches are that their content can only change if it does not affect any lower branches or leafs. If a needed change does not satisfy these criteria, then a new branch is needed. Branches do not have hard specifications, but are supported by leaves that do. There is no fixed limit to the depth of branches, however effort is made to avoid unnecessary branches. New branches can be added in parallel to existing branches, the node about such a branch is called a fork. Branches can only inserted in between existing branches or between a branch and leaf only when the following criteria are met:

- Creation of the branch does not affect any other branches or leaves.
- All working groups managing branches or leaves along any path above or below approve the change according to the rules of the STC.

Leaves are specifications which support all of the branches above them. Leaf specifications are to be implemented without exception. Vendors claiming compliance must declare all leaf specifications that are either required or are implemented. This is to provide full assurance on the compliance and compatibility of an implementation.

It is the intent of the STC that once a leaf is accepted it will never become obsolete. This is the assure users that their equipment can always be supported. New versions and substitutes for leafs are allowed and must be clearly identified as to compatibility to other leafs in the same branch

Approval of new or changed branches or leaves is managed by the appropriate STC working group.

Branches

Following is a list of attributes of OPENSTAR™ branches:

• Branches are not OPENSTAR™ specifications.

• Branches are managed by STC working groups.

• Branches contain concepts, requirements, philosophies and judgment criteria for the branches and leaves below them. Every branch is connected to a lower level branch or a group of one or more leafs.

• Branches contain descriptions of the scope of that branch.

• Branch content can change only if the change does not affect the validity of branches and leaves below it.

• Branches may fork if the working groups feel that the current branch limits the type of leafs which may be below it.

Leaves

Following is a list of attributes of OPENSTAR™ Leaves:

• Leaves are Openstar specifications.

• Leaves have no children. Specifically no branches or leaves are to be found below a leaf.

• Leaf specifications must be implemented without exception.

• Leaves may be extended only if an extension mechanism is provided for that leaf. Any extensions for which such a mechanism is not provided fall outside of the scope of the Openstar specification.

• Leaf specifications are versioned. A version must be fully backward compatible with previous versions. If it is not fully backward compatible then it is a new leaf, a alternative, not a version.

• Different branches can share a leaf as long as the leaf satisfies the requirements of all supported branches.

• Any member can contribute a candidate leaf. The actual acceptance of a leaf is the decision of the STC working group.

Throughout this document, all leafs are labeled “Leaf”, and all first level branches are labeled “Branch”. All unlabeled items are branches.

Specification Groups

While the tree structure provides logical order to the specifications of the STC it offers no assistance in choosing which of the leafs should be required for a compliant implementation. As different markets may have different needs it is unlikely that all specifications will be implementation in any single system.

To help reduce the possible range of leaf groupings supported the concept of specification group is introduced. A specification group is a collection of leafs with an indication if that leaf is optional or required in order for an implementation of a specific specification group to be considered compliant.

For instance we may have a High Performance ASIC specification group and an RF Economy solution group.

Solution groups may be proposed by any member and will be assigned to a working group to determine the content. A definition of a specification group is the same as any STC leaf specification and follows the same process.

Hardware Branch

This section specifies all branches and leaves for the hardware branches. The first levels of hardware branches are: TIM, TIM to TIM Infrastructure, TIM to TIM and TIM Electrical.

Infrastructure: IF Branch

The basic of the OPENSTAR mechanical specification is the Test Instrument Module. The infrastructures the facilities required to support the TIMs. This includes but is not limited to

CPU Architecture

Controller Specification

This branch covers the OPENSTAR™ system's controller configuration and specification.

TIM Branch

Test Instrument Module (TIM)

Mechanical Specifications for Test Instrument Module (TIM) (Exterior Branch) (400X480: STC-H0002.R1.0)

This branch defines the physical dimensions of the Test Instrument Module (TIM), including size, thickness, and connector placement. Now there is only one leaf, however others may be added in the future for different system and chassis configurations. All future leaves shall include migration paths to the existing TIM Spec.

Overview of the TIM Infrastructure (TIM-IFS)

Test Instrument Module (TIM)

Mechanical Specifications Defines the physical dimensions of the TIM – Height, width, etc.

Physical Dimensions

Enclosure

Height and Width

TIM - Top Interface Area

The TIM infrastructure requires a structure for positioning the upper part of the TIM. The structuring item used for this positioning is referred to as the “TIM top connector plate”. This plate is aligned with and mounted on the TIM infrastructure prior to the installation of the TIM. Normally, the top plate includes one side of the TIM to ITA connectors. The mate to this connector is part of the ITA.

TIM - Bottom Side Interface Area

Various OPENSTAR specifications define connectors that are used for communication with the infrastructure and between TIMs. The bottom of the TIM is used for this purpose. Locations other than those designated by the OPENSTAR specifications are available for connecting TIMs and external resources

Securing Means

Defines method of securing the TIM in the infrastructure. All OPENSTAR module must be designed in a way that permits the use of all modules to be used in any OPENSTAR compliant infrastructure.

Weight

There is a limitation on the weight of TIMs that can be mounted onto the infrastructure. The specification expresses a maximum weight per slot.

Securing Branch (STC-H0008R01)

This section contains the OPENSTAR™ mechanical specifications for a using a latch on the bottom of a TIM to secure it to the TIM-IF

Alignment and Securing

Cooling Branch

There are several accepted methods for providing cooling for the TIMs. The method used is dependent on the requirements of the individual TIM.

Air Cooling (STC-H0005R1.0)

TIM Supplied Cooling

TIM supplied cooling refers to the situation where the TIM provides for its own cooling usually by using internal fans. The

only requirements placed on the TIM-IF are to allow for entry and exit of the air required.

TIM-Infrastructure Supplied Air Cooling

The TIM-IF may supply forced air for cooling the TIMs. The method and amount of available cooling is dependent on the TIM infrastructure.

Liquid cooling -Fluorinert™ (STC-H0006R1.0)

Specifies the requirements for liquid cooling using Fluorinert™.

TIM Power Supply Branch

The basic requirements of these specifications are that 48V and up to 20Amps are made available to each TIM. It is however understood that different requirements may require different power requirements. It is strongly recommended that this basic requirement be adhered to.

TIM Power Connector Branch

This branch includes the power supply specification for the Test Instrument Module.

20A Connector (STC-H0003R1.0)

TIM-Side Specifications, Mechanical Specifications

Location and pin out of the power connector.

Electrical Specifications

This section defines electrical specifications for the DC +48V power supply between the TIM and TIM infrastructure

48 volt supply

TIM Power Supply (STC-H0004R1.0)

The power is supplied to the TIM by a 48V DC connection

Connector Specifications

Electrical Specifications

Grounding (STC-H0007R1.0)

TIM Grounds and Returns

Grounds and Returns Inside the TIM

Connections to the TIM Case and Shield

Other Ground and Return Connections

Protection Devices

Tim to TIM infrastructure: TIM-TIM IF

Defines required signals, communication and interaction between the module and the system infrastructure.

Power Seq and Fault Branch (STC-H0014R1.0)

Abnormality Detection

Mechanical Specifications

Electrical Specifications

Power Sequencing

Electrical Specifications

DVM Connection (STC-H0013R1.0)

Mechanical Specifications

TIM Specifications

Electrical Specifications

Signal Pin Assignment

Design Rules Inside the TIM

Test Instrument Module Data Communications Branch

Connector Branch

1 Gbs Fiber Optic - OPENSTAR™ Bus (STC-H0009R1.0)

This specification uses portions of the ANSI fiber Channel specification for the physical media ANSI INCITS 230-1994(R1999)

Protocol Branch

OPENSTAR Bus Protocol (STC-H0001R1.0)

This branch has specifications the data communication busses available in the OPENSTAR architecture. The main data interface to ensure the exchangeability between systems is the OPENSTAR bus. However other industrial busses may be added in the future.

OPENSTAR™ Bus Functions

Packet Configuration

Configuration Space

Initial Bus Configuration

TIM to TIM Branch

Synchronization

Digital Synchronization

Digital Sync Connector (STC-H0012R1.0)

60 Pin (ECL) Connector

Digital 250M Timing (STC-H0011R1.0)

Introduction

Signal Specifications

Timing Adjustment for Sync Status Signals

Digital Model (STC-H0010R1.0)

Introduction

Architecture Overview

Signal Operation Examples

Environment

Safety Leaf

EMC/EMI Leaf

Hardware Identification

This branch covers the Plug & Play installation support of Test Instrument Modules and any other instrument identification related specification.

Visible Identification Leaf

This is the specification for the label on the Test Instrument Module.

Software Branch

This section describes the branches and leaves for the OPENSTAR™ software specification. The tree is rooted at a branch called *Software* and comprises four major sub-branches: User, Environment, Core and Module. Each of these, along with their branches and leaves, will be described below.

User

The *User* branch specifies interactions between the OPENSTAR™ core system and the user of the system. In this context, the *User* reflects both test engineers developing test plans for devices as well as users that will be developing test classes and/or tools against the published interfaces. There are a number of sub-branches within this branch.

Developer

The *Developer* branch contains specifications for development of software agains the OPENSTAR™ interfaces. This includes test class, tool and supplemental datalog development. Users in this category will be doing development in C++.

GUI Tools Development

This branch addresses general issues for GUI tool development.

Tools Development Environment and API Extension Specification (STC-S0001R1.0)

This describes the general rules for tools and scripting client development against the tools API

Developer API

This branch provides companion documents and interfaces for development against the tools API.

Tools Proxy Specification (STC-S0002R1.0)

This describes the interfaces for a COM implementation of the Tools API

Datalog Interfaces (STC-S0004R1.0)

Comprises methods that shall be inherited by a derived class that has requirement to generate *datalog events* that trigger actions by the datalog framework.

Device Simulation Interface (STC-S0005R1.0)

This describes the interfaces provided for connection

of a DUT model to the simulation framework.

Error Handling

The *Error Handling* branch contains specifications that address mechanisms for error handling within the OPENSTAR™ system

Error Handling Specification (STC-S0007R1.0)

This describes the error handling mechanism used within the cores software. This is used to facilitate the development of compliant software modules.

Alarm Handling Specification (STC-S0008R1.0)

This describes the alarm handling mechanism used within the core software. This is used to facilitate the development of compliant software components for both software-only and module support solutions.

Programming Language Branch

The programming language must generate to c++ or another language with suitable bindings. Some detail of the Language -> c++ conversion will probably have to be included. This also includes a description of the underlying c++ object model.

Test Programming Language Specification (STC-S0010R1.0)

This describes the OPENSTAR Test Program Language (OTPL) specification, including the various sub languages.

Environment

The environment branch addresses issues that concern the software environment in which both users and module developers must work. This includes support issues, such as configuration management, and environment configuration files specifically addressing syntax.

Configuration Management

Configuration Management addresses the configuration of the software used to run the test system. Configuration management includes records that relate the software modules to the specific hardware in the system as well as providing specifications for switching software versions.

Configuration Database and Profile Management

Specification (STC-S0011R1.0)

This includes the format for the CCR records and the requirement for profile and software component management.

Configuration Management Operating System

An OPENSTAR™ compliant system may be deployed on different platforms. Some configuration management considerations are platform dependent.

Installation, Activation and Version Switch (STC-S0012R1.0)

This includes a description of the requirements for version switching on the given platform.

Environment Configuration Files

Configuration files are required to specify a variety of things to the system. These items reflect the configuration of the system both in terms of hardware makeup and software modules. The specifications comprising this section will include the syntax for the various configuration files.

Resource Definition Language Specification (STC-S0013R1.0)

This contains the syntax definitions for the resource definition language.

System Configuration Language Specification (STC-S0014R1.0)

This contains the syntax definitions for the Language File.

Pin Description Language Specification (STC-S0015R1.0)

This contains the syntax definitions for the Pin Description Language File.

Socket Language Specification (STC-S0016R1.0)

This contains the syntax definitions for the Socket Language File.

Environment Operating System

An OPENSTAR™ compliant system may be deployed on different platforms. Some Environment considerations are platform dependent.

Environment and Global Variables Specification (STC-S0017R1.0)

This defines the environment and global settings that must be set/used in order for an OPENSTAR™ compliant system to operate properly.

Tester Operating System Installation Configuration Specification (STC-S0018R1.0)

This defines the directory structure that must be employed in order to allow proper operation of an OPENSTAR™ compliant system. This includes Tester Operating System (TOS) components as well as vendor components. This may or may not be OS dependent.

Core

The *Core* branch contains specifications that describe the activities that an OPENSTAR™ compliant software core must perform. Such specifications are required as software and hardware modules developed against an OPENSTAR™ system will contain certain behavioral expectations.

Core Configuration

The *Core Configuration* branch includes specifications for automated core behaviors related to the configuration of the system. This branch addresses automated activities for startup as well as for the execution of test plans.

System Initialization Specification (STC-S0019R1.0)

This defines the rules for boot time discovery of the configuration of the hardware.

Pre Execution Specification (STC-S0020R1.0)

This defines the system configuration activities that occur prior to the running of a Test Plan, including establishment of system services and communication channels.

TIM Support

The *TIM* branch contains specifications that are relevant for the development of third party hardware modules. Specifically, these specs address the software components that must be developed in support of the hardware.

TIM Support Software

TIM Support Software covers the software items that are required for the support of new hardware modules.

TIM Software APIs

This section addresses specifications for the APIs used by module developers in the development of the required software support components.

Emulation Interface (STC-S0023R1.0)

This describes the module emulation interface for support of third party modules. This allows Integration of module emulation software into and OPENSTAR™ compliant framework.

1. Glossary of Terms

Term	Meaning
Branch	A category of the OPENSTAR™ specification and documentation set. A Branch is supported by sets of specifications called leaves, or by other Branches.
Chassis	Contains the test head, and is the mechanical structure that serves as a frame to which to secure TIMs and other components.
Fluorinert™	A liquid coolant with inert properties useful for temperature control of electronic circuits and systems.
Fork	A node is the document structure tree where branches and/or leaves are joined, and where branches and/or leaves may be added.
Internal Connection	Transmission of a signal among TIMs with a deep functional relationship.
Leaf	A leaf is the specification level of the OPENSTAR™ specification and documentation set. It is a specification for a specific OPENSTAR™ capability
Open Architecture Initiative	A generic term referring to a leading rule in driving open architecture.
Performance Board	The board that interfaces between a DUT (device under test) and the tester. Also known as a “load board”.
Performance Board Interface Cable	The cable that connects from the top of a TIM to the performance board. Includes two connectors: one that connects to the performance board, and another that connects to the top of the TIM.
Peripheral Component Interconnect	An optional Bus for OPENSTAR™ Test Instrument Module control.
Solution Map	A set of Leaves used put together as an OPENSTAR™ system for a target application.
Stiffener	A stiffener a mechanical component used to secure a TIM to the test head chassis. It also plays the role of relaying standard interfaces at the bottom of the TIM.
Test Instrument Module	Also referred to as module, TIM is a circuit which conforms to OPENSTAR™ interface definitions, and provides stimulus or measurement functions for the Device Under Test.

Tree	A data structure used for modeling the OPENSTAR™ documentation set.