SunGuide^{TM}:

Video Switching
Interface Control Document

SunGuide-VS-ICD-6.2

Prepared for:

Florida Department of Transportation
Traffic Engineering and Operations Office
605 Suwannee Street, M.S. 90
Tallahassee, Florida 32399-0450
(850) 410-5600

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Created By:	Jennifer Spuler, SwRI		JYS	11/15/04
Reviewed By:	Steve Dellenback, SwRI		SWD	11/15/04
	Steve Novosad, SwRI		SEN	11/15/04
	Steve Dellenback, SwRI		SWD	10/16/07
	Steve Dellenback, SwRI		SWD	11/14/07
	Steve Dellenback, SwRI		SWD	05/28/08
Modified By:	Meredith Moczygemba, SwRI		MRM	11/17/05
	Meredith Moczygemba, SwRI		MRM	9/12/07
	Steve Dellenback, SwRI		SWD	11/14/07
	Roger Strain, SwRI		RLS	5/27/08
	Tucker Brown, SwRI		TJB	2/2/16
Completed By:				

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List of Acronyms

ATMS	Advanced Traffic Management System
DOT	Department of Transportation
FDOT	Florida Department of Transportation
IM	Incident Management
ITS	Intelligent Transportation Systems
ITN	Invitation to Negotiate
SwRI	Southwest Research Institute
TMC	Traffic Management Center
VS	Video Switching
XML	Extensible Markup Language

REVISION HISTORY

Revision	Date	Changes
1.0.0	November 15, 2004	Initial Release
1.0.2	November 17, 2005	Updated for Release 2 software
3.0.0	October 16 12, 2007	Updated for Release 3 software
3.0.1	November 14, 2007	Added "how to use this document" section
3.1.1	May 28, 2008	Updated for Release 3.1.1 software
6.2	February 2, 2016	Updated for Release 6.2

1. Scope

1.1 Document Identification

This Interface Control Document (ICD) describes the interface between individual SunGuide™ clients and the Video Switching (VS) subsystem and between the VS subsystem and the associated drivers. The general base architecture of the XML communications including connection information, byte order and base transaction classes is delineated in the general ICD. This ICD defines Extensible Markup Language (XML) schemas upon which XML requests shall be based in communicating amongst the various processes. Refer to the SunGuide-General-ICD document for details regarding data transfer.

1.2 Project Overview

The Florida Department of Transportation (FDOT) SunGuide Support, Maintenance and Development Contract addresses the necessity of supporting, maintaining and performing enhancement development efforts to the SunGuide software. The SunGuide software is a set of Intelligent Transportation System (ITS) software that allows the control of roadway devices as well as information exchange across a variety of transportation agencies and is deployed throughout the state of Florida. The SunGuide software is based on ITS software available from the state of Texas; with significant customization and development of new software modules to meet the needs of the FDOT. The following figure provides a graphical view of the software to be developed:
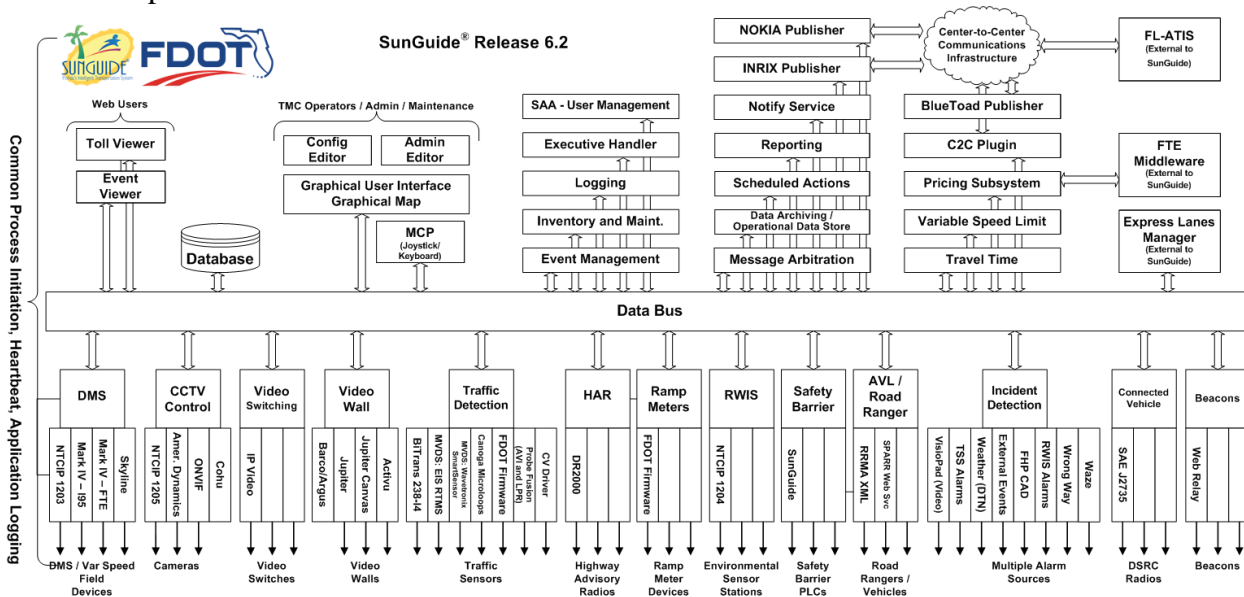

Figure 1-1 - High-Level Architectural Concept

1.3 How to Use This Document

The ICDs describe the specific interface between two SunGuide subsystems or between a SunGuide subsystem and a SunGuide driver. The relationship of appropriate documents is shown in the Figure 1-2.
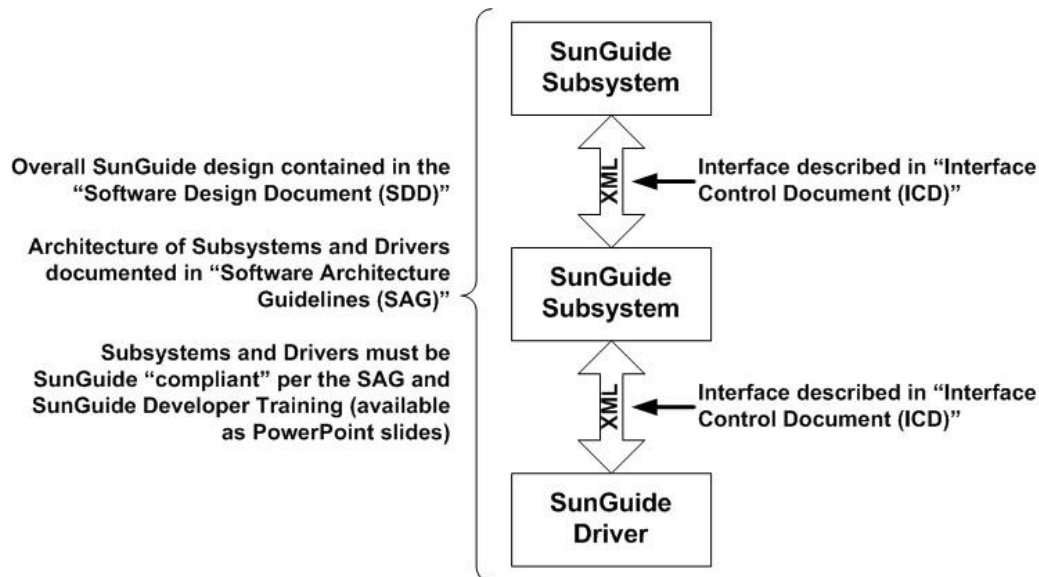

Figure 1-2 - SunGuide Developer Documentation

This document describes an *internal* SunGuide interface. The interface described is between two SunGuide compliant processes. The reader should review the following document to gain an understanding of how SunGuide compliant application is created (this will vary if the application is a driver or subsystem):

> *SunGuide Software Architecture Guidelines* (SAG)

The SAG describes what needs to be included in a SunGuide application to assure that it will work cooperatively in the SunGuide environment. Once the SAG is reviewed, the following document should be reviewed:

> *SunGuide Software Design Document* (SDD)

The SDD will provide an understanding of how individual components of SunGuide were designed. Finally the ICD, along with the associated schema should be reviewed to determine what data needs to be exchanged on the interface being defined in this document.

Additionally, a SunGuide "Developer Training" class is available that provides the students with an introduction into developing SunGuide processes. The SunGuide source code repository has a generic subsystem and a generic driver available that can be used as the basis for developing a new application.

1.4 Related Documents

The following documents were used to develop this document:

- FDOT Scope of Services: *BDQ69, Standard Written Agreement for SunGuide Software Support, Maintenance, and Development, Exhibit A: Scope of Services.* July 1, 2010.

- Notice to Proceed: Letter to Southwest Research Institute® (SwRI®) for BDQ69, July 1, 2010.

- SunGuide Project website: http://sunguidesoftware.com.

1.5 Contacts

The following are contact persons for the SunGuide software project:
- Fred Heery, ITS Section, Traffic Engineering and Operations Office Central Office, fred.heery@dot.state.fl.us, 850-410-5606
- Derek Vollmer, ITS Section, Traffic Engineering and Operations Office Central Office, Derek.Vollmer@dot.state.fl.us, 850-410-5615
- Clay Packard, Atkins Project Manager, clay.packard@dot.state.fl.us, 850-410-5623
- David Chang, Atkins Project Advisor, david.chang@dot.state.fl.us, 850-410-5622
- Tucker Brown, SwRI Project Manager, tbrown@swri.com, 210-522-3035
- Roger Strain, SwRI Software Project Manager, rstrain@swri.org, 210-522-6295

2. Data

The following sections detail the XML transactions that can be exchanged between client and server applications.

2.1 Schema

The schemas for these transactions may be located in the Schemas directory. The objects directory contains common data schemas that are used by the various request/messages/responses. Schemas are organized in the following tree structure:

vs
- messages
    - expireSourceRestrictedApprovalMsg.xsd
    - updateConnectionsMsg.xsd
    - updateSnapshotMsg.xsd
- objects
    - activeVideoTour.xsd
    - destinationLayout.xsd
    - ipVideoDeviceType.xsd
    - switch.xsd
    - switchAddress.xsd
    - videoDeviceType.xsd
    - videoTour.xsd
- requests
    - addSwitchReq.xsd
    - addTourReq.xsd
    - addVideoDestinationReq.xsd
    - addVideoSourceReq.xsd
    - approveSourceRestrictedReq.xsd
    - blankAllDestinationsReq.xsd
    - changeDestinationRestrictedStateReq.xsd
    - changeSourceRestrictedStateReq.xsd
    - connectionReq.xsd
    - deleteSwitchReq.xsd
    - deleteTourReq.xsd
    - deleteVideoDestinationReq.xsd
    - deleteVideoSourceReq.xsd
    - modifySwitchReq.xsd
    - modifyTourReq.xsd
    - modifyVideoDestinationReq.xsd
    - modifyVideoSourceReq.xsd
    - querySwitchConnectionsReq.xsd
    - retrieveDataReq.xsd
    - retrieveSnapshotReq.xsd
    - startVideoTourReq.xsd
    - stopVideoTourReq.xsd
    - subscribeReq.xsd

- o updateDestinationLayoutReq.xsd
- responses
  - o addSwitchResp.xsd
  - o addTourResp.xsd
  - o addVideoDestinationResp.xsd
  - o addVideoSourceResp.xsd
  - o approveSourceRestrictedResp.xsd
  - o blankAllDestinationsResp.xsd
  - o changeDestinationRestrictedStateResp.xsd
  - o changeSourceRestrictedStateResp.xsd
  - o connectionResp.xsd
  - o deleteSwitchResp.xsd
  - o deleteTourResp.xsd
  - o deleteVideoDestinationResp.xsd
  - o deleteVideoSourceResp.xsd
  - o modifySwitchResp.xsd
  - o modifyTourResp.xsd
  - o modifyVideoDestinationResp.xsd
  - o modifyVideoSourceResp.xsd
  - o querySwitchConnectionsResp.xsd
  - o retrieveDataResp.xsd
  - o retrieveSnapshotResp.xsd
  - o startVideoTourResp.xsd
  - o stopVideoTourResp.xsd
  - o subscribeResp.xsd
  - o updateDestinationLayoutResp.xsd

Requests may be sent from a client to a subsystem or from a subsystem to a driver. Responses may be sent from a driver to a subsystem or a subsystem to a client. A message can be sent from any process to another process.

2.1.1 Subsystem communication

Initial communication to a subsystem is described in the general ICD. For VS, the sources, destinations, switches, tours, virtual video wall layouts, and active tours are retrieved from the database on startup. Once a client has initiated the connection to VS, additional sources, destinations, switches, tours, and active tours may be added, existing sources, destinations, switches, tours, active tours may be modified, deleted, and virtual video wall layouts may be modified. Connections may be initiated or broken as well as changing the restricted state of source or destination. The blankAllDestinationsReq will break all connections held for a switch driver.

The following table shows the various subscriptions a client may request. The last column shows the XML updates that will be received if a client has subscribed to this data.

Subscription	Description	Updates Received

Subscription	Description	Updates Received
sourceStatus	Receive updates to source status.	approveSourceRestrictedResp, changeSourceRestrictedStateResp, expireSourceRestrictedApprovalMsg
destinationStatus	Receive updates to destination status.	changeDestinationRestrictedStateResp, updateConnectionsMsg
sourceData	Receive updates to source configuration.	addVideoSourceResp, modifyVideoSourceResp, deleteVideoSourceResp
destinationData	Receive updates to destination configuration.	addVideoDestinationResp, modifyVideoDestinationResp, deleteVideoDestinationResp
switchData	Receive updates to switch configuration.	addSwitchResp, modifySwitchResp, deleteSwitchResp
videoTourData	Receive updates to video tour configuration.	addVideoTourResp, modifyVideoTourResp, deleteVideoTourResp
activeVideoTourData	Receive updates to active video tours.	startVideoTourResp, stopVideoTourResp
layoutData	Receive updates to virtual video wall destinations	updateDestinationLayoutResp
userData	Receive updates to user configuration.	updateSystemDataMsg
snapshotData	Receive updates to video snapshots.	updateSnapshotMsg

2.1.2 Driver communication

Initial communication from a subsystem to a driver is described in the general ICD. For VS, an addVideoSourceReq and an addVideoDestinationReq are sent to each driver containing the sources and destinations that belong to the driver. If a physical switch is in the VS subsystem configuration, then an addSwitchReq is sent to each driver containing the the switches that belong to the driver.

As in Section 2.1.1, additional sources, destinations, and switches may be added, existing sources, destinations, and switches may be modified, or deleted. The driver also handles video switching (connectionReq and blankAllDestinationReq) and maintaining snapshots of sources.

2.2 Examples

For example, if a client wishes to add a source to the system, the client sends an addVideoSourceReq to the subsystem. Once the subsystem has verified this is a new source, the request is then forwarded to the appropriate driver. The driver adds the source and sends an addVideoSourceResp to the subsystem. The subsystem then sends this response back to the appropriate client and to any clients who have subscribed to source data.
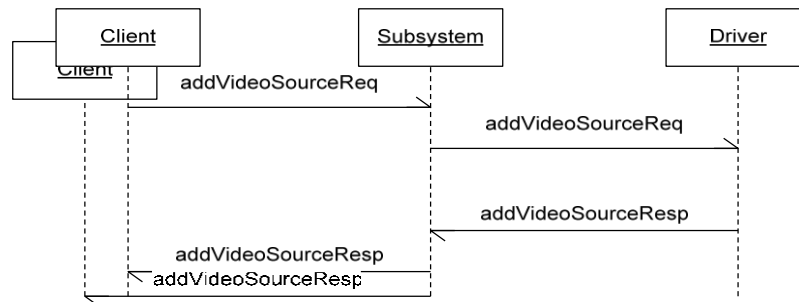

Figure 2-1 - Sample Transaction

The tables below show which requests can be sent from client to subsystem and subsystem to driver. The responses sent from driver to subsystem and subsystem to client are also specified. Messages are sent when a response is not required.

2.3 Subsystem Schemas

FC (From client),TC (To client), TD (To driver), FD (From driver)

Usage Description	Requests	FC	TD	Responses	FD	TC	Messages	TD	FD	TC
Used for a client to add a new switch to the subsystem.	addSwitchReq	X	X	addSwitchResp	X	X				
Used for a client to add a new tour to the subsystem.	addTourReq	X		addTourResp		X				
Used for a client to add a new video destination to the subsystem.	addVideoDestinationReq	X	X	addVideoDestination Resp	X	X				
Used for a client to add a new video source to the subsystem.	addVideoSourceReq	X	X	addVideoSourceResp	X	X				
Used for a client to approve the restricted state of a source.	approveSourceRestrictedReq	X		approveSourceRestric tedResp		X				
Used for a client to blank all destinations (break all connections held) for a switch driver.	blankAllDestinationsReq	X	X	blankAllDestinations Resp	X	X				
Used for a client to change the restricted state for a destination.	changeDestinationRestrictedStateReq	X		changeDestinationRe strictedStateResp		X				

Usage Description	Requests	FC	TD	Responses	FD	TC	Messages	TD	FD	TC
Used for a client to change the restricted state for a source.	changeSourceRestrictedStateReq	X		changeSourceRestrictedStateResp		X				
Used for a client to create or break a connection between source and destination.	connectionReq	X	X	connectionResp	X	X				
Used for a client to delete an existing switch from the subsystem.	deleteSwitchReq	X	X	deleteSwitchResp	X	X				
Used for a client to delete an existing tour from the subsystem.	deleteTourReq	X		deleteTourResp		X				
Used for a client to delete an existing video destination from the subsystem.	deleteVideoDestinationReq	X	X	deleteVideoDestinationResp	X	X				
Used for a client to delete an existing video source from the subsystem.	deleteVideoSourceReq	X	X	deleteVideoSourceResp	X	X				
Used to notify client that the approval field of a restricted source has been cleared.							expireSourceRestrictedApprovalMsg			X

Usage Description	Requests	FC	TD	Responses	FD	TC	Messages	TD	FD	TC
Used for a client to modify an existing switch in the subsystem.	modifySwitchReq	X	X	modifySwitchResp	X	X				
Used for a client to modify an existing tour in the subsystem	modifyTourReq	X		modifyTourResp		X				
Used for a client to modify an existing video destination in the subsystem.	modifyVideoDestinationReq	X	X	modifyVideoDestinationResp	X	X				
Used for a client to modify an existing video source in the subsystem.	modifyVideoSourceReq	X	X	modifyVideoSourceResp	X	X				
Used for a client to retrieve all connections held by a specific switch driver.	querySwitchConnectionsReq	X	X	querySwitchConnectionsResp	X	X				
Used to retrieve data from VS, data includes sources, destinations, switches, video tours, active video tours, users, and source/destination status	retrieveDataReq	X		retrieveDataResp		X				

Usage Description	Requests	FC	TD	Responses	FD	TC	Messages	TD	FD	TC
Used for a client to retrieve current snapshot for a source.	retrieveSnapshotReq	X	X	retrieveSnapshotResp	X	X				
Used for a client to start an existing video tour.	startVideoTourReq	X		startVideoTourResp		X				
Used for a client to stop a running video tour.	stopVideoTourReq	X		stopVideoTourResp		X				
Used to subscribe to updates from the system. Data includes source status, destination status, sources, destinations, switches, video tours, active video tours, and users.	subscribeReq	X		subscribeResp		X				
Used when a destination's connection is changed.							updateConnectionsMsg			X
Used to modify virtual video wall layout. Data includes destinations on virtual wall with size and position information for each.	updateDestinationLayoutReq	X		UpdateDestinationLayoutResp		X				

Usage Description	Requests	FC	TD	Responses	FD	TC	Messages	TD	FD	TC
Used when a client subscribes to sourceStatus to maintain most current snapshot of source.							updateSnapshotMsg		X	X

2.4 Driver Schemas

TD (To driver), FD (From driver)

Usage Description	Requests	TD	Responses	FD	Messages	TD	FD
Used for a client to add a new switch to the subsystem.	addSwitchReq	X	addSwitchResp	X			
Used for a client to add a new video destination to the subsystem.	addVideoDestinationReq	X	addVideoDestinationResp	X			
Used for a client to add a new video source to the subsystem.	addVideoSourceReq	X	addVideoSourceResp	X			
Used for a client to blank all destinations (break all connections held) for a switch driver.	blankAllDestinationsReq	X	blankAllDestinationsResp	X			

Usage Description	Requests	TD	Responses	FD	Messages	TD	FD
Used for a client to create or break a connection between source and destination.	connectionReq	X	connectionResp	X			
Used for a client to delete an existing switch from the subsystem.	deleteSwitchReq	X	deleteSwitchResp	X			
Used for a client to delete an existing video destination from the subsystem.	deleteVideoDestinationReq	X	deleteVideoDestinationResp	X			
Used for a client to delete an existing video source from the subsystem.	deleteVideoSourceReq	X	deleteVideoSourceResp	X			
Used for a client to modify an existing switch in the subsystem.	modifySwitchReq	X	modifySwitchResp	X			
Used for a client to modify an existing video destination in the subsystem.	modifyVideoDestinationReq	X	modifyVideoDestinationResp	X			
Used for a client to modify an existing video source in the subsystem.	modifyVideoSourceReq	X	modifyVideoSourceResp	X			

Usage Description	Requests	TD	Responses	FD	Messages	TD	FD
Used for a client to retrieve all connections held by a specific switch driver.	querySwitchConnectionsReq	X	querySwitchConnectionsResp	X			
Used for a client to retrieve current snapshot for a source.	retrieveSnapshotReq	X	retrieveSnapshotResp	X			
Used when a client subscribes to sourceStatus to maintain most current snapshot of source.					updateSnapshotMsg		X

3. Notes

Information about XML and schemas can be found at the World Wide Web Consortium (W3) website at http://www.w3.org.