

**SunGuide®:**

# **Pricing System Interface Control Document**

**SunGuide-PS-ICD-6.2**



Prepared for:

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## **List of Acronyms**

ATMS	Advanced Traffic Management System
DOT	Department of Transportation
FDOT	Florida Department of Transportation
EM	Event Management
ITS	Intelligent Transportation Systems
ITN	Invitation to Negotiate
PS	Pricing System
SwRI	Southwest Research Institute
TMC	Traffic Management Center
XML	Extensible Markup Language

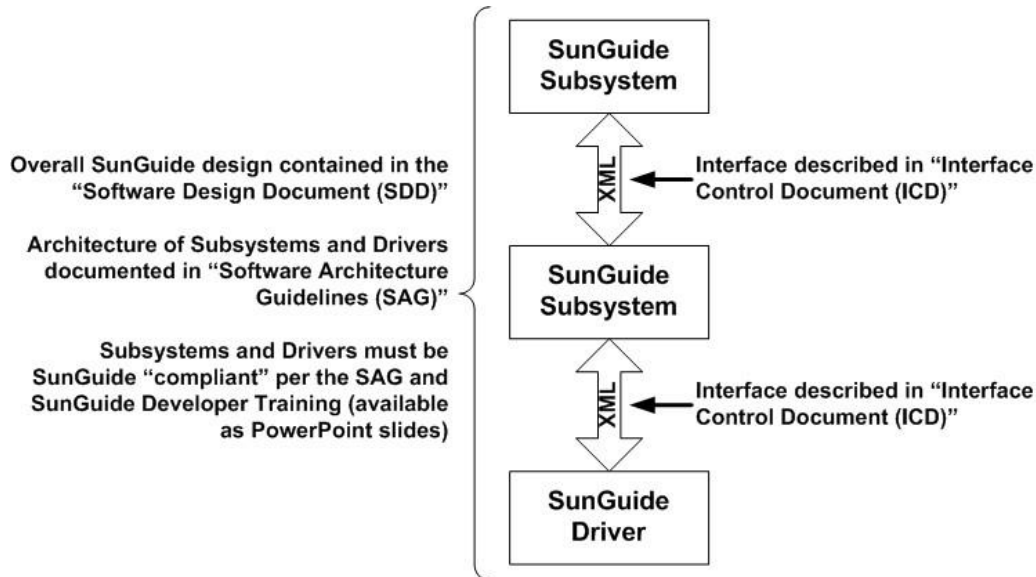
## **REVISION HISTORY**

<b>Revision</b>	<b>Date</b>	<b>Changes</b>
3.1.0	March 10, 2008	Initial Release
4.3.0	January 21, 2010	Release 4.3.0 Final Version
6.2	February 2, 2016	Updated for Release 6.2



### 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**

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## **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 requests/responses. Schemas are organized in the following tree structure:

- messages
  - dmsAttemptArchiveMsg.xsd
  - heartbeatArchiveMsg.xsd
  - modeArchiveMsg.xsd
  - rateUpdateMsg.xsd
  - tollAlertAcknowledgeMsg.xsd
  - tollAlertMsg.xsd
  - tollRateArchiveMsg.xsd
- objects
  - dailyRateSchedule.xsd
  - defaultMessage.xsd
  - expressSegment.xsd
  - holiday.xsd
  - mode.xsd
  - pricingSystemConfiguration.xsd
  - rateAdjustment.xsd
  - segmentRateSchedule.xsd
  - tollAlert.xsd
  - tollRateSign.xsd
- requests
  - acknowledgeTollAlertReq.xsd
  - addDailyRateScheduleReq.xsd
  - addExpressSegmentReq.xsd
  - addHolidayReq.xsd
  - addSegmentRateScheduleReq.xsd
  - addTollRateSignReq.xsd
  - approveRestartModeReq.xsd
  - deleteDailyRateScheduleReq.xsd
  - deleteExpressSegmentReq.xsd
  - deleteHolidayReq.xsd
  - deleteSegmentRateScheduleReq.xsd
  - deleteTollRateSignReq.xsd
  - dmsCorrectionAlertReq.xsd
  - generateOfflineSynchronizationReq.xsd
  - loadOfflineSynchronizationReq.xsd
  - middlewareRateAdjReq.xsd
  - modifyDailyRateScheduleReq.xsd

- modifyExpressSegmentReq.xsd
- modifyHolidayReq.xsd
- modifySegmentRateScheduleReq.xsd
- modifyTollRateSignReq.xsd
- retrieveDataReq.xsd
- setSegmentStateReq.xsd
- setSystemConfigurationReq.xsd
- subscribeReq.xsd
- responses
  - acknowledgeTollAlertResp.xsd
  - addDailyRateScheduleResp.xsd
  - addExpressSegmentResp.xsd
  - addHolidayResp.xsd
  - addSegmentRateScheduleResp.xsd
  - addTollRateSignResp.xsd
  - approveRestartModeResp.xsd
  - deleteDailyRateScheduleResp.xsd
  - deleteExpressSegmentResp.xsd
  - deleteHolidayResp.xsd
  - deleteSegmentRateScheduleResp.xsd
  - deleteTollRateSignResp.xsd
  - dmsCorrectionAlertResp.xsd
  - generateOfflineSynchronizationResp.xsd
  - loadOfflineSynchronizationResp.xsd
  - middlewareRateAdjResp.xsd
  - modifyDailyRateScheduleResp.xsd
  - modifyExpressSegmentResp.xsd
  - modifyHolidayResp.xsd
  - modifySegmentRateScheduleResp.xsd
  - modifyTollRateSignResp.xsd
  - retrieveDataResp.xsd
  - setSegmentStateResp.xsd
  - setSystemConfigurationResp.xsd
  - subscribeResp.xsd

Requests may be sent from a client to a subsystem. Responses may be sent from 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 PS, the initial dataset is retrieved from the database on startup: this includes segments, schedules, holidays, signs, system configuration parameters, alert list, startup configuration, and users. Once a client has initiated the connection to PS, additional data items may be added and existing data may be modified and deleted.

If any data have been added, modified, or deleted, the response messages which indicate these changes will be sent to subscribed clients as well.

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.

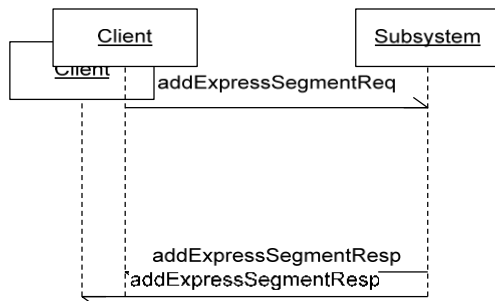
<b>Subscription</b>	<b>Description</b>	<b>Updates Received</b>
expressSegmentData	Receive updates to express segment data	addExpressSegmentResp, deleteExpressSegmentResp, modifyExpressSegmentResp, retrieveDataResp
tollRateSignData	Receive toll rate sign data	addTollRateSignResp, deleteTollRateSignResp, modifyTollRateSignResp, retrieveDataResp
dailyRateScheduleData	Receive daily rate schedule data	addDailyRateScheduleResp, deleteDailyRateScheduleResp, modifyDailyRateScheduleResp, retrieveDataResp
segmentRateScheduleData	Receive segment rate schedule data	addSegmentRateScheduleResp, deleteSegmentRateScheduleResp, modifySegmentRateScheduleResp, retrieveDataResp
holidayData	Receive holiday data	addHolidayResp, deleteHolidayResp, modifyHolidayResp, retrieveDataResp
systemConfigurationData	Receive system configuration data	setSystemConfigurationResp, approveRestartModeResp, retrieveDataResp
alertData	Receive alerts	acknowledgeTollAlertResp, retrieveDataResp, tollAlertMsg
segmentStatusData	Receive segment status updates	addExpressSegmentResp, modifyExpressSegmentResp, deleteExpressSegmentsResp, setSegmentStateResp, middlewareRateAdjResp, rateUpdateMsg
archiveData	Receive data archive updates	dmsAttemptArchiveMsg, modeArchiveMsg, tollRateArchiveMsg
userData	Receive updates to user configuration	retrieveDataResp, updateSystemDataMsg

### *2.1.2 Driver communication*

Initial communication from a subsystem to a driver is described in the general ICD. For PS, the DMS subsystem is analogous to a driver. PS can display messages on DMS's in the system.

## 2.2 Examples

For example, if a client wishes to add an express segment to the system, the client sends an `addExpressSegmentReq` to the subsystem. The subsystem adds the segment and sends an `addExpressSegmentResp` to the client and to any clients who have subscribed to segment data.



**Figure 2-1 Sample Transaction**

The tables below show which requests can be sent from client to subsystem. The responses sent from 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)*

Usage Description	Requests	FC	Responses	TC	Messages	FC	TC
Used for a client to acknowledge a toll alert.	acknowledgeTollAlertReq	X	acknowledgeTollAlertResp	X			
Used for a client to add a daily rate schedule to the subsystem.	addDailyRateScheduleReq	X	addDailyRateScheduleResp	X			
Used for a client to add an express segment to the subsystem.	addExpressSegmentReq	X	addExpressSegmentResp	X			
Used for a client to add a holiday to the subsystem.	addHolidayReq	X	addHolidayResp	X			
Used for a client to add a segment rate schedule to the subsystem.	addSegmentRateScheduleReq	X	addSegmentRateScheduleResp	X			
Used for a client to add a toll rate sign to the subsystem.	addTollRateSignReq	X	addTollRateSignResp	X			
Used for a client to set the startup state of segments	approveRestartModeReq	X	approveRestartModeResp	X			

Usage Description	Requests	FC	Responses	TC	Messages	FC	TC
Used for a client to delete a daily rate schedule from the subsystem.	deleteDailyRateScheduleReq	X	deleteDailyRateScheduleResp	X			
Used for a client to delete an express segment from the subsystem.	deleteExpressSegmentReq	X	deleteExpressSegmentResp	X			
Used for a client to delete a holiday from the subsystem.	deleteHolidayReq	X	deleteHolidayResp	X			
Used for a client to delete a segment rate schedule from the subsystem.	deleteSegmentRateScheduleReq	X	deleteSegmentRateScheduleResp	X			
Used for a client to delete a toll rate sign from the subsystem.	deletetollRateSignReq	X	deleteTollRateSignResp	X			
Message is sent for archiving purposes when a new attempt to send a message to a DMS is made.					dmsAttemptArchiveMsg		X
Used for a client to generate an alert for a DMS correction	dmsCorrectionAlertReq	X	dmsCorrectionAlertResp	X			
Used for a client to generate the offline	generateSynchronizationFileReq	X	generateSynchronizationFileResp	X			

Usage Description	Requests	FC	Responses	TC	Messages	FC	TC
file needed to submit rates to Middleware while there is a communication failure							
Message is sent for archiving purposes when a heartbeat attempt to the Middleware.					heartbeatArchiveMsg		X
Used for a client to send manually approved rates sent by Middleware while there was a communication failure	loadOfflineSynchronizationReq	X	loadOfflineSynchronizationResp	X			
Used for a client to send a Middleware Rate Adjustment to the Middleware	middlewareRateAdjReq	X	middlewareRateAdjResp	X			
Used for a client to modify a daily Rate schedule in the subsystem.	modifyDailyRateScheduleReq	X	modifyDailyRateScheduleResp	X			
Used for a client to modify an express segment in the subsystem.	modifyExpressSegmentReq	X	modifyExpressSegmentResp	X			
Used for a client to modify a holiday in	modifyHolidayReq	X	modifyHolidayResp	X			



Usage Description	Requests	FC	Responses	TC	Messages	FC	TC
the subsystem.							
Used for a client to modify a segment rate schedule in the subsystem.	modifySegmentRateScheduleReq	X	modifySegmentRateScheduleResp	X			
Used for a client to modify a toll rate sign in the subsystem.	modifyTollRateSignReq	X	modifyTollRateSignResp	X			
Message is sent for archiving purposes when an override is made.					modeArchiveMsg		X
Message is sent to broadcast new rates for an express segment.					rateUpdateMsg		X
Used for a client to retrieve data from the subsystem.	retrieveDataReq	X	retrieveDataResp	X			
Used for a client to override segment state data in the subsystem.	setSegmentStateReq	X	setSegmentStateResp	X			
Used for a client to set system configuration data used by the subsystem.	setSystemConfigurationReq	X	setSystemConfigurationResp	X			
Used for a client to subscribe to updates	subscribeReq	X	subscribeResp	X			

Usage Description	Requests	FC	Responses	TC	Messages	FC	TC
from the subsystem.							
Message sent to users when a toll alert is acknowledged.					tollAlertAcknowledgedMsg		X
Message sent to users for new alert conditions for an express segment.					tollAlertMsg		X
Message is sent for archiving purposes when a toll rate attempt is made.					tollRateArchiveMsg		X

## **2.4 Driver Schemas**

The PS subsystem does not communicate with drivers in the typical sense. The PS subsystem utilizes the Subsystem Interfaces of the DMS subsystem to make command requests to display DMS messages. Refer to the DMS ICD (SunGuide-DMS-ICD-1.0.2) for further information on this interface.

### **3. Notes**

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