

SunGuideSM:

Traffic Control Subsystem Interface Control Document

SunGuide-TCS-ICD-7.0



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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 |
| TCS | Traffic Control Subsystem |
| TMC | Traffic Management Center |
| VS | Video Switching |
| VW | Video Wall |
| XML | Extensible Markup Language |

REVISION HISTORY

| Revision | Date | Changes |
|-----------------|-------------------|-----------------|
| 1.0.0 | December 15, 2017 | Initial Release |
| | | |
| | | |
| | | |

1. Scope

1.1 Document Identification

This Interface Control Document (ICD) describes the interface between individual SunGuide clients and the Traffic Control (TCS) 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-6.2 document for details regarding data transfer.

1.2 Project Overview

The Florida Department of Transportation (FDOT) is conducting a program that is developing 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. The goal of the SunGuide software is to have a common software base that can be deployed throughout the state of Florida. The SunGuide software development effort is based on ITS software available from the state of Texas; significant customization of the software is being performed as well as the development of new software modules. The following figure provides a graphical view of the software to be developed:

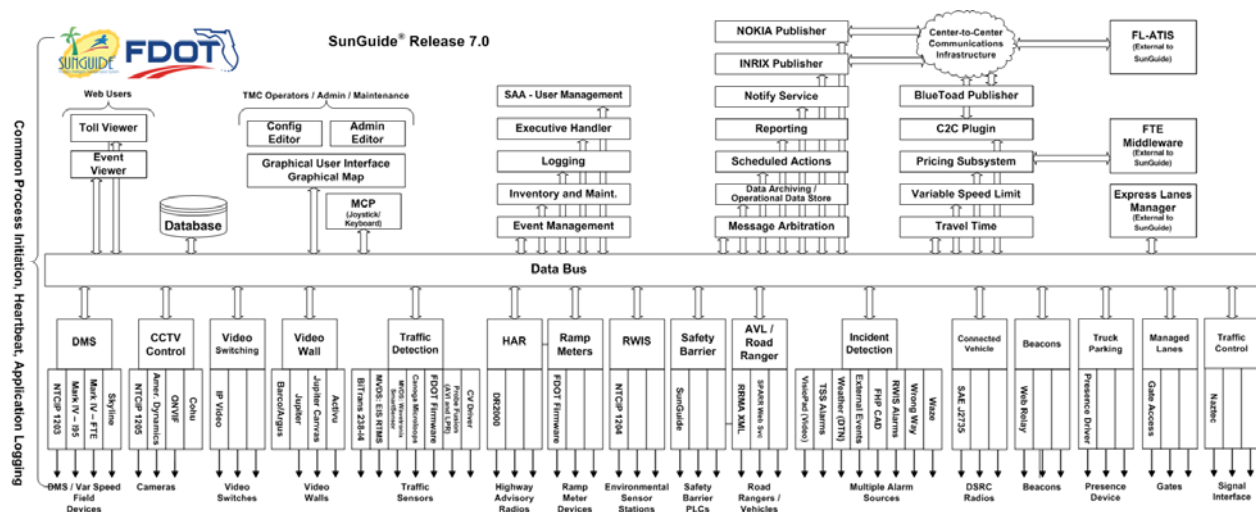


Figure 1.1 - High-Level Architectural Concept

1.3 Related Documents

Additional information regarding the SunGuide project can be found in the following documents and electronic publications:

- FDOT Scope of Services: *BE492, Standard Written Agreement for SunGuide Software Support, Maintenance, and Development, Exhibit A: Scope of Services*. December 14, 2017.

- Notice to Proceed: Letter to Southwest Research Institute® (SwRI®) for BE492, December 14, 2017
- Letter of Authorization 001: Letter to SwRI for BE492, December 15, 2017.
- SunGuide Project website: <http://sunguidesoftware.com>.

1.4 Contacts

The following are contact persons for the SunGuide software project:

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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 Schemas1.0 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:

- messages
 - addTimingPlanMsg.xsd
 - addTrafficSignalMsg.xsd
 - driverStatusUpdateMsg.xsd
 - modifyTimingPlanMsg.xsd
 - modifyTrafficSignalMsg.xsd
 - removeTimingPlanMsg.xsd
 - removeTrafficSignalMsg.xsd
- objects
 - signalPlan.xsd
 - signalRoute.xsd
 - status.xsd
 - trafficSignal.xsd
- requests
 - activatePlanReq.xsd
 - addSignalRouteReq.xsd
 - deleteSignalRouteReq.xsd
 - modifySignalRouteReq.xsd
 - refreshDriverStatusReq.xsd
 - retrieveDataReq.xsd
 - subscribeReq.xsd
- responses
 - activatePlanResp.xsd
 - addSignalRouteResp.xsd
 - deleteSignalRouteResp.xsd
 - modifySignalRouteResp.xsd
 - refreshDriverStatusResp.xsd
 - retrieveDataResp.xsd
 - subscribeResp.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 TCS, the signal routes are retrieved from the database on startup, while the information about the traffic signals are retrieved from the traffic signal driver. Once a client has initiated the connection to TCS, signal routes may be added/modified/deleted, and signal plans may be activated. If the traffic controllers have been modified outside of the TCS subsystem, the TCS driver will send a message with the updated information to TCS.

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 |
|-------------------|--|---|
| trafficSignalData | Receive updates to traffic signal controllers. | addTrafficSignalMsg modifyTrafficSignalMsg removeTrafficSignalMsg |
| timingPlanData | Receive updates to traffic signal plans. | addTimingPlanMsg modifyTimingPlanMsg removeTimingPlanMsg |
| signalRouteData | Receive updates to signal routes. | addSignalRouteResp modifySignalRouteResp deleteSignalRouteResp |
| userData | Receive updates to users. | updateSystemDataMsg |

2.1.2 Driver communication

Initial communication from a subsystem to a driver is described in the general ICD. On the TCS driver startup, the driver queries the master signal software for the current configuration. Once the driver has current data, the TCS subsystem may forward requests from clients to the appropriate driver.

2.2 Examples

For example, if a client wishes to activate a signal timing plan, the client sends a activatePlanReq to the subsystem. Once the subsystem has verified the client has permission to perform this request, the request is then forwarded to the appropriate driver. The driver makes request to the master signal software and sends an activatePlanResp to the subsystem. The subsystem then sends this response back to the appropriate client and to any clients who have subscribed to plan data.

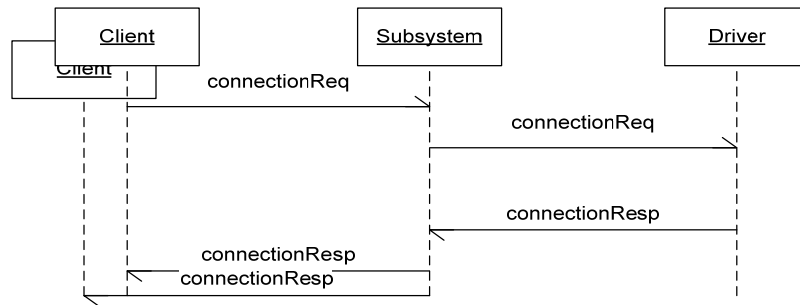


Figure 2 Sample Transaction

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 | F C | T D | Responses | F D | T C | Messages | TD | FD | TC |
|---|------------------------|--------|--------|-------------------------|--------|--------|----------|----|----|----|
| Used for a client to activate a traffic signal timing plan. | activatePlanReq | X | X | activatePlanResp | X | X | | | | |
| Used to add a signal route to the system. | addSignalRouteReq | X | | addSignalRouteResp | | X | | | | |
| Used to modify a signal route in the system. | modifySignalRouteReq | X | | modifySignalRouteResp | | X | | | | |
| Used to delete a signal route in the system. | deleteSignalRouteReq | X | | deleteSignalRouteResp | | X | | | | |
| Used to refresh the drivers cache of signal controllers and timing plans. | refreshDriverStatusReq | | X | refreshDriverStatusResp | X | | | | | |
| Used to retrieve data from TCS data including signal controllers, signal timing plans, and users. | retrieveDataReq | X | X | retrieveDataResp | X | X | | | | |

| Usage Description | Requests | F C | T D | Responses | F D | T C | Messages | TD | FD | TC |
|--|-----------------|----------------|----------------|------------------|----------------|----------------|-----------------------|-----------|-----------|-----------|
| Used to update the status of controllers and timing plans from a single driver. | | | | | | | driverStatusUpdateMsg | | X | |
| Used to subscribe to updates from the system. Data includes traffic signals, timing plans, signal routes, and users. | subscribeReq | X | | subscribeResp | | X | | | | |
| Used to notify subscribers when a new Timing Plan has been added to the external system. | | | | | | | addTimingPlanMsg | | | 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 activate signal timing plan. | activatePlanReq | X | activatePlanResp | X | | | |

| Usage Description | Requests | TD | Responses | FD | Messages | TD | FD |
|---|-------------------------|-----------|-------------------------|-----------|-----------------------|-----------|-----------|
| Used to refresh the cache of signal controllers and timing plans. | refreshDriverStatus Req | X | refreshDriverStatusResp | X | | | |
| Used for sending an asynchronous update to the subsystem when a driver polls the external system. | | | | | driverStatusUpdateMsg | | X |

3. Notes

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