

Department of Public Works

June 12th, 2009

San Gabriel Valley Pilot Project

SITE INTEGRATION
TCS COMMAND/DATA
INTERFACE TEST PROCEDURES

Release 2 - Final

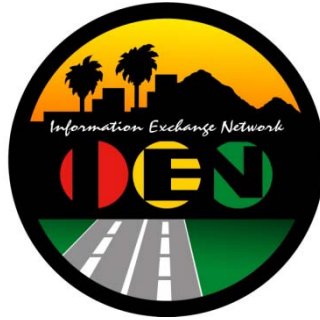


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**LOS ANGELES COUNTYWIDE
INFORMATION EXCHANGE NETWORK**



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Department of Public Works**

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REVISION HISTORY

VERSION	DATE	IEN RELEASE	DESCRIPTION
Draft	03/03/2006	1.08	Initial Release
1	10/20/2006	1.08	Release 1 Version (Incorporates LA County comments on "Draft" and IEN Site Integration Tests conducted in the City of West Hollywood)
2	June 12 th , 2009	2.2	Release 2 Version updated to support CDI version 3 and new CDI Test Utility.

1. INTRODUCTION

1.1 PURPOSE

This document presents the LA County Information Exchange Network (IEN) Site Integration Command/Data Interface (CDI) Test Procedures. The purpose of this test is to verify the functionality of the CDI software, which bridges the IEN and a participating agency’s Traffic Control System (TCS).

1.2 SCOPE

The test procedures contained within this document verify the performance and functionality of CDI software. CDI functionality is described in the *Recommendations For The Implementation Of New Traffic Control System Command/Data Interface Programs* document.

1.3 AUDIENCE

This document is intended for City/Agency personnel who are installing a CDI at their location to connect their Traffic Control System to the IEN.

1.4 REFERENCES

This document references the following materials:

- *IEN System Technical Reference Manual*
- *Recommendations For The Implementation Of New Traffic Control System Command/Data Interface Programs*

1.5 DOCUMENT CONVENTIONS

The following conventions are used within this document:

CONVENTION	EXAMPLE
A mono-spaced font is used to indicate prompts and commands typed in at a computer. The bold text is text that must be typed in.	C : > NSLOOKUP
Text enclosed in “greater-than” and “less-than” characters indicates keystrokes.	<TAB>
Text enclosed in brackets indicates a user-supplied value. Do not enter the brackets.	C : > PING [IP ADDRESS]
A plus sign indicates that two keys are to be pressed simultaneously; the first key is held down while the second key is pressed.	<SHIFT>+<F1>
A capitalized word represents a command button or menu option.	SHOW DIAGRAM
Italic typeface indicates document titles or emphasis.	<i>Scope of Work</i>

2. APPROACH

The following approach will be used for the test cases within this document.

2.1 TEST STEP FORMAT

The IEN Site Integration CDI Test Procedures is comprised of a series of test cases. Each test case contains multiple steps, where each step exercises a discrete aspect of the system. The test steps in this document contain the following fields:

Table 2-1: Test Step Fields

FIELD	DESCRIPTION
Step	Identifier for the test step within the test case
Description	A description of the function or component that is being tested
Precondition	Any preconditions that must be met before the test can be performed
Input	One or more actions to be performed by the Test Conductor as part of the test
Expected Output	One or more operations or events that the system must return as a result of the input for the test to pass
Notes/Comments	An open field in which the Test Conductor and/or witnesses can log comments or information related to the test step
Pass/Fail	The result of the test (to be entered during testing)

2.2 ROLES AND RESPONSIBILITIES

The following roles are used in the CDI Test Procedure:

- **Test Conductor:** The Test Conductor is responsible for performing the test procedures and logging the results. The Test Conductor should be familiar with IEN Site Server components, CDI software, and Traffic Control System connected to the CDI that is being tested.
- **Test Witness:** Test Witnesses are responsible for observing the performance of the test and certifying the documented results. Test Witnesses can record additional notes and comments for the Test Report.

The Test Conductor and Test Witnesses are members of the stakeholder agencies and/or their representatives. At least one representative should be present from the LA County Department of Public Works.

2.3 TEST PERFORMANCE

The CDI Test Procedures test cases and steps are listed in Section 4 of this document. The test cases have been developed such that each test case may be run independently.

Prior to the start of the test, the Test Conductor will ensure that all Test Environment specifications are met and that the Test Environment Configuration Table (see Section 3) has been completed.

The Test Conductor will manipulate the test environment to satisfy all preconditions for a particular step. The Test Conductor is to perform the actions specified in the Input field of each test step and then observe the behavior of the system for the criteria specified in the Expected

Output fields. A test passes if the actual output meets the expected output criteria; otherwise the test fails. Additional information can be recorded in the Notes/Comments field as needed.

Each step shall be documented as being completed with either a check mark (“√”) or “P” for pass or an “X” or “F” for fail. At the conclusion of each test case, the Test Conductor, as well as any other Test Witnesses, shall log the test case results in both the Test Case Specifications and the Test Results Summary Table (see Section 5). A test case fails if any of the test steps fail. All failed test steps will be noted and System Problem/Change Request form(s) (SPCRs) (Appendix B) completed. Additional comments may be entered to document anomalies, detailed results, or redlined changes to the test steps. The Test Results Summary Table must contain an entry for each test case. The Test Case Specifications and the Test Results Summary Table are the written record of all activities that are performed as part of this integration test.

2.4 SEVERITY LEVELS

In the event that the actual results of a test step does not exactly match the stated expected results (i.e., a test step fails), the Test Conductor must rate and document the severity of the failure. Table 2.2 should be used as the guideline in this appraisal.

Table 2-2: Failure Severity

#	SEVERITY	DESCRIPTION
1	CRITICAL	Causes a system or application to fail. No work around is available.
2	SEVERE	Major functionality is missing and no work around is available.
3	MODERATE	Required functionality is missing but work around is available.
4	INCONVENIENCE	Inconvenient or an annoying but does not affect functionality. Documentation errors.
5	SUGGESTION	Improvement or enhancement that is outside the scope of required work.

3. TEST ENVIRONMENT SPECIFICATIONS

The CDI Test Environment consists of the following components:

Table 3-1: Test Environment Components

COMPONENT	DESCRIPTION
Command/Data Interface	Software that connects an IEN Site Server to a TCS. This component is only required for Sites that are connecting a TCS.
IEN Site Server	A Windows-based PC on which the IEN Site Server software is installed.
LANs	<p>COTS networking components that interconnect the other test environment components. These components will vary from site to site, however the following should be true:</p> <ul style="list-style-type: none"> • IEN systems are isolated from other local systems • Traffic is not permitted between the IEN and other local networks with the exception of the connection between the Site Server, CDI, and TCS • The Site Server and CDI host system are connected over a 100Mbps or better network link.
TCS Server	The Traffic Control System server that connects to the local IEN Site Server through the Command/Data Interface that is being tested.
TCS Workstation	A system on which TCS data values may be viewed. The system will be used to verify the values reported by the CDI.

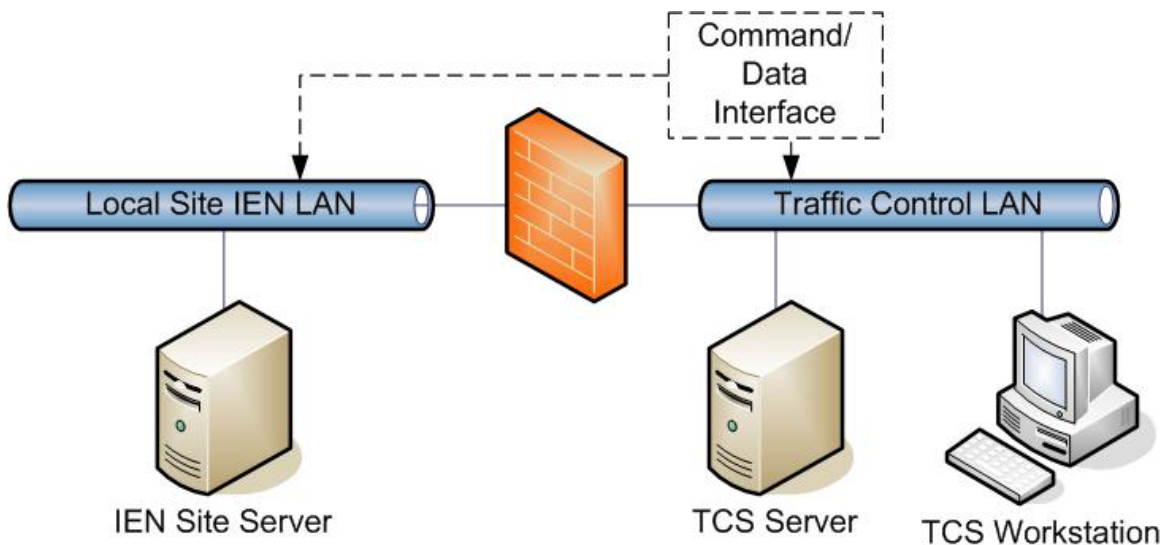
The terms *local* and *remote* are used to differentiate between components installed at the Site where the CDI is located as opposed to components installed at other Sites within the IEN.

The CDI, and its connectivity to the local Site Server and TCS, is the component being tested herein. The other components listed above support the CDI’s operation. Test steps will be run on the IEN Site Server, CDI host system, and on TCS systems. Each test will identify the system on which it is to be performed as well as any user requirements. All components are to be operating “normally” unless otherwise noted in the specifications of the test case.

The CDI Test Procedures rely on the availability of data from the connected Traffic Control System. Many of the tests attempt to verify the data by comparing the values that the IEN receives from the CDI with the values shown within the TCS. Appendix C – Viewing TCS Data in IEN User Interfaces lists the locations where TCS data is displayed in the IEN user interfaces. There will likely be some difference between the time a value is reported in the TCS and the time that that value is received and displayed in the CDI Test Utility. Latencies of one or more seconds are expected. Latencies greater than five seconds should be noted in the test comments.

The Test Environment is depicted in the following exhibit.

Exhibit 3-1: Test Environment



The system on which CDI software is run will vary depending on how the CDI is implemented to support a particular type of TCS. The TransSuite TCS and QuicNet IV CDIs both run on the TCS Server; however, this may not always be the case.

Each CDI must be configured for the Site at which it is located. In Table 3-2 below, record the appropriate values for the CDI being tested.

Table 3-2: Test Environment Configuration

PARAMETER	VALUE
Traffic control system type	
CDI interface version (2 or 3)	
Host name of system on which the CDI software runs	
CDI server IP address that is used to communicate with the Site Server	
Site ID number	
Site name	
Host name of system on which the Site Server software runs	
Site Server IP address that is used to communicate with the CDI server	

3.1 CDI TEST UTILITY

The IEN CDI Test Utility can be used to send individual data and command requests to a CDI and to view the resulting responses. The utility is installed as part of the IEN Site Server software.

To start the utility, select **START > ALL PROGRAMS > LOS ANGELES COUNTY IEN > ADMINISTRATIVE TOOLS > CDI TEST UTILITY**.

To configure the utility, select the **CONFIGURE** option on the utility’s Setup menu. In the CDI Test Configuration window, enter appropriate values for the following parameters and then press the **OK** button:

Table 3-3: CDI Test Utility Configuration Parameters

PARAMETER	DESCRIPTION
CDI Version	The IEN CDI IDL version that the CDI supports (2 or 3).
IP Address	IP address or host name of the system running CORBA Naming Service software for local IEN systems. This is the local IEN Site Server in most cases. Enter the IP address if the system has multiple network interfaces.
Port	Port used by the CORBA Naming Service software for local IEN systems. This should always be “14444”.
Site ID	Identification number of the local site. Provided by IEN Administrators. Must match the site ID that the CDI uses in its data and command accessors.
System ID	Identification number of the traffic control system at the local site. This will be “1” for sites that have only one traffic control system to connect. Must match the system ID that the CDI uses in its data and command accessors.
Int ID	Identification number of an intersection to request data for.
Det ID	Identification number of a system detector to request data for.
Sec ID	Identification number of a section to request data for.

Choose the **SELECT TEST FILE** option on the File menu to specify the test log file.

To use the utility, select the desired test in the **SELECT TEST** field and press **START**. The utility will request the selected data and display the results. Press the **MESSAGE WINDOW** button to see CDI connection status information.

4. TEST CASES

The following sections contain the test cases of the IEN Site Integration CDI Test Procedures. Each test case is written to be a standalone test and may be performed in any order.

The default test environment configuration (as specified in Section 3) will be used for each test case contained within this document unless otherwise noted within the specifications of the test case.

It is the responsibility of the Test Conductor to insure that the test results are logged for each test case and test step. It is the responsibility of Test witness(es) to sign the test results verifying Test Case completion as documented. All witnesses must be noted on the Test Results Form.

It is estimated that it will take two to four hours to perform this test.

4.1 VERIFY NETWORK CONNECTION

TEST CASE SPECIFICATION	
ID	CDI-1
Name	Verify Network Connection
Version	2.00
Description	Verifies basic network connectivity between the Site Server and CDI
Prerequisites	The IEN components being tested are configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Verify that the Site Server can ping the CDI host system.				
	ICMP (the protocol over which the "ping" tool communicates to test network connections) traffic is permitted between the Site Server and CDI host system.	Open a command prompt on the IEN Site Server and issue the following command: PING [CDI MACHINE IP]	The CDI host system replies to the Site Server's pings.		
2	Verify that the Site Server resolves the correct IP Address from the CDI's host name.				
	ICMP traffic is permitted between the Site Server and CDI host system.	Open a command prompt on the IEN Site Server and issue the following command: PING [CDI MACHINE NAME]	(1) The Site Server resolves the appropriate IP address from the CDI host name. (2) The CDI host system replies to the Site Server's pings.		
3	Verify that the CDI host system can ping the Traffic Control System Server.				
	ICMP traffic is permitted between the Site Server and CDI host system.	From the CDI host system, ping the TCS Server by IP Address.	The TCS Server replies to the CDI's pings.		

COMMENTS:

4.2 VERIFY PUBLICATION OF CDI DATA AND COMMAND OBJECTS

TEST CASE SPECIFICATION	
ID	CDI-2
Name	Verify Publication of CDI Data and Command Objects in the Site Server's CORBA Naming Service
Version	2.00
Description	Verifies the publication of CDI data and command interface factory objects to the CORBA Naming Service on the IEN Site Server. The Site Server uses these object references to connect to the CDI.
Prerequisites	The IEN components being tested are configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	<p>Default</p> <p>Stop the CDI software and the IEN Site Server service on the Site Server.</p> <p>Initialize the OmniNames CORBA Naming Service:</p> <ol style="list-style-type: none"> 1. Stop the OmniNames CORBA Naming Service on the Site Server. 2. Open a command prompt and run the following command to delete the Naming Service backup files: <code>DEL %IEN_SUPPORT_DIR%\LOGS\OMNINAMES-*</code> 3. Start the Naming Service again. <p>The Naming Service should be empty. This can be confirmed by selecting <code>START > ALL PROGRAMS > LOS ANGELES COUNTY IEN > ADMINISTRATIVE TOOLS > SYSTEM COMMANDS > SHOW NAMING REFERENCES</code>. There should be nothing between the {ROOT} and {ROOT/IEN} contexts in the command output.</p>
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass

TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Verify that the CDI software starts on the CDI host system.				
		Start the CDI software on the CDI host system (The CDI startup procedures will vary by TCS vendor – see CDI documentation for instructions.)	The CDI software is successfully started (output will vary by CDI type).		
2	Verify that CDI data and command objects are registered in the Site Server Naming Service. CDI's must to publish these references so that the Site Server can locate where it needs to pull data from and push commands to.				
	(1) OmniNames CORBA naming service is started on the Site Server. (2) CDI software is running.	Select START > ALL PROGRAMS > LOS ANGELES COUNTY IEN > ADMINISTRATIVE TOOLS > SYSTEM COMMANDS > SHOW NAMING REFERENCES.	The command output shows that the following two objects have bound to the Naming Service under the {ROOT} context: <ul style="list-style-type: none"> • TCSCDIData[siteID](Site[siteID]) • TCSCDICmd[siteID](Site[siteID]) (Where siteID is the ID number of the local Site within its Corridor)		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
3	Verify that the CDI periodically republishes its objects in the Site Server Naming Service. CDI's should republish its object references periodically.				
	(1) OmniNames CORBA naming service is started on the Site Server. (2) CDI software is running.	(1) Initialize the OmniNames CORBA Naming Service: <ol style="list-style-type: none"> 1. Stop the OmniNames CORBA Naming Service on the Site Server. 2. Open a command prompt and run the following command to delete the Naming Service backup files: <pre>DEL %IEN_SUPPORT_DIR%\LOGS\OMNINAMES-*</pre> 3. Start the Naming Service again. (2) Wait for the CDI's configured reconnect interval (see CDI documentation). (3) Select START > ALL PROGRAMS > LOS ANGELES COUNTY IEN > ADMINISTRATIVE TOOLS > SYSTEM COMMANDS > SHOW NAMING REFERENCES.	The command output shows that the following two objects have bound to the Naming Service under the {ROOT} context: <ul style="list-style-type: none"> • TCSCDIData[siteID](Site[siteID]) • TCSCDICmd[siteID](Site[siteID]) (Where siteID is the ID number of the Site within its Corridor)		

COMMENTS:

4.3 VERIFY SYSTEM INFORMATION VALUES

TEST CASE SPECIFICATION	
ID	CDI-3
Name	Verify CDI System Information
Version	2.00
Description	Verify the CDI's reported System Information values.
Prerequisites	The IEN components being tested are configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	5
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the CDI Version test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the CDI VERSION test and press START.	The Test Utility shows results returned from the CDI.		
2	Verify that the CDI reports a valid System Version value.				
		(1) Examine the reported System Version value. (2) Record the reported value in the Notes/Comments field.	The CDI reports a system version in the format [major].[minor].[revision].		
3	Verify that the CDI reports a valid System Name value.				
		Examine the reported System Name value.	The CDI reports an appropriate name for the system.		
4	Verify that the CDI reports a valid System Status value.				
		Examine the reported System Status value.	The CDI reports the appropriate value from the IEN System Status enumeration.		
5	Verify that the CDI reports a valid Interface Version value.				
		(1) Examine the reported Interface Version value. (2) Record the reported value in the Notes/Comments field.	The CDI reports an interface version in the format [major].[minor].[revision].		

COMMENTS:

4.4 VERIFY INTERSECTION INFO VALUES

TEST CASE SPECIFICATION	
ID	CDI-4
Name	Verify Intersection Info Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_INTERSECTIONINFO event type.
Prerequisites	The IEN components being tested are configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	11
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Info test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION INFORMATION test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports a valid Section ID value.				
	Step 1 completed	Compare the reported Section ID value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
4	Verify that the CDI reports a valid Polling Interval value.				
	Step 1 completed	Compare the reported Polling Interval value with the corresponding value in the TCS software.	The value reported by the CDI matches the value in the TCS.		
5	Verify that the CDI reports a valid Controller Type value.				
	Step 1 completed	Compare the reported Controller Type value with the corresponding value in the TCS software.	The CDI reports an appropriate controller type value for the intersection.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
6	Verify that the CDI reports a valid Intersection Description value.				
	Step 1 completed	Examine the Intersection Description value reported in the Results Summary field.	The CDI reports an appropriate description value for the intersection.		
7	Verify that the CDI reports a valid Main Street value.				
	Step 1 completed, CDI Version 3	Compare the reported Main Street value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).	Not supported by Version 2 CDIs.	
8	Verify that the CDI reports a valid Cross Street value.				
	Step 1 completed, CDI Version 3	Compare the reported Cross Street value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).	Not supported by Version 2 CDIs.	
9	Verify that the CDI reports a valid Main Street Direction value.				
	Step 1 completed, CDI Version 3	Compare the reported Main Street Direction value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Directions enumeration for the intersection.	Not supported by Version 2 CDIs.	
10	Verify that the CDI reports a valid Latitude value.				
	Step 1 completed, CDI Version 3	Compare the reported Latitude value with the corresponding value in the TCS software.	(1) The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS). (2) The value reported by the CDI is in NAD83 format expressed in micro-degrees (ex. “34140873”).	Not supported by Version 2 CDIs.	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
11	Verify that the CDI reports a valid Longitude value.				
	Step 1 completed, CDI Version 3	Compare the reported Longitude value with the corresponding value in the TCS software.	(1) The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS). (2) The value reported by the CDI is in NAD83 format expressed in micro-degrees (ex. “-118176842”).	Not supported by Version 2 CDIs.	

COMMENTS:

4.5 VERIFY INTERSECTION REAL-TIME STATUS VALUES

TEST CASE SPECIFICATION	
ID	CDI-5
Name	Verify Intersection Real-Time (RT) Status Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_INTERSECTIONRTSTATUS event type.
Prerequisites	The IEN components being tested are configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	4
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Real-Time Status test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION REAL-TIME STATUS test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports a valid Cycle Counter value.				
	Step 1 completed	Compare the reported Cycle Counter value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
4	Verify that the CDI reports a valid Reference Cycle Counter value.				
	Step 1 completed	Compare the reported Reference Cycle Counter value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.6 VERIFY INTERSECTION REAL-TIME SUMMARY VALUES

TEST CASE SPECIFICATION	
ID	CDI-6
Name	Verify Intersection Real-Time Summary Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_INTERSECTIONRTSUMMARY event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	13
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Real-Time Summary test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION REAL-TIME SUMMARY test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports a valid Signal Control Mode value.				
	Step 1 completed	Compare the reported Signal Control Mode value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Control Modes enumeration for the intersection.		
4	Verify that the CDI reports a valid Intersection Signal State value.				
	Step 1 completed	Compare the reported Signal State value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Intersection Signal States enumeration for the intersection.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
5	Verify that the CDI reports a valid Controller Response State value.				
	Step 1 completed	Compare the reported Response State value with the corresponding value in the TCS software.	(1) If the controller is responding to TCS communication, the CDI reports the controller to be Responding. (2) If the controller is not responding to TCS communication, the CDI reports the controller to be Not Responding.		
6	Verify that the CDI reports a valid Preemption Type value.				
	Step 1 completed	For a preempted controller, compare the reported Preemption Type value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the Intersection Preemption Types enumeration for the intersection.		
7	Verify that the CDI reports a valid Controller Alarms value.				
	Step 1 completed	Trigger a controller alarm. Compare the reported Alarms value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the Intersection Controller Alarm Bit enumeration for the intersection.		
8	Verify that the CDI reports a valid Main Street Green Active value.				
	Step 1 completed	Compare the reported Main Street Green Active with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
9	Verify that the CDI reports a valid Controller Communication State value.				
	Step 1 completed	Compare the reported Comm. State value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the Intersection Controller Communication States enumeration for the intersection.		
10	Verify that the CDI reports a valid Timing Plan ID value.				
	Step 1 completed	Compare the reported Timing Plan ID value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
11	Verify that the CDI reports a valid Desired Cycle Length value.				
	Step 1 completed	Compare the reported Desired Cycle Length value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
12	Verify that the CDI reports a valid Desired Offset value.				
	Step 1 completed	Compare the reported Desired Offset value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
13	Verify that the CDI reports a valid Actual Offset value.				
	Step 1 completed	Over a period of several cycles, compare the reported Actual Offset values with the corresponding values in the TCS software.	For each cycle, the value reported by the CDI matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.7 VERIFY INTERSECTION PHASE STATE DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-7
Name	Verify Intersection Phase State Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_PHASE_STATEDATA event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Phase State test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION PHASE STATE test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports valid Active Phase values.				
	Step 1 completed	For the duration of a cycle, compare the reported Active Phase ID values with the corresponding values in the TCS software.	Each value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.8 VERIFY INTERSECTION PEDESTRIAN PHASE STATE DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-8
Name	Verify Intersection Pedestrian Phase State Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_PEDPHASE_STATEDATA event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Pedestrian Phase State test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION PEDESTRIAN PHASE STATE test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports valid Active Pedestrian Phase values.				
	Step 1 completed	For the duration of a cycle, compare the reported Active Pedestrian Phase ID values with the corresponding values in the TCS software.	Each value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.9 VERIFY VEHICLE CALL STATE DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-9
Name	Verify Vehicle Call State Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_VEHCALL_STATEDATA event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Vehicle Call State Data test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION VEHICLE CALL STATE test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports valid Vehicle Call values.				
	Step 1 completed	For the duration of a cycle, compare the reported Active Vehicle Call Phase ID values with the corresponding values in the TCS software.	Each value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.10 VERIFY LAST CYCLE PHASE DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-10
Name	Verify Last Cycle Phase Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_LASTCYCLE_PHASEDATA event.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	4
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Last Cycle Phase Data test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION LAST CYCLE test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports a valid Actual Cycle Length value.				
	Step 1 completed	Compare the reported Actual Cycle Length value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
4	Verify that the CDI reports valid Last Cycle Phase Lengths.				
	Step 1 completed	Over a period of several cycles, compare the reported Last Cycle Phase Length values reported with the corresponding values in the TCS software.	Each value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.11 VERIFY CONTROLLER PHASE MAXIMUM GREEN TIME DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-11
Name	Verify Controller Phase Maximum Green Time Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_TP_PHASEDATA event.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Intersection Max Green Times test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION MAX GREEN TIMES test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested Intersection.				
	Step 1 completed	Compare the reported Intersection ID value with the requested intersection ID.	The value reported by the CDI matches the requested intersection ID.		
3	Verify that the CDI reports valid Max Green Times.				
	Step 1 completed	Compare the reported Max Phase Green Time values with the corresponding values in the TCS software.	Each value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.12 VERIFY DETECTOR INFO DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-12
Name	Verify Detector Info Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_DETECTORINFO event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	9
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Detector Information test.				
	Step 1 completed	(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the DETECTOR INFORMATION test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested detector.				
	Step 1 completed	Compare the reported Detector ID value with the requested Detector ID.	The value reported by the CDI matches the requested detector ID.		
3	Verify that the CDI reports a valid Averaging Period value.				
	Step 1 completed	Compare the reported Averaging Period value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
4	Verify that the CDI reports a valid Detector Class value.				
	Step 1 completed	Compare the reported Detector Class value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Detector Class enumeration for the detector.		
5	Verify that the CDI reports a valid Detector Type value.				
	Step 1 completed	Compare the reported Detector Type value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Detector Types enumeration for the selected detector.		
6	Verify that the CDI reports a valid Detector Direction value.				

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
	Step 1 completed	Compare the reported Detector Direction value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Direction enumeration for the selected detector.		
7	Verify that the CDI reports a valid Lane Number value.				
	Step 1 completed	Compare the reported Lane Number value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
8	Verify that the CDI reports a valid Detector Roadway value.				
	Step 1 completed	Compare the reported Roadway Name value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		
9	Verify that the CDI reports a valid Detector Weighting Factor (K) value.				
	Step 1 completed	Compare the reported Detector Weighting Factor (K) value with the corresponding value in the TCS software.	The value reported by the CDI either matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.13 VERIFY DETECTOR STATE DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-13
Name	Verify Detector State Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_DETECTORSTATE event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	13
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Detector State Information test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the DETECTOR STATE INFORMATION test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested detector.				
	Step 1 completed	Compare the reported Detector ID value with the requested Detector ID.	The value reported by the CDI matches the requested detector ID.		
3	Verify that the CDI reports a valid Detector Status value.				
	Step 1 completed	Compare the reported Detector Status value with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Detector Status enumeration for the selected detector.		
4	Verify that the CDI reports a valid Upload Date value.				
	Step 1 completed, CDI version 3	Over the period of several detector data uploads, compare the reported Upload Date value with the corresponding value in the TCS software.	Each value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS).	Not supported by Version 2 CDIs.	
5	Verify that the CDI reports a valid Upload Time value.				
	Step 1 completed, CDI version 3	Over the period of several detector data uploads, compare the reported Upload Time value with the corresponding value in the TCS software.	Each value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS).	Not supported by Version 2 CDIs.	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
6	Verify that the CDI reports a valid "last uploaded" Volume value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Last Uploaded Volume value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS). (2) The value is reported in units of vehicles per hour.		
7	Verify that the CDI reports a valid Average Volume value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Average Volume value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS). (2) The value is reported in units of vehicles per hour.		
8	Verify that the CDI reports a valid "last uploaded" V+KO value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Last Uploaded V+KO value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS). (2) The value is reported in units of vehicles per hour.		
9	Verify that the CDI reports a valid Average V+KO value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Average V+KO value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS). (2) The value is reported in units of vehicles per hour.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
10	Verify that the CDI reports a valid “last uploaded” Occupancy value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Last Uploaded Occupancy value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS). (2) The value is reported as a percentage.		
11	Verify that the CDI reports a valid Average Occupancy value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Average Occupancy value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS). (2) The value is reported as a percentage.		
12	Verify that the CDI reports a valid “last uploaded” Speed value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Last Uploaded Speed value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS). (2) The value is reported in units of miles per hour.		
13	Verify that the CDI reports a valid Average Speed value.				
	Step 1 completed	Over the period of several detector data uploads, compare the reported Average Speed value with the corresponding value in the TCS software.	(1) Each value reported by the CDI matches the value in the TCS or is “-1” (if the value is unknown or N/A in the TCS). (2) The value is reported in units of miles per hour.		

COMMENTS:

4.14 VERIFY SECTION INFO DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-14
Name	Verify Section Info Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_SECTIONINFO event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Section Information test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the SECTION INFORMATION test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested section.				
	Step 1 completed	Compare the reported Section ID value with the requested Section ID.	The value reported by the CDI matches the requested section ID.		
3	Verify that the CDI reports valid Member Intersection values.				
	Step 1 completed	Compare the Member Intersection values reported in the Results Summary field with the corresponding value in the TCS software.	The value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.15 VERIFY SECTION STATE DATA VALUES

TEST CASE SPECIFICATION	
ID	CDI-15
Name	Verify Section State Data Values
Version	2.00
Description	Verify that the CDI returns valid data for the IEN_SECTIONSTATE event type.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	4
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Open the CDI Test Utility and run the Section State Information test.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the SECTION STATE INFORMATION test and press START.	If the requested device is valid for the CDI, the Test Utility shows results returned from the CDI. If the requested device is invalid for the CDI, no results are returned.		
2	Verify that the CDI reports data for the requested section..				
	Step 1 completed	Compare the reported Section ID value with the requested Section ID.	The value reported by the CDI matches the requested section ID.		
3	Verify that the CDI reports a valid Section Control Mode value.				
	Step 1 completed	Compare the Section Control Mode value reported in the Results Summary field with the corresponding value in the TCS software.	The CDI reports the appropriate value from the IEN Section Control Mode enumeration for the selected section.		
4	Verify that the CDI reports a valid Section Timing Plan value.				
	Step 1 completed	Compare the Section Timing Plan value reported in the Results Summary field with the corresponding value in the TCS software.	The value reported by the CDI matches the value in the TCS or is "-1" (if the value is unknown or N/A in the TCS).		

COMMENTS:

4.16 VERIFY DATA INTERFACE PERFORMANCE

TEST CASE SPECIFICATION	
ID	CDI-16
Name	Verify Data Interface Performance
Version	2.00
Description	Verify that the CDI meets performance targets.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	1
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Run the Performance test and examine the resulting performance statistics ¹ .				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the CDI Performance test and press START.	(1) The average response time is less than .5 seconds. (2) The response payload is less than the available bandwidth of the connection between the CDI server and the Site Server.		

COMMENTS:

¹ Calculation of interface performance statistics:

1. Average CDI response time (millisecond) = $(\sum \text{response_time_per_request}) / \text{total_request_made}$

Average Pay Load (bytes) = $(\sum \text{total_byte_per_retured_eventseq}) / \text{total_request_made}$

Verify Support for IEN Intersection Commands

TEST CASE SPECIFICATION	
ID	CDI-17
Name	Verify Support for IEN Intersection Commands
Version	2.00
Description	Verify that the CDI receives IEN intersection commands and implements the commands in the TCS.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default. Stop the IEN Site Server Windows Service on the local Site Server. Commands should be issued to test devices that are not deployed in the field.
Number of Steps	8
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION			P/F	
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Verify that the CDI supports IEN intersection timing plan commands.				
		<p>(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1).</p> <p>(2) In the CDI Test Utility, select the INTERSECTION COMMAND SET PLAN test and press START.</p> <p>(3) Enter a timing plan number and then click OK.</p> <p>(4) Verify that the CDI receives the command and causes the TCS to command the device to the selected timing plan.</p>	<p>(1) The CDI commands the selected device to the specified timing plan.</p> <p>(2) The device implements the specified timing plan.</p>		
2	Verify that the CDI supports IEN intersection normal mode commands.				
		<p>(1) In the CDI Test Utility, select the INTERSECTION COMMAND CHANGE MODE test and press START.</p> <p>(2) Set the mode to NORMAL(0) and then click OK.</p> <p>(3) Verify that the CDI receives the command and causes the TCS to command the device to run the timing plan selected for the section and system that contain the device.</p>	<p>(1) The CDI commands the selected device to normal.</p> <p>(2) The device implements the appropriate timing plan.</p>		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
3	Verify that the CDI supports IEN intersection local time-of-day mode commands.				
		(1) In the CDI Test Utility, select the INTERSECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to LOCAL_TOD (1) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the device to run the timing plan selected in its local scheduler.	(1) The CDI commands the selected device to local time-of-day mode. (2) The device implements the appropriate timing plan.		
4	Verify that the CDI supports IEN intersection free mode commands.				
		(1) In the CDI Test Utility, select the INTERSECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to FREE (2) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the device to run free.	(1) The CDI commands the selected device to free. (2) The device runs free.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
5	Verify that the CDI supports IEN intersection central time-of-day mode commands.				
		<p>(1) In the CDI Test Utility, select the INTERSECTION COMMAND CHANGE MODE test and press START.</p> <p>(2) Set the mode to TOD (3) and then click OK.</p> <p>(3) Verify that the CDI receives the command and causes the TCS to command the device to run the timing plan selected in the central scheduler.</p>	<p>(1) The CDI commands the selected device to central time-of-day mode.</p> <p>(2) The device implements the appropriate timing plan.</p>		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
6	Verify that the CDI supports IEN intersection traffic responsive mode commands.				
		(1) In the CDI Test Utility, select the INTERSECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to RESPONSIVE (4) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the device to run in traffic responsive mode.	(1) The CDI commands the selected device to traffic responsive mode. (2) The device implements the appropriate timing plan.		
7	Verify that the CDI supports IEN intersection flash commands.				
	CDI version 3	(1) In the CDI Test Utility, select the INTERSECTION COMMAND FLASH test and press START. (2) Verify that the CDI receives the command and causes the TCS to command the device to flash operation.	(1) The CDI commands the selected device to flash. (2) The device enters flash operation.	Not supported by Version 2 CDIs.	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
8	Verify that the CDI supports IEN intersection release control commands.				
		(1) In the CDI Test Utility, select the INTERSECTION COMMAND RELEASE test and press START. (2) Verify that the CDI receives the command and causes the TCS to end IEN control of the selected device.	(1) The CDI commands the TCS to release IEN control of the selected device. (2) The TCS assumes control of the device.		

COMMENTS:

4.17 VERIFY SUPPORT FOR IEN SECTION COMMANDS

TEST CASE SPECIFICATION	
ID	CDI-18
Name	Verify Support for IEN Section Commands
Version	2.00
Description	Verify that the CDI receives IEN section commands and implements the commands in the TCS.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default. Stop the IEN Site Server Windows Service on the local Site Server. Commands should be issued to test devices that are not deployed in the field.
Number of Steps	7
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Verify that the CDI supports IEN section timing plan commands.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the SECTION COMMAND SET PLAN test and press START. (3) Enter a timing plan number and then click OK. (4) Verify that the CDI receives the command and causes the TCS to command the device to the selected timing plan.	(1) The CDI commands the selected device to the specified timing plan. (2) The device implements the specified timing plan.		
2	Verify that the CDI supports IEN section normal mode commands.				
		(1) In the CDI Test Utility, select the SECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to NORMAL(0) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the section to run the timing plan selected for the system that contains the section.	(1) The CDI commands the selected device to normal. (2) The device implements the appropriate timing plan.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
3	Verify that the CDI supports IEN section local time-of-day mode commands.				
		(1) In the CDI Test Utility, select the SECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to LOCAL_TOD (1) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to set the section mode to local time of day.	(1) The CDI commands the selected device to local time-of-day mode. (2) The device runs local time-of-day mode.		
4	Verify that the CDI supports IEN section free mode commands.				
		(1) In the CDI Test Utility, select the SECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to FREE (2) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the device to run free.	(1) The CDI commands the selected device to free. (2) The device runs free mode.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
5	Verify that the CDI supports IEN section central time-of-day mode commands.				
		(1) In the CDI Test Utility, select the SECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to TOD (3) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the device to run the timing plan selected in the central scheduler.	(1) The CDI commands the selected device to central time-of-day mode. (2) The device runs central time-of-day mode.		
6	Verify that the CDI supports IEN section traffic responsive mode commands.				
		(1) In the CDI Test Utility, select the SECTION COMMAND CHANGE MODE test and press START. (2) Set the mode to RESPONSIVE (4) and then click OK. (3) Verify that the CDI receives the command and causes the TCS to command the device to run in traffic responsive mode.	(1) The CDI commands the selected device to traffic responsive mode. (2) The device runs traffic responsive mode.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
7	Verify that the CDI supports IEN section release control commands.				
		(1) In the CDI Test Utility, select the SECTION COMMAND RELEASE test and press START. (2) Verify that the CDI receives the command and causes the TCS to end IEN control of the selected device.	(1) The CDI commands the TCS to release IEN control of the selected device. (2) The TCS assumes control of the device.		

COMMENTS:

4.18 VERIFY SUPPORT FOR DEVICE LIST REQUESTS

TEST CASE SPECIFICATION	
ID	CDI-19
Name	Verify Support for Device List Requests.
Version	2.00
Description	Verify that the CDI returns a valid list of devices and their supported data types.
Prerequisites	The IEN Workstation being tested is configured as specified in the <i>IEN System Technical Reference Manual</i> and connected to the other Test Environment components.
Environment	Default. Stop the IEN Site Server Windows Service on the local Site Server.
Number of Steps	3
TEST CASE ACCEPTANCE	
Acceptance Targets	n/a
Acceptance Criteria	All test steps must pass
TEST CASE EXECUTION	
Software version/date	
Test start date/time	
Test end date/time	
Total Pass/Fail	

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
1	Verify that the CDI provides an accurate list of intersections.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the INTERSECTION LIST test and press START. (3) Compare the list of intersections reported in the Results Summary field with the set of intersections that are defined in the TCS software.	(1) The list reported by the CDI contains all intersections that the agency permit's the IEN to request data for. (2) The set of supported data types for each listed intersection is accurate.		
2	Verify that the CDI provides an accurate list of sections.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the SECTION LIST test and press START. (3) Compare the list of sections reported in the Results Summary field with the set of sections that are defined in the TCS software.	(1) The list reported by the CDI contains all sections that the agency permit's the IEN to request data for. (2) The set of supported data types for each listed section is accurate.		

STEP	DESCRIPTION				P/F
	PRECONDITION	INPUT	EXPECTED OUTPUT	NOTES/COMMENTS	
3	Verify that the CDI provides an accurate list of system detectors.				
		(1) Start the CDI Test Utility on the local Site Server and configure it for the CDI being tested (See Section 3.1). (2) In the CDI Test Utility, select the DETECTOR LIST test and press START. (3) Compare the list of system detectors reported in the Results Summary field with the set of detectors that are defined in the TCS software.	(1) The list reported by the CDI contains all detectors that the agency permit's the IEN to request data for. (2) The set of supported data types for each listed detector is accurate.		

COMMENTS:

5. TEST RESULTS FORM

Test Date _____

Test Location _____

Test Name/ID _____

The undersigned verify that this test was conducted as redlined in the test cases and/or documented in the Test Result Summary Table (see Table 5.2).

Table 5-1: Test Witness Signatures

	Name (Printed)	Signature	Date
Test Conductor	_____	_____	_____
Test Recorder	_____	_____	_____
Client Witness	_____	_____	_____
Other Witness	_____	_____	_____

Table 5-2: Test Results Summary Table

TEST CASE	DATE	START TIME	END TIME	PASS/FAIL	FAILED STEPS	SPCRS #'S	REMARKS
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							

6. APPENDICES

6.1 APPENDIX A – ACRONYMS AND DEFINITIONS

TERM	DEFINITION
ATMS	Advanced Traffic Management System
COTS	Commercial Off the Shelf Software
CDI	Command and Data Interface. Software that connects an IEN Site Server to a Traffic Control System.
DPW	(Los Angeles County) Department of Public Works
ICMP	Internet Control Message Protocol, the protocol over which the “ping” tool communicates to test network connections
IEN	Information Exchange Network
IMS	Incident Management System
IP	Internet Protocol
LAN	Local Area Network
SPCR	System Problem/Change Request form
TCS	Traffic Control System

6.2 APPENDIX B – SOFTWARE PROBLEM/CHANGE REQUEST FORM

SPCR Report Identifier: _____ Suggested Priority (1-5) _____

Reported By: _____ Date _____
 Organization: _____ Phone _____

Problem Title: _____
 Project _____
 Component/Program Unit _____ Version _____

Description (Be concise, include equipment involved and location. Attach additional sheets or supporting information as necessary)

Test Step/Scenario _____
 Repeatable (Check One) Always () Frequently () Rarely () Unable to Repeat ()

Phase Found _____
 Requirement(s) Affected (Reference Document and Paragraph) _____

Initially Assign To _____

Priority Legend

#	PRIORITY	DESCRIPTION
1	CRITICAL	Causes a system to crash.
2	SEVERE	Causes an application or user to crash and no work around is available.
3	MODERATE	Affects required functionality but a work around is available to proceed.
4	INCONVENIENCE	Inconvenient or an annoying but does not affect functionality. Documentation errors.
5	SUGGESTION	Improvement or enhancement that is outside the scope of required work.

6.3 APPENDIX C – VIEWING TCS DATA IN IEN USER INTERFACES

6.3.1 Intersection Data

The following table indicates where TCS intersection data is displayed in the IEN:

Table 6-1: IEN Intersection Data Displays

DATA	WHERE DISPLAYED
IEN_INTERSECTIONINFO²	
Intersection ID number	Intersection detail screen
ID number of section containing this intersection	Intersection detail screen (labeled “Section Number”)
Seconds between poll attempts to the intersection controller	Intersection detail screen
Controller type	Intersection detail screen
Description of the intersection controller	Intersection detail screen
Name of main street	Intersection detail screen
Name of cross street	Intersection detail screen
Direction of movement along the main street	Intersection detail screen
Latitude coordinate of intersection location	Intersection configuration screen
Longitude coordinate of intersection location	Intersection configuration screen
IEN_INTERSECTIONRTSTATUS	
Cycle counter, seconds since start of cycle	Intersection detail screen
Reference cycle counter for the intersection	Intersection detail screen

² IEN administrators can override the device configuration values that are reported by the CDI with values manually entered through IEN device configuration screens.

IEN_INTERSECTIONRTSUMMARY

Signal control mode	Intersection detail screen (labeled “Mode”)
Intersection signal state	Intersection detail screen (labeled “Signal Status”)
Controller response state	Intersection detail screen (labeled “Comm Rsp”)
Preemption type	Intersection detail screen (labeled “Preempt”)
Controller alarms	Intersection detail screen (labeled “Alarms”)
Main street green active	Intersection detail screen (labeled “Main St. Green”)
Communication state for the intersection controller	Intersection detail screen (labeled “Comm State”)
Timing plan ID number	Intersection detail screen (labeled “Timing Plan”)
Desired cycle length	Intersection detail screen (the first value of the “Planned Cycle Length/Offset” pair)
Desired offset	Intersection detail screen (the second value of the “Planned Cycle Length/Offset” pair)
Actual offset	Intersection detail screen (the second value of the “Last Cycle Length/Offset” pair)

IEN_PHASE_STATEDATA

Active green phases	Intersection detail screen (labeled “Active Phases”)
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IEN_PEDPHASE_STATEDATA

Active pedestrian phases	Intersection detail screen (labeled “Ped. Phase State”)
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IEN_VEHCALL_STATEDATA

Active actuation phases Intersection detail screen (labeled “Vehicle Call State”)

IEN_LASTCYCLE_PHASEDATA

Length of last cycle Intersection detail screen (the first value of the “Last Cycle Length/Offset”)

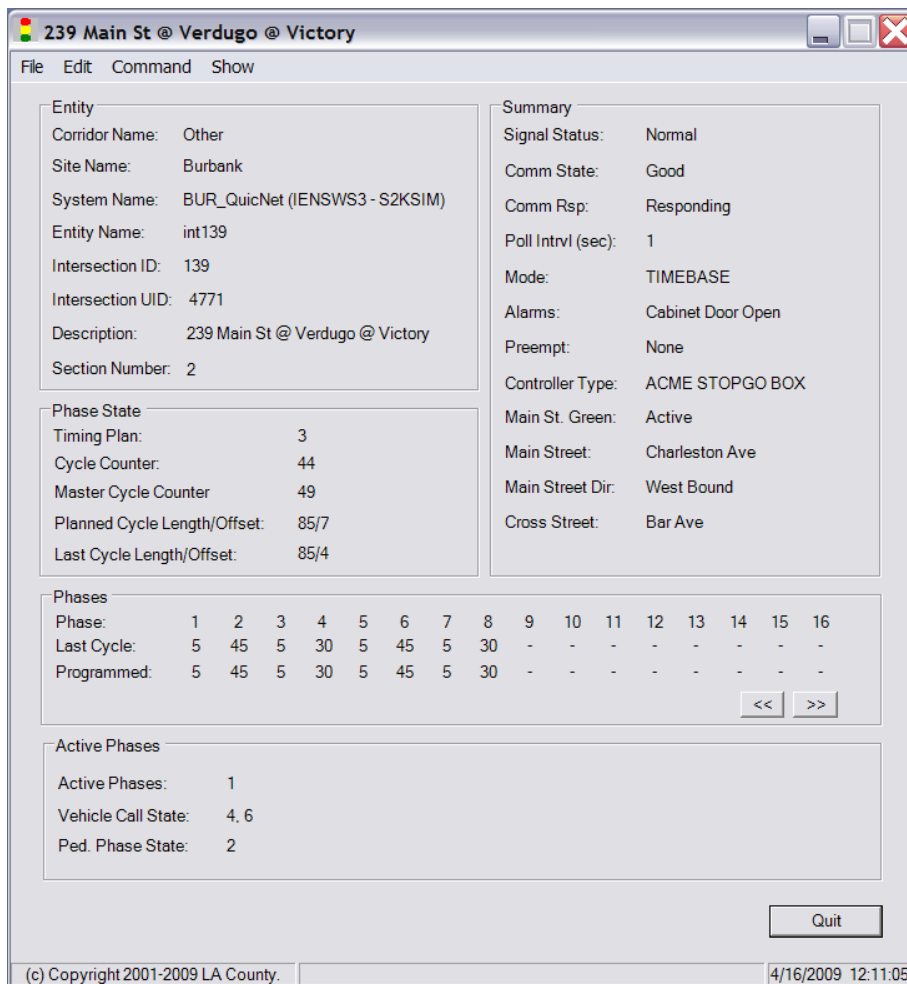
Total green time for each active phase in the controller's last cycle. Intersection detail screen (labeled “Last Cycle”)

IEN_TP_PHASEDATA

Maximum permissible green time for each phase of the active timing plan. Intersection detail screen (labeled “Programmed”)

With the exception of latitude and longitude coordinates, all intersection data can be viewed on the intersection detail screen.

Figure 6-1: IEN Intersection Detail Screen



Latitude and longitude coordinates can be viewed through the IEN intersection configuration screens, which are accessible to administrative users only.

To open the intersection detail screen, right-click an intersection control within ATMS Map or ATMS Explorer and select MONITOR.

6.3.2 System Detector Data

The following table indicates where TCS system detector data is displayed in the IEN:

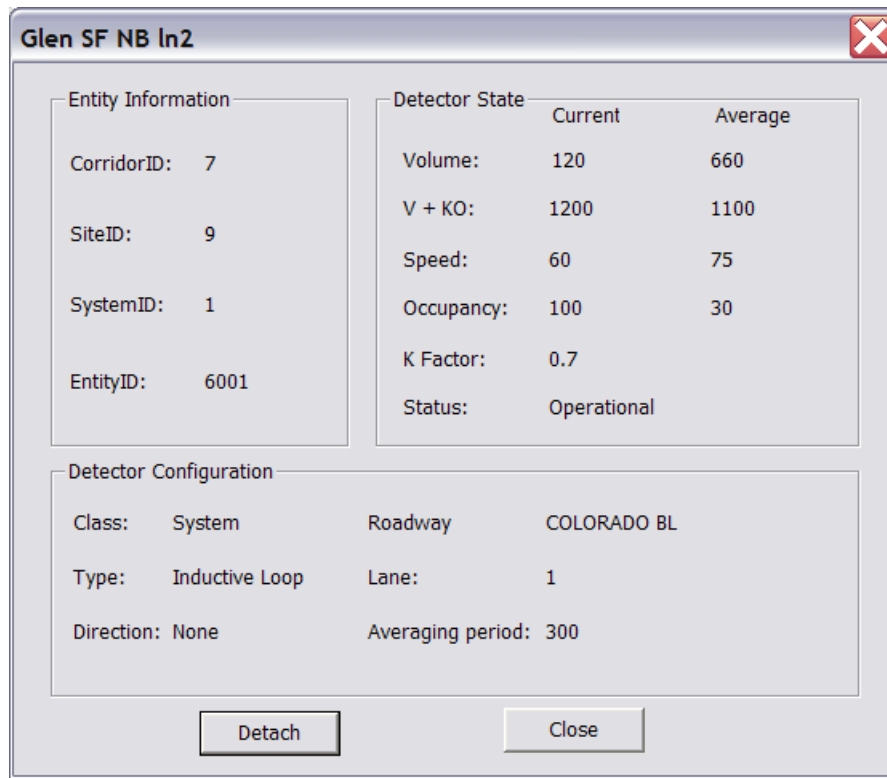
Table 6-2: IEN System Detector Data Displays

DATA	WHERE DISPLAYED
IEN_DETECTORINFO³	
Detector data averaging period	System detector detail screen
Detector ID	System detector detail screen
Detector class	System detector detail screen
Detector type	System detector detail screen
Direction of traffic flow over the detector	System detector detail screen
Lane number for traffic passing over the detector	System detector detail screen
Name of the roadway that contains the detector	System detector detail screen
Weighting factor (K) for volume + weighted occupancy calculations	System detector detail screen
IEN_DETECTORSTATE	
Volume from the most recent upload, in vehicles per hour	System detector detail screen (labeled “current volume”)
Average volume, in units of vehicles per hour	System detector detail screen
Volume, in vehicles per hour + weighted occupancy, for volume and occupancy from the most recent upload.	System detector detail screen (labeled “current V+ KO”)
Average volume, in vehicles per hour + weighted occupancy, for volume and occupancy in the averaging period.	System detector detail screen (labeled “average V + KO”)
Detector status	System detector detail screen
Speed data from the most recent upload, in miles per hour	System detector detail screen (labeled “current speed”)
Average speed, in miles per hour	System detector detail screen
Occupancy data from the most recent upload, in percent	System detector detail screen (labeled “current occupancy”)
Average occupancy, in percent	System detector detail screen

All detector data can be viewed on the system detector detail screen.

³ IEN administrators can override the device configuration values that are reported by the CDI with values manually entered through IEN device configuration screens.

Figure 6-2: IEN System Detector Screen



To open the system detector detail screen, right-click a system detector control within an ATMS Explorer diagram and select MONITOR.

6.3.3 Section Detail Screen

The following table indicates where TCS section data is displayed in the IEN:

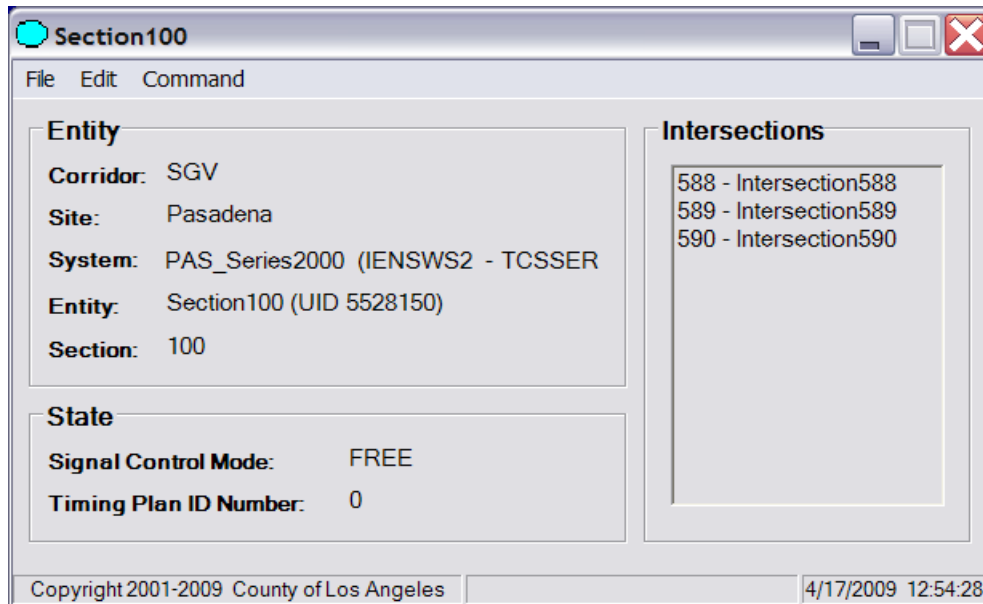
Table 6-3: IEN Section Data Displays

DATA	WHERE DISPLAYED
IEN_SECTIONINFO⁴	
List of member intersections	Section detail screen
IEN_SECTIONSTATE	
Section control mode	Section detail screen
Section timing plan	Section detail screen

⁴ IEN administrators can override the device configuration values that are reported by the CDI with values manually entered through IEN device configuration screens.

All section data can be viewed on the section detail screen.

Figure 6-3: IEN Section Detail Screen



To open the section detail screen, right-click a section control within an ATMS Explorer diagram and select MONITOR.