Department of Public Works

March 30th, 2005

San Gabriel Valley Pilot Project

INFORMATION NETWORK EXCHANGE

TEST ENVIRONMENT MANUAL

Final

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LOS ANGELES COUNTYWIDE

INFORMATION EXCHANGE NETWORK

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TABLE OF CONTENTS PAGE #

1. INTRODUCTION

1.1 PURPOSE

This document describes the use and features of the Los Angeles Countywide Information Exchange Network (IEN) Test Environment.

1.2 AUDIENCE

This document is intended for users and administrators of the IEN test environment.

1.3 REFERENCES

Readers of this document should refer to the following documents for more information:

- The *IEN CDI Recommendations Document* - Describes how command data interfaces (CDI) must implement the IEN interfaces. The document is intended to support the development of new TCS CDI software and uses the Series 2000 TCS CDI as a working example.
- The *IEN System Technical Reference Manual* - Describes the configurations of the various systems and components that comprise the IEN. The document provides detailed procedures for installing and configuring the IEN software.
- The *IEN System Administrator's Guide* - Describes the applications and procedures that are used to administer the IEN. The IEN administrative responsibilities include configuring and managing user accounts and resources, managing system privileges, customizing ATMS database values, performing system backups, and monitoring the status of the system.
- The *IEN System Operator's Manual* - Describes the operational features and functions of the IEN applications. The document is intended for users who are responsible for monitoring arterial Traffic Control System field devices and tracking incidents within the system.
- The IEN user Interface Online Help screens.

1.4 DOCUMENT CONVENTIONS

The following formatted text conventions are used within this document.

`C:> type` **`readme.txt`**	A monospaced font is used to indicate prompts and commands or keys typed in at a computer. The bold text is text that should be typed in.
<Tab>	Text enclosed in brackets indicates keystrokes.
<Shift>+<F1>	A plus sign indicates that two keys are to be pressed simultaneously; the first key is held down while the second key is pressed.
File	A bold font represents a button or menu in the application such as the **File** menu or the **OK** button.

2. OVERVIEW

The IEN Test Environment is available to local Cities and Agencies that are in the process of connecting their Traffic Control System (TCS) to the IEN. The Test Environment is intended to facilitate the development and testing of these connections, limiting their impact upon the production environment.

The Test Environment consists of three (3) systems configured into Corridor Server, Site Server, and Workstation roles.

- IENTESTCS runs the Corridor Server software and a corridor database loaded with Pasadena device configuration data. The system also runs Site Server software and a Series 2000 TCS CDI Simulator (See Section 4.4) to make simulated Pasadena TCS data available within the production environment.
- IENTESTSS runs Site Server software and can be used for testing connections with new types of TCS CDI's.
- IENTESTWS runs the IEN Workstation software, which includes the operator user interfaces. The system is used to configure TCS devices within the Test Environment's corridor database and to view TCS data values in IEN device displays.

Access to the Test Environment requires network connectivity and user accounts on the IEN Windows domain. Test Environment systems are currently located on LA County's IEN network segment and can be reached from any location connected to the IEN WAN. User access accounts will be provided by an IEN administrator.

3. TEST ENVIRONMENT SPECIFICATIONS

Test Environment network, hardware, and software specifications are described below.

3.1 NETWORK SPECIFICATIONS

The Test Environment systems are located on the IEN network at the following IP addresses:

Table 3-1 Test Environment IP Addresses

SYSTEM	IP ADDRESS
IENTESTCS	10.10.2.17
IENTESTSS	10.10.2.16
IENTESTWS	10.10.2.18

3.2 HARDWARE SPECIFICATIONS

The Test Environment consists of three (3) Dell PowerEdge 2650 servers.

Table 3-2 Test Environment Hardware Specifications

PARAMETER	EXPLANATION
Manufacturer	Dell
Model	PowerEdge 2650
CPU	2.4Ghz
RAM	512MB
Hard Drive	73GB
Network Interface	100Mbps Ethernet

3.3 COTS SOFTWARE SPECIFICATIONS

The following COTS software is used in the Test Environment:

Table 3-3 Test Environment COTS Software Specifications

COMPONENT	IENTESTCS	IENTESTSS	IENTESTWS
Operating System	Windows 2003 Standard	Windows 2003 Standard	Windows 2000 Server (SP 4)
Oracle Database 10g (10.1.0.3.0)	Server	Client	Client
Microsoft Access 2000 (SP 3)	-	-	√
NTP client 4.1.7.2	√	√	√
Microsoft .Net Framework 1.1*	√	√	√
MDAC 2.8 RTM*	√	√	√

*Installed by the IEN software setup program

4. USING THE TEST ENVIRONMENT FOR CDI TESTING

The following sections describe how to use Test Environment components to test new CDI connections to the IEN.

4.1 VERIFYING REFERENCES IN THE SITE SERVER NAMING SERVICE

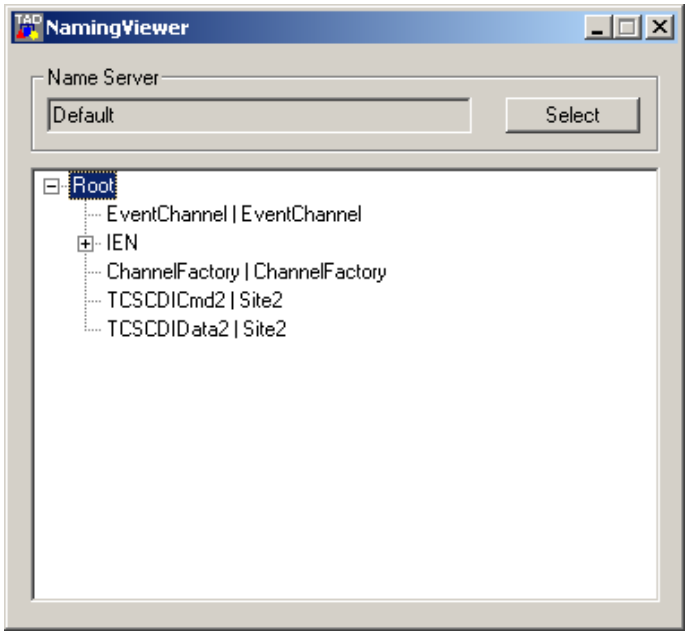
The IEN Site Server program uses the naming service to locate TCS CDI CORBA objects. The TCS CDI must publish CORBA references to its interface objects in the Site Server's CORBA Naming Service. The references that a CDI must publish in the Naming Service are described in the *IEN CDI Recommendations* document.

The Naming Service running on the Site Server is published at port 14444. The full reference is shown below:

```
-ORBInitRef NameService=corbaloc:iiop:IENTESTSS:14444/NameService
```

To verify that TCS CDI references are published in the Site Server's naming service, open the TAO Naming Viewer utility (Start > Program Files > Information Exchange Network > Administrative Tools > TAO NT Naming Viewer). In Exhibit 4-1 below, the viewer shows that TCS CDI command accessor and data accessor references have been correctly published at the root of the Site Server's Naming Service.

Exhibit 4-1 TAO NT Naming Viewer



4.2 CONFIGURING THE SITE SERVER

Configuring a Site Server involves setting appropriate IEN Environment values and creating the Site Server's configuration file.

IEN Environment values are configured using the IEN Environment Setting utility (Start > Program Files > Information Exchange Network > Administrative Tools > Set IEN Environment). Table 4-1 below describes the IEN Environment Settings.

Table 4-1 IEN Environment Settings

SETTING	DESCRIPTION
Local Machine Name	Host name of the local machine.
Local Machine ID	ID number of the local machine within its Site. The IEN software does not currently use this value.
Name Server Name	Host name of the system that runs the Naming Service that the local system will use to resolve CORBA object references. For Site Servers, this value is typically their own hostname.
Name Server IP	IP Address of the network interface on which the local system's Naming Service is run. The local system will use this Naming Service to resolve CORBA object references.
Endpoint IP	IP Address of the network interface on which the local system's IEN CORBA server objects are run. For Site Servers, use the IP Address of the interface that is on the IEN network.
Description	Textual description of the system (ex. "Pasadena Site Server").
Corridor Server Name	Host name of the system's Corridor Server. The Test Environment Corridor Server's host name is "IENTESTCS".
Corridor Server ID	ID number of the system's Corridor Server. The Test Environment Corridor Server's ID is "1".
Site Server Name	Host name of the system's Site Server. For Site Servers, this is the host name of the local system.
Site Server ID	ID number of the system's Site Server. Each Site Server is assigned a unique site id within its corridor.

The Site Server application reads a configuration file at start up. The configure file is specified by the registry value [HKEY_LOCAL_MACHINE\SOFTWARE\TransCore\LACDPW\IEN] SiteServerCfgFile. The Site Server configuration file is described below and a sample configuration file is listed in Appendix E.

All Site Server configuration files must include the following lines:

```
[System]
CorridorID =
SiteID =
SystemID =
DiagLevel =
UpdateInterval =
UpdateCycle =
```

Ensure that the CorridorID and SiteID combination is unique for this Site Server: there must be only one (1) Site Server at each site, and if multiple Site Servers with the same parameters are started, confusion will result.

The SystemID should be set to zero if there is no TCS from which to fetch data at that site.

The DiagLevel parameter controls diagnostic output from the Site Server (See Section 4.3). The value should be set to zero for normal operation.

UpdateInterval is the number of seconds between each poll for data. UpdateCycle is the number of seconds between full data updates and between attempts to connect to the IenCorridorDataService.

For Site Servers that are connected to a TCS CDI, the configuration file must also contain the initial data request list. The list tells the Site Server which devices and data types to request from the CDI upon startup.

```
[IntersectionInfo]
1 = 100, 101, 103-331, 333-335
2 = 100, 101, 103-331, 333-335
4 = 100, 101, 103-331, 333-335

[DetectorInfo]
1 = 2201-2208, 2231-2238, 6251-6258
2 = 2201-2208, 2231-2238, 6251-6258
4 = 2201-2208, 2231-2238, 6251-6258
```

As shown in the example above, the list has the structure [EventType] SiteID = TCSDeviceList. Each EventType specifies a particular set of device data values (as defined within the IEN IDL files). SiteID is the ID of a site to which the Site Server will send local TCS device data. TCSDeviceList specifies the set of local TCS devices whose data is passed to the destination site. Thus the lines specify which types of data are sent where and for which devices.

4.3 VIEWING SITE SERVER DIAGNOSTICS

The Site Server application is instrumented with extensive diagnostics. To view diagnostic output, the Site Server must be run from the command line instead of as a Windows Service.

To start the Site Server from the command line, open a command prompt, change to the C:\program files\transcore directory, and run the following command (where NAMESVCIP is the IP Address of the interface on which the CORBA Naming Service is run, ENDPNT is the IP address of the interface on which the Site Server software is run, CFGFILENAME is the full path to the Site Server configuration file, and LOGFILENAME is the full path to the Site Server log file.):

```
sitesvr -ORBInitRef
NameService=corbaloc:iiop:NAMESVCIP:14444/NameService  -
ORBendPoint giop:tcp:ENDPNT:10066 --cfgfile CFGFILENAME --
siteid IDNUM --logfile LOGFILENAME
```

The Site Server application will start and provide connection feedback within the command window. To change the quantity of CDI communication that the Site Server prints out, change

the DiagLevel setting in the configuration file, then stop and restart the Site Server. Table 4-2 below lists the diagnostic levels available with the Site Server:

Table 4-2: Site Server Diagnostic Levels

DIAGNOSTIC LEVEL	EXPLANATION
0	Generate no diagnostic messages for CDI communication.
> 0	Print the time required for the Site Server to call the CDI's getDeviceEventDataList method, in milliseconds.
10	Print data in intersection related events received from the CDI, as well as the time required to make the getDeviceEventDataList call to the CDI.
11	Print data in detector related events received from the CDI, as well as the time required to make the getDeviceEventDataList call to the CDI.
12	Print data in section related events received from the CDI, as well as the time required to make the getDeviceEventDataList call to the CDI.
>20	At startup, prints a summary of the types of device data that the Site Server is requesting from the TCS CDI, as well as the time required to make the getDeviceEventDataList call to the CDI.
>22	At startup, prints a summary of the types of device data that the Site Server is requesting from the TCS CDI. Each time that the Site Server requests calls the CDI's getDeviceEventDataList method, prints the list of devices and data types requested, as well as the time required to make the call.

4.4 RUNNING THE SERIES 2000 TCS CDI SIMULATOR

A Series 2000 TCS CDI simulator is available for the Windows-platform. Instead of connecting to a Series 2000 TCS server, the simulator reads TCS data values from a configuration file. The simulator, functioning as a CDI, responds to Site Server requests for data with the configured data values. The simulator does not support IEN commands for simulated devices.

The simulator configuration file specifies the identity of the CDI and the devices that it will export to the IEN. This configuration file also contains the TCS data values to be reported for the simulated devices. A sample configuration file is provided in Appendix D.

The following excerpt from the configuration file shows how IEN_INTERSECTIONRTSUMMARY data values are specified:

```
[IntersectionRTSummary]

     # See IENRTData.idl for testing values
     #
     # format:
     # intersection id =
     #    SignalControlMode,
     #    intersectionSignalState,
     #    controllerResponseState,
     #    preemptType,
     #    controllerAlarms,
     #    mainStreetGreenActive,
     #    commStat,
     #    timingPlanIdNumber,
     #    desiredCycleLength,
```

```
#    desiredOffset,
#    actualOffset,

0 = 5, 2, 2, 2, 0, 1, 0, 2, 60, 15, 10

142 = 5, 2, 2, 2, 7, 1, 0, 2, 60, 15, 10
162 = 5, 2, 4, 3, 16, 1, 20, 4, 54, 1, 20
```

Default values are specified under device id "0". The simulator will report default values unless an alternate set of values is defined for the individual device (as shown in the above excerpt for intersections 142 and 162). Devices for which alternate values are defined must be listed on the simintersection, simdetector, or simsection lines in the device definition section of the configuration file. The simulator reads device lists from the configuration file at startup and TCS data values once per second. TCS data values can be changed in the configuration file at run time and the simulator will read and report the changed values.

Follow these steps to run the simulator:

1. Copy the tcsiencdi.exe and tcsdata.cfg files into a common directory
2. Update the TCS identity and device lists sections within the tcsdata.cfg file as necessary
3. Start the CORBA Naming Service and Site Server software that the CDI simulator will connect to
4. Open a command window, switch to the directory that contains the simulator files, and issue the following command (where SITESERVERHOST is the name of the machine running the CORBA Naming Service and Site Server software and SITEID# is the site number specified in the tcsdata.cfg file.):

```
TCSIENCDI.EXE -ORBInitRef
NameService=corbaloc:iiop:SITESERVERHOST:14444/NameService --
siteid SITEID#
```

The simulator will run and provide connection feedback within the command window. The simulator can be stopped by issuing the escape command (<CTRL>+<C>) or closing the command window.

4.5 RESTORING BASELINE CONFIGURATIONS

Images have been taken of the Test Environment systems. These images can be used to restore test systems to their baseline configurations.

Follow these steps to restore an image:

1. Insert the PowerQuest DriveImage CD into the system to be restored and reboot the system
2. The system will boot from the CD
3. At the `A:\>` prompt, type **`Y:`** and press <Enter>
4. At the `Y:\>` prompt, type **English\execute\pqdi** and press <Enter>
5. On the "PowerQuest DriveImage" screen, select **Restore Image**
6. On the "Select Image File" screen, click **Browse**

7. On the “Open Image File” screen, select the “images” partition in the Drives pick list
8. Select the image name in the File Name browser and click **OK**
9. Back on the “Select Image File” screen, click **Next**
10. On the “Select Destination Partition or Unallocated Space” screen, select the active partition and click **Next**
11. Click **OK** to clear the warning
12. On the “Select Disk Write Mode” screen, select **Fast Mode** and click **Next**
13. On the “Ready to restore image file” screen, click **Finish**
14. When the “image has been successfully restored” message is posted, remove the CD and reboot the system

5. APPENDICES

5.1 APPENDIX A – IENTESTCS SETUP PROCEDURES

The following procedures describe the installation and configuration of IEN Test Environment systems. Please consult the *IEN System Technical Reference Manual* for production system installation and configuration procedures.

5.1.1 Windows 2003 Server

1. Install Windows 2003 Server with default options using the following configuration parameters:
    - Partitions: C: (12GB), E: (36GB), I: (20GB)
    - Hostname: IENTESTCS
    - IP Address: 10.10.2.17
    - DNS: 10.10.2.10
    - Gateway: 10.10.2.254
    - Domain: IEN.LOCAL
2. Disable the unused network interface
3. Install the latest Microsoft software patches and driver updates
4. Disable Windows Automatic Updates
5. Create the directory C:\tao

5.1.2 NTP Client 4.1.7.2

The NTP client software setup program is located in the network share IENUTILSVR1\IENSUPPORT.

1. Launch the installer by double-clicking the setup.exe file
2. Select **No** at the "view readme file" prompt
3. At the "Welcome" screen, click **Next**
4. At the "File location" screen, click **Next** to continue
5. At the "Select components" screen, select **Single Time Source** and click **Next**
6. At the "Enter Information" screen, enter **10.10.2.10** and click **Next**
7. Select **No** at the "view config file" prompt
8. Select **No** at the "view documentation" prompt
9. Open the Computer Management console (Start\Run\compmgmt.msc); if the Windows Time service is running, stop and disable it
10. Stop the Network Time Protocol service and set the service to "automatic" startup
11. Give the command **`ntpdate -b 10.10.2.10`** at a command prompt to bring the local system clock close enough to the reference time on 10.10.2.10 that the NTP service will be willing to change your system clock
12. Start the NTP server service

5.1.3 Oracle Database 10g Server

1. Double-click the setup program to launch the installer
2. On the "Welcome" screen, select **Basic Installation** and set the following options:
    - Oracle Home Location: *use the default location*
    - Installation Type: **Standard Edition**
3. Deselect the **Create Starter Database** option and click **Next**
4. If the installer posts an error saying that it can't determine the IP Address, add the server's IP address and host name to the hosts file and then click the **Retry** button
5. On the "Summary" screen, click **Install**
6. On the "End of Installation" screen, click **Exit** and **Yes** to confirm

5.1.4 Oracle 10g Patch Set 10.1.0.3.0

1. Double-click the setup program to launch the installer
2. On the "Welcome" screen, click **Next**
3. On the "Specify File Locations" screen, select the name of the Oracle home on which to apply the patch (typically OraDb10g_home1 for the first 10g server home) and click **Next**
4. If prompted, shutdown all running services specified by the installer and click the **Retry** button
5. On the "Summary" screen, click **Install**
6. Click **Exit** on the "End of Installation" screen

5.1.5 IEN Corridor Server Database

Database installation instructions are provided in the README_CreateIENCSDB.txt file, which is installed along with the database creation scripts as part of the IEN corridor server software.

5.1.6 IEN Corridor Server Software

Version: 1.06

1. Double-click the setup program to launch the installer. Skip to step 4 if .NET framework v1.1 has already been installed on the system.
2. On the Microsoft .NET Framework "License Agreement" screen, select **I agree** and click **Install**
3. Click **OK** to clear the Microsoft .NET Framework installation is complete message box
4. On the "Welcome" screen, click **Next**
5. On the "License Agreement" screen, select **I accept the terms in the license agreement** and click **Next**
6. On the "Customer Information" screen, enter appropriate user name and organization values and click **Next**
7. On the "Setup Type" screen, select **Corridor Server** and click **Next**
8. On the "Ready to Install the Program" screen, click **Install**

9. On the "Installation Wizard Complete" screen, enable the **Launch IEN Setting UI** option and click **Finish**
10. On the "IEN Environment Setting" screen, enter the following values and click **Set**:
    - Local Machine Name: IENCS
    - Local Machine ID: 1
    - Name Server Name: IENCS
    - Name Server IP: 10.10.2.17
    - Endpoint IP: 10.10.2.17
    - Description: Test Corridor Server
    - Corridor Server Name: IENCS
    - Corridor ID: 1
    - Site Server Name: IENCS
    - Site ID: 2
11. Click **OK** to clear the "IEN environment has been successfully set" message box
12. Reboot the system

5.2 APPENDIX B – IENTESTSS SETUP PROCEDURES

The following procedures describe the installation and configuration of IEN Test Environment systems. Please consult the *IEN System Technical Reference Manual* for production system installation and configuration procedures.

5.2.1 Windows 2003 Server

1. Install Windows 2003 Server with default options using the following configuration parameters:
    - Partitions: C: (12GB), D: (56GB)
    - Hostname: IENTESTSS
    - IP Address: 10.10.2.16
    - DNS: 10.10.2.10
    - Gateway: 10.10.2.254
    - Domain: IEN.LOCAL
2. Disable the unused network interface
3. Install the latest Microsoft software patches and driver updates
4. Disable Windows Automatic Updates

5.2.2 NTP Client 4.1.7.2

Follow the procedures described in Section 5.1.2.

5.2.3 Oracle Database 10g Client

1. Double-click the setup program to launch the installer
2. At the "Welcome" screen, click **Next** to proceed
3. At the "Specify File Locations" screen, set the destination path to **C:\Oracle\product\10.1.0\Client_1** and click **Next**
4. At the "Select Installation Type" screen, select **Administrator** and click **Next**
5. At the "Summary" screen, click **Install**
6. At the "Oracle Net Configuration Assistant: Welcome" screen, select **Next** to continue
7. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, Select Naming Method" screen, select **Local Naming** and click **Next**
8. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, Service Name" screen, enter **IENCS** for the database service name and click **Next**
9. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, Select Protocols" screen, select **TCP** and click **Next**
10. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, TCP/IP Protocol" screen, enter **IENTESTCS** for the host name, select the standard port number 1521 for the connection, and click **Next**
11. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, Test" screen, select **No, do not test** and click **Next**
12. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, Net Service Name" screen, enter **IENCS** for the net service name and click **Next**
13. At the "Oracle Net Configuration Assistant: Naming Methods Configuration, Another Net Service Name?" screen, select **No** and click **Next**
14. At the "Oracle Net Configuration Assistant: Net Service Name Configuration Done" screen, click **Next**
15. At the "Oracle Net Configuration Assistant: Naming Methods Configuration Done" screen, click **Next**
16. At the "Oracle Net Configuration Assistant: Done" screen, click **Finish**
17. At the "End of Installation" screen, click **Exit** and then **Yes** to confirm and exit the installation program

5.2.4 Oracle 10g Patch Set 10.1.0.3.0

1. Double-click the setup program to launch the installer
2. On the "Welcome" screen, click **Next**
3. On the "Specify File Locations" screen, select the name of the Oracle home on which to apply the patch (“OraClient10g_home1” by default) and click **Next**
4. If prompted, shutdown all running services specified by the installer and click the **Retry** button
5. On the "Summary" screen, click **Install**
6. Click **Exit** on the "End of Installation" screen

5.2.5 IEN Site Server Software

Version: 1.06

1. Double-click the setup program to launch the installer. Skip to Step 4 if .NET framework v1.1 has already been installed on the system..
2. On the Microsoft .NET Framework "License Agreement" screen, select **I agree** and click **Install**
3. Click **OK** to clear the Microsoft .NET Framework installation is complete message box
4. On the "Welcome" screen, click **Next**
5. On the "License Agreement" screen, select **I accept the terms in the license agreement** and click **Next**
6. On the "Customer Information" screen, enter appropriate user name and organization values and click **Next**
7. On the "Setup Type" screen, select **Custom** and click **Next**
8. On the “Custom Setup” screen, set the Site Server, Series 2000 CDI Simulator, and Pasadena TMC Site Server Configuration features to **This feature, and all subfeatures, will be installed on local hard drive**; set all other features to **This feature will not be available** and click **Next**
9. On the "Ready to Install the Program" screen, click **Install**
10. On the "Installation Wizard Complete" screen, enable the **Launch IEN Setting UI** option and click **Finish**
11. On the "IEN Environment Setting" screen, enter the following values and click **Set**:
    - Local Machine Name: IENSS
    - Local Machine ID: 1
    - Name Server Name: IENSS
    - Name Server IP: 10.10.2.16
    - Endpoint IP: 10.10.2.16
    - Description: Test Site Server
    - Corridor Server Name: IENCS
    - Corridor ID: 1
    - Site Server Name: IENSS
    - Site ID: 6
12. Click **OK** to clear the "IEN environment has been successfully set" message box
13. Reboot the system

5.3 APPENDIX C – IENTESTWS SETUP PROCEDURES

The following procedures describe the installation and configuration of IEN Test Environment systems. Please consult the *IEN System Technical Reference Manual* for production system installation and configuration procedures.

5.3.1 Windows 2000 Server

1. Install Windows 2000 Server with default options using the following configuration parameters:
    - Partitions: C: (20GB), E: (28GB), I: (20GB)
    - Hostname: IENTESTWS
    - IP Address: 10.10.2.18
    - DNS: 10.10.2.10
    - Gateway: 10.10.2.254
    - Domain: EN.LOCAL
2. Disable the unused network interface
3. Install the latest Microsoft software patches and driver updates
4. Disable Windows Automatic Updates

5.3.2 NTP Client 4.1.7.2

Follow the procedures described in Section 5.1.2.

5.3.3 Oracle Database 10g Client

Follow the procedures described in Section 5.2.3.

5.3.4 Oracle 10g Patch Set 10.1.0.3.0

Follow the procedures described in Section 5.2.4.

5.3.5 IEN Workstation Server Software

Version: 1.06

1. Double-click the setup program to launch the installer. Skip to Step 4 if .NET framework v1.1 has already been installed on the system.
2. On the Microsoft .NET Framework "License Agreement" screen, select **I agree** and click **Install**
3. Click **OK** to clear the Microsoft .NET Framework installation is complete message box
4. On the "Welcome" screen, click **Next**
5. On the "License Agreement" screen, select **I accept the terms in the license agreement** and click **Next**

6. On the "Customer Information" screen, enter appropriate user name and organization values and click **Next**
7. On the "Setup Type" screen, select **Workstation** and click **Next**
8. On the "Ready to Install the Program" screen, click **Install**
9. On the "Installation Wizard Complete" screen, enable the **Launch IEN Setting UI** option and click **Finish**
10. On the "IEN Environment Setting" screen, enter the following values and click **Set**:
    - Local Machine Name: IENWS
    - Local Machine ID: 1
    - Name Server Name: IENWS
    - Name Server IP: 10.10.2.18
    - Endpoint IP: 10.10.2.18
    - Description: Test Workstation
    - Corridor Server Name: IENCS
    - Corridor ID: 1
    - Site Server Name: IENCS
    - Site ID: 2
11. Click **OK** to clear the "IEN environment has been successfully set" message box
12. Reboot the system

5.4 APPENDIX D – SAMPLE TCSDATA.CFG FILE

```
 [TCS]

#TCS identity
Corridor ID = 1
Site ID = 2
System ID = 1
SystemName = S2KSimulation

#CDI options
CommandsEnabled = 1
DiagLevel = 1

[Device]

#TCS devices
Intersection = 1-999
Detector = 2201-2208, 2231-2238, 6251-6258
Section = 1-16, 99

#simulated devices
SimIntersection = 142, 162-165, 167, 168, 171, 212, 213, 215-217, 220, 223, 604
SimDetector = 2201-2208
SimSection = 1

[IntersectionRTSummary]

# See IENRTData.idl for testing values
#
# format:
# intersection id =
#    1-SignalControlMode,
#    2-intersectionSignalState,
#    3-controllerResponseState,
#    4-preemptType,
#    5-controllerAlarms,
#    6-mainStreetGreenActive,
#    7-commStat,
#    8-timingPlanIdNumber,
#    9-desiredCycleLength,
#    10-desiredOffset,
#    11-actualOffset,

0 = 5, 2, 2, 2, 0, 1, 2, 2, 60, 15, 10

142 = 2, 2, 2, 3, 2, 1, 2, 2, 90, 15, 20
162 = 5, 2, 4, 3, 16, 1, 20, 4, 54, 1, 20
163 = 5, 2, 2, 2, 0, 0, 3, 12, 80, 30, 25
164 = 5, 2, 4, 2, 1, 1, 2, 2, 60, 15, 10

[IntersectionRTStatus]

# format:
# intersection id =
#    attempts,
#    goodResponses,
#    badResponses,
#    noResponses,
#    cycleCounter,
#    attemptsPeriod,
#    goodRespPeriod,
#    badRespPeriod,
#    noRespPeriod
```

```
# See IENRTData.idl for testing values

0 = 20, 20, 0, 0, 100, 20, 20, 0, 0
142 = 40, 20, 0, 0, 100, 20, 20, 0, 0
162 = 19, 10, 1, 1, 100, 20, 20, 170, 0
163 = 20, 110, 0, 0, 100, 20, 20, 0, 2
164 = 20, 20, 0, 0, 100, 20, 20, 0, 1


[IntersectionPhaseData]

# format:
# intersection id =
#   activePhaseNumber1,
#   activePhaseNumber2,
#   ...
#
# note: phase number should no bigger than 128

0 = 2, 6
142 = 2, 6
162 = 2, 6
163 = 1, 2
164 = 2, 6


[IntersectionPedPhaseData]

# format:
# intersection id =
#   activePhaseNumber1,
#   activePhaseNumber2,
#   ...
#
# note: phase number should no bigger than 128

0 = 2, 6
142 = 8
162 = 2, 6, 8, 10
163 = 1, 4
164 = 2, 6

[IntersectionVehCallData]

# format:
# intersection id =
#   activePhaseNumber1,
#   activePhaseNumber2,
#   ...
#
# note: phase number should no bigger than 128

0 = 2, 6
142 = 2
162 = 2, 11
163 = 1, 6
164 = 2, 9, 11

[IntersectionLastCycleData]

# format:
# intersection id =
#   totalCycleLength
#   phaseNumber1
#   phase1Length
#   phaseNumber2
```

```
#   phase2Length
#   ...
#
# note: phase number should no bigger than 128,
#       phase number and phase length should in pair

0 = 80, 1, 15, 2, 15, 3, 15, 4, 15, 5, 15, 6, 17

142 = 65, 1, 15, 2, 15, 3, 15, 4, 15, 5, 15, 6, 17
162 = 70, 1, 17, 2, 10, 3, 10, 4, 13, 5, 11, 6, 19
163 = 70, 1, 10, 2, 11, 3, 10, 4, 10, 5, 11, 6, 30
164 = 70, 1, 10, 2, 10, 3, 10, 4, 10, 5, 9, 6, 15

[IntersectionTPPhaseData]

# format:
# intersection id =
#   phaseNumber1
#   phase1Length
#   phaseNumber2
#   phase2Length
#   ...
#
# note: phase number should no bigger than 128,
#       phase number and phase length should in pair

0 = 1, 15, 2, 15, 3, 15, 4, 15, 5, 15, 6, 17

142 = 1, 20, 2, 15, 3, 15, 4, 15, 5, 54, 6, 12
162 = 1, 17, 2, 10, 3, 10, 4, 13, 5, 11, 6, 19
163 = 1, 10, 2, 11, 3, 10, 4, 10, 5, 11, 6, 30
164 = 1, 10, 2, 10, 3, 10, 4, 10, 5, 9, 6, 15

[IntersectionInfoData]

# format:
# intersection id =
#   sectionID,
#   commStatPeriod,
#   desc,
#   controllerIDbyte1,
#   controllerIDbyte2,
#   ...

0 = 2, 10, COLORADO BL @ RAYMOND AV, 19, 12
142 = 1, 10, COLORADO BL @ RAYMOND AV, 19, 15
162 = 2, 10, COLORADO BL @ RAYMOND BLVD, 19, 18
163 = 1, 10, COLORADO BL @ RAYMOND AV, 19, 18
164 = 1, 10, COLORADO BL @ RAYMOND AV, 19, 18

[DetectorConfiguration]

# format:
# detector id =
#   detClass,
#   detType,
#   direction,
#   laneNumber,
#   roadwayName

0 = 3, 2, 10, 1, Unknown
2201 = 3, 2, 10, 1, COLORADO BL
2202 = 3, 2, 10, 1, COLORADO BL
2203 = 3, 2, 10, 2, COLORADO BL
2204 = 3, 2, 10, 2, COLORADO BL
2205 = 3, 2, 10, 3, COLORADO BL
```

```
2206 = 3, 2, 10, 3, COLORADO BL
2207 = 3, 2, 10, 4, COLORADO BL
2208 = 3, 2, 10, 4, COLORADO BL

[DetectorStateData]

# format:
# detector id =
#   1=volumeCurrentCycle,
#   2=volumeAverage,
#   3=vPlusKOCurrentCycle,
#   4=vPlusKOAverage,
#   5=status,
#   6=speedCurrentCycle,
#   7=speedAverage,
#   8=occupancyCurrentCycle,
#   9=occupancyAverage

0 = 60, 40, 12, 11, 3, 35, 30, 12, 20
2201 = 120, 660, 1200, 1100, 3, 60, 75, 100, 50
2202 = 11, 24, 17, 11, 3, 45, 20, 25, 30
2203 = 13, 65, 12, 11, 3, 25, 30, 10, 22
2204 = 11, 24, 17, 11, 0, 45, 20, 25, 50
2205 = 13, 65, 12, 11, 3, 25, 30, 10, 22
2206 = 18, 28, 18, 12, 3, 45, 20, 25, 50
2207 = 13, 65, 12, 11, 3, 25, 30, 10, 22
2208 = 11, 24, 17, 11, 3, 45, 20, 25, 50
2228 = 11, 24, 17, 11, 3, 45, 20, 25, 50

[SectionStateData]

# format
# section id =
#   signalControlMode,
#   timingPlanIdNumber

0 = 2, 2
1 = 6, 3
```

5.5 APPENDIX E – SAMPLE SITE SERVER CONFIGURATION FILE

```
# system identification and update interval

[System]

# system ids
CorridorID = 1
SiteID = 2
SystemID = 1
DiagLevel = 0

# system update interval
UpdateInterval = 1
UpdateCycle = 60

# client ping interval
PingInterval = 600

# initial data request list
# format:
# site id = device number list
# site id should start with 1 to IEN_TOTALSITE

[IntersectionInfo]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[IntersectionRTStatus]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[IntersectionRTSummary]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[PhaseStateData]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[PedPhaseStateData]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[VehCallStateData]
```

```
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[LastCyclePhaseData]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[TPPhaseData]
1 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
2 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901
4 = 100, 101, 103-331, 333-335, 501-505, 601-619, 621-629, 700-715, 801-804, 806-807,
900-901

[DetectorInfo]
1 = 2201-2208, 2231-2238, 6251-6258
2 = 2201-2208, 2231-2238, 6251-6258
4 = 2201-2208, 2231-2238, 6251-6258

[DetectorState]
1 = 2201-2208, 2231-2238, 6251-6258
2 = 2201-2208, 2231-2238, 6251-6258
4 = 2201-2208, 2231-2238, 6251-6258

[SectionState]
1 = 1-16, 99
2 = 1-16, 99
4 = 1-16, 99
```