OpenView SDK
User’s Manual
Software Version 1.0

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.
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List of Abbreviations

API application programming interface
NDT nondestructive testing
SDK software development kit
Important Information — Please Read Before Use

OpenView SDK is designed to help create custom applications for nondestructive inspections of industrial and commercial materials.

Instruction Manual

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

IMPORTANT

Some of the details of screen images shown in this manual may differ from the screen images displayed in your software. However, the principles remain the same.

Safety Symbols

The following safety symbols might appear on the instrument and in the instruction manual:

⚠️ General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.
Shock hazard caution symbol

This symbol is used to alert the user to potential electric shock hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety signal words might appear in the documentation of the instrument:

DANGER

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to will result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.

WARNING

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.

CAUTION

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.
Note Signal Words

The following note signal words could appear in the documentation of the instrument:

**IMPORTANT**

The IMPORTANT signal word calls attention to a note that provides information that is important or essential to the completion of a task.

**NOTE**

The NOTE signal word calls attention to an operating procedure, practice, or the like, that requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

**TIP**

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or that provides hints on how to effectively use the capabilities of the product.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the Terms and Conditions available at https://www.olympus-ims.com/en/terms/.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.
This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Evident reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user’s manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page on the Evident Scientific Web site.
OpenView SDK is a software development kit (SDK) that you can use to develop optimized inspection software and workflows:

- It enables you to build customized software user interfaces based on the application and user requirements.
- You can use it to automate your inspection-system workflow.

OpenView SDK is compatible with 64-bit C++ and C# programming environments. It includes a complete sample program with original source code that provides a user-friendly, ready-to-use starting point for creating the most common types of applications (for details, see “Sample Application and Code Snippets” on page 17).

A certain level of knowledge and familiarity with nondestructive testing (NDT) using ultrasound is required to be able to use OpenView SDK. For details on OpenView SDK commands, refer to the help file at the following access path:

[Installation Folder Name]\EvidentNDT\OpenView SDK[Version]\Doc

For more information on nondestructive ultrasonic testing, refer to the following manuals from the Advanced NDT Series collection, available for free as downloadable PDF files at https://www.olympus-ims.com/en/pdf-library/.

- Introduction to Phased Array Ultrasonic Technology Applications
- Advances in Phased Array Ultrasonic Technology Applications
12 Introduction
1. **SDK Integration into a System Workflow**

OpenView SDK is mainly used in conjunction with the FocusData SDK during the steps of an inspection system workflow. The workflow steps are shown in Figure 1-1 on page 13.

**Figure 1-1** The workflow steps

OpenView SDK enables you to build your own software to generate inspection configurations, control the inspection, and modify acoustic parameters. You can also use it to retrieve, process, and store live A-scan and C-scan data.

Several actions are completed by the custom software during the workflow’s steps. The actions are detailed in Table 1 on page 14.
### Table 1 Actions for the workflow

<table>
<thead>
<tr>
<th>Workflow step</th>
<th>Custom software actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>• Import .law file</td>
</tr>
<tr>
<td></td>
<td>• Beam set creation</td>
</tr>
<tr>
<td>Calibration</td>
<td>• Set Beam parameters</td>
</tr>
<tr>
<td></td>
<td>• Set Gate parameters</td>
</tr>
<tr>
<td></td>
<td>• Set TCG parameters</td>
</tr>
<tr>
<td></td>
<td>• Set general UT parameters</td>
</tr>
<tr>
<td>Inspection</td>
<td>• Start inspection</td>
</tr>
<tr>
<td></td>
<td>• Stop inspection</td>
</tr>
<tr>
<td>Analysis</td>
<td>• Build custom data representation</td>
</tr>
</tbody>
</table>
2. Hardware Requirements and Configurations

OpenView SDK is compatible with Windows 7 and later operating system versions.

2.1 Getting Started — Minimum Computer Requirements

The minimum computer requirements for OpenView SDK are as follows:

- CPU: Intel Core i7 or Xeon E3
- RAM memory: 16 GB (DDR3 or better)
- Data storage drive: SSD
- Network adaptor: Gigabit Ethernet card — dedicated to the acquisition instrument (for acquisition). The driver must support a 9k Jumbo Packet. The computer needs a second network adaptor if you want to simultaneously connect it to a local area network and to a data acquisition instrument.
- A keyboard and a pointing device
- One of the following operating systems (64 bit):
  - Microsoft Windows 10
  - Microsoft Windows 8
  - Microsoft Windows 7

2.2 Required Integrated Development Environment (IDE)

OpenView SDK requires the following integrated development environment (IDE): Visual Studio 2015 or later version.
2.3 Configurations

The firewall, instrument connection, and Ethernet minimum speed are automatically configured using the Configuration Tool provided with OpenView SDK. For integration details, see “SDK Integration Requirements” on page 29. For troubleshooting and configuration details, see “Troubleshooting Guide” on page 23, and “Configuring the IP Address” on page 25.
3. Sample Application and Code Snippets

The compiled and ready-to-use sample application (program) for OpenView SDK can be found in the folder at the following access path:

[Installation Folder Name]\Evident NDT\OpenView SDK [Version]\%

This sample application is an ideal starting point for building your own custom applications.

The complete source code of the sample application is available at the above access path, in a subfolder with the name of the sample application, to which is added the name of the language used to program the sample application's code.

The code snippets can be accessed as follows:

- Visual Studio Solution (program):
  C:\EvidentNDT\OpenView SDK\1.0\OpenViewSDK.CodeSnippets.sln
- Projects that are included with the Solution:
  C:\EvidentNDT\OpenView SDK\1.0\CodeSnippets

The SampleApplication.NET.exe program integrates the main OpenView SDK functions into a simple user interface (see examples in Figure 3-1 on page 18 to Figure 3-3 on page 19).
Figure 3-1 The Sample Application SDK main window — example 1

Figure 3-2 The Sample Application SDK main window — example 2
Figure 3-3 The Sample Application SDK main window — example 3
4. Command Organization

OpenView SDK commands are based on a tree structure. The availability of commands depends on the elements to be controlled.

4.1 Conventions

The following conventions are used in the commands:

- Interfaces can be easily identified because their names generally begin with the letter \textit{i}.
- Sets of parameters end with \textit{collections}.

4.2 Units

All values in your settings are expressed in the International System of Units (SI) as follows:

- Time is in nanoseconds.
- Amplitude is in percentage and in decibels (dB).

4.3 Command Structure

The illustration of the entire API command structure is provided through the OpenView SDK installer at the following access path:

\texttt{C:\EvidentNDT\OpenView SDK\1.0\doc}
5. Troubleshooting

This chapter provides OpenView SDK troubleshooting instructions.

5.1 Troubleshooting Guide

Table 2 on page 23 provides a guide for exceptions that may be thrown by OpenView SDK.

<table>
<thead>
<tr>
<th>Exception message</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The user has tried to use an address already used by an application: Port, IP address, Protocol</td>
<td>Close the process using the address. Tip: Use the command “netstat -a -b” to list all processes using an address.</td>
</tr>
<tr>
<td>The network adaptor with IP address is unusable.</td>
<td>Validate the following points:</td>
</tr>
<tr>
<td></td>
<td>• The network adaptor associated with the IP address exists.</td>
</tr>
<tr>
<td></td>
<td>• The network adaptor is not disabled.</td>
</tr>
<tr>
<td></td>
<td>• The Ethernet cable connected to the network adaptor has both end points connected.</td>
</tr>
<tr>
<td>The TCP connection has been closed unexpectedly: Protocol, Remote IP address, Remote Port</td>
<td>Validate the following points:</td>
</tr>
<tr>
<td></td>
<td>• The Ethernet cable(s) linking the PC to the device is/are still connected.</td>
</tr>
<tr>
<td></td>
<td>• The device has not been rebooted.</td>
</tr>
<tr>
<td>The device Serial Number is in an invalid state.</td>
<td>Reboot the device.</td>
</tr>
</tbody>
</table>
The firewall blocks the following transfer: Local Port, Local IP address, Remote IP address, Protocol, Direction. Note: There may be an optional, additional message stating that the rule Rule Name blocks the transfer.

If a rule is mentioned in the message, disable the rule. If nothing is mentioned, reinstall OpenView SDK.

The device Serial Number does not have enough disk space to download the firmware package. Contact Evident.

The buffer holding the acquisition data has overflowed.

Try the following steps:
- Ensure that a thread is constantly calling "IAcquisition::WaitForData" when the object "IAcquisition" is started.
- Reduce the workload of the thread calling "IAcquisition::WaitForData" to a minimum.
- Execute the code with a faster PC.
- Execute the code in the Release configuration.
- Close all applications other than the one using OpenView SDK.
- Lower the data throughput by either lowering the acquisition rate or by using a lighter setup.
- If you are using a switch, validate that it supports Jumbo Packets up to 9014 bytes.
- Try replacing the hardware linking the devices to the PC: Ethernet cable, switch, and PC.
- Reboot the device(s).
- If none of the above resolves the error, contact Evident.

Table 2 Troubleshooting guide (continued)

<table>
<thead>
<tr>
<th>Exception message</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firewall blocks the following transfer: Local Port, Local IP address, Remote IP address, Protocol, Direction. Note: There may be an optional, additional message stating that the rule Rule Name blocks the transfer.</td>
<td>If a rule is mentioned in the message, disable the rule. If nothing is mentioned, reinstall OpenView SDK.</td>
</tr>
<tr>
<td>The device Serial Number does not have enough disk space to download the firmware package.</td>
<td>Contact Evident.</td>
</tr>
<tr>
<td>The buffer holding the acquisition data has overflowed.</td>
<td>Try the following steps:</td>
</tr>
<tr>
<td></td>
<td>- Ensure that a thread is constantly calling &quot;IAcquisition::WaitForData&quot; when the object &quot;IAcquisition&quot; is started.</td>
</tr>
<tr>
<td></td>
<td>- Reduce the workload of the thread calling &quot;IAcquisition::WaitForData&quot; to a minimum.</td>
</tr>
<tr>
<td></td>
<td>- Execute the code with a faster PC.</td>
</tr>
<tr>
<td></td>
<td>- Execute the code in the Release configuration.</td>
</tr>
<tr>
<td></td>
<td>- Close all applications other than the one using OpenView SDK.</td>
</tr>
<tr>
<td></td>
<td>- Lower the data throughput by either lowering the acquisition rate or by using a lighter setup.</td>
</tr>
<tr>
<td></td>
<td>- If you are using a switch, validate that it supports Jumbo Packets up to 9014 bytes.</td>
</tr>
<tr>
<td></td>
<td>- Try replacing the hardware linking the devices to the PC: Ethernet cable, switch, and PC.</td>
</tr>
<tr>
<td></td>
<td>- Reboot the device(s).</td>
</tr>
<tr>
<td></td>
<td>- If none of the above resolves the error, contact Evident.</td>
</tr>
</tbody>
</table>
5.2 Configuring the IP Address

This section provides instructions for configuring the IP address on the FOCUS PX.

To configure the IP address

1. Close your API software application before starting the IP address configuration.
2. Open the Configuration Tool in administrator mode:
   ◆ On the desktop, right-click the Configuration Tool icon, and then click Run as administrator > Yes (see Figure 5-1 on page 26).

Table 2 Troubleshooting guide (continued)

<table>
<thead>
<tr>
<th>Exception message</th>
<th>Solution</th>
</tr>
</thead>
</table>
| The configuration of the network adaptor with IP address is invalid. | Use the connectivity Configuration Tool to set up the network adaptor with the following parameters:  
- Set the IP address as detailed in Table 3 on page 27. For Configuration Tool instructions, see “Configuring the IP Address” on page 25.  
- The subnet mask must be 255.255.0.0.  
- The Jumbo Packet must be set to 9014 bytes. |
3. Click **Configure Network Card** (see Figure 5-2 on page 26).

4. In the **Network configuration** dialog box, select the network card that is used for FOCUS PX communication (see Figure 5-3 on page 27).
5. Type the value of the IP address that you want to use. See Table 3 on page 27 for the available IP addresses.

6. Click **Configure**.

7. Click **OK > Apply**.

### Table 3 Available IP addresses

<table>
<thead>
<tr>
<th>Address block</th>
<th>Range</th>
<th>Scope</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0.0.0/8</td>
<td>10.0.0.0 – 10.255.255</td>
<td>Private network</td>
<td>Used for local communications within a private network.</td>
</tr>
<tr>
<td>172.16.0.0/12</td>
<td>172.16.0.0 – 172.31.255.255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>192.168.0.0/16</td>
<td>192.168.0.0 – 192.168.255.255</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5-3 Selecting the network card to configure
Appendix: SDK Integration Requirements

This appendix contains the requirements and recommended practices for integrating OpenView SDK into your software.

A.1 Required Firewall Rules

Table 4 on page 29 lists all ports that must be enabled during the installation of your software, along with the executable commands that add firewall rules for the ports.

<table>
<thead>
<tr>
<th>Port</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=in action=allow protocol=TCP localport=21</td>
</tr>
<tr>
<td>67</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=in action=allow protocol=UDP localport=67</td>
</tr>
<tr>
<td>68</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=out action=allow protocol=UDP remoteport=68</td>
</tr>
<tr>
<td>9994</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=out action=allow protocol=UDP remoteport=9994,10994,12000,27015</td>
</tr>
<tr>
<td>10994</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=out action=allow protocol=TCP remoteport=9994,10994,12000,27015</td>
</tr>
<tr>
<td>12000</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=out action=allow protocol=TCP remoteport=9994,10994,12000,27015</td>
</tr>
<tr>
<td>27015</td>
<td>netsh advfirewall firewall add rule name=&quot;Evident OpenView SDK&quot; dir=out action=allow protocol=TCP remoteport=9994,10994,12000,27015</td>
</tr>
</tbody>
</table>
A.2 Installers and Keys for OpenView SDK

The two available installers for OpenView SDK are described in Table 5 on page 30. Software integrators must incorporate the end user’s installer into their own installer.

Table 5 Installers

<table>
<thead>
<tr>
<th>Installer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>InstallOpenViewSDK-1.0RXXX.exe</td>
<td>To be installed on the programmer’s computer. Includes libraries, documentation and code snippets. This installs in C:\EvidentNDT.</td>
</tr>
<tr>
<td>InstallOpenView-1.0RXXX.exe</td>
<td>To be installed on the end user’s computer. Includes libraries only. This installs in C:\Program Files.</td>
</tr>
</tbody>
</table>

To locate and access the libraries at runtime, a key is required. The key values are automatically configured by the installers (see Table 6 on page 30).

Table 6 Keys

<table>
<thead>
<tr>
<th>Installer</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>InstallOpenViewSDK-1.0RXXX.exe</td>
<td>HKEY_LOCAL_MACHINE\SOFTWARE\EvidentNDT\OpenViewSDK\1.0\VersionPath</td>
</tr>
<tr>
<td>InstallOpenView-1.0RXXX.exe</td>
<td>HKEY_LOCAL_MACHINE\SOFTWARE\EvidentNDT\OpenView\1.0\VersionPath</td>
</tr>
</tbody>
</table>

A.3 Firmware Package

The software development kit (OpenView SDK) and FOCUS PX firmware package used by FOCUS PX instruments are bundled together. The OpenView SDK installer embeds the FOCUS PX firmware so that at start-up, the firmware package is sent to the FOCUS PX. Because OpenView SDK always requires the firmware package that is used on the computer, the application code should search for the latest installed version of firmware.

The following sample code is an example of good programming practice:

```c++
// Select the latest version of firmware packages.
shared_ptr<IFirmwarePackage> package;
auto packages = IFirmwarePackageScanner::GetFirmwarePackageCollection();
```
if (!packages.empty() )
package = packages->GetFirmwarePackage(0);

if (package == nullptr)
    throw std::exception("Could not find the firmware package.");

// Start the package on the device.
if (!device->HasPackage(package))
    device->Download(package);

device->Start(package);

A.4 Configuration Tool

The Configuration Tool is installed by the end user’s installer. The root directory is in
the same location as the content of the registry key (see Table 6 on page 30). The
“Tools” folders must be added to this root directory.

It is recommended that you add a link in your software to call up the Configuration
Tool. The link should show, for example, a blue and yellow shield icon

![Configure Network](image) to indicate that administrative rights may be required.
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