



IX-API SDK 3.0 Release Notes

for the Windows NT® operating system



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SDK 3.0 Release Information

This document describes features and behavior of the 3.0 release of the Intel® IX-API SDK, and is a supplement to the Intel documents *Developing Applications Using the IX-API SDK* and the *IX-API SDK Reference*.



NOTE: This release supports *only* the Windows NT® operating system. System requirements are provided with the installation instructions in the document *Installing the IX-API SDK*.

This document contains the following sections:

- “Product Name Changes” on page 1
- “New Features in This Release” on page 2
- “Changes in This Release” on page 5
- “Known Limitations of SDK 3.0” on page 6
- “Reported Incidents Fixed in This Release” on page 9
- “Porting Applications from Previous Releases” on page 9
- “Documentation for This Release” on page 10

Product Name Changes

The following product names have changed for this release:

- Policy Accelerator 100 is the new name for the Policy Engine
- IX-API SDK is the new name for the software developer’s kit for the Policy Accelerator 100

Documents and software have been updated to reflect these changes and related changes in terminology. For example, the *PE module* of a *PolicyWare application* is now known as the *accelerator module* of an *IX application*.

New Features in This Release

This release includes new features in the following areas:

- “ODX NIC Interface” on page 2
- “New NCL Constructs” on page 2
- “Diagnostic Utility” on page 3
- “New Demos” on page 3

ODX NIC Interface

For Windows NT, this release supports a direct interface between the Policy Accelerator board and a standard network interface card (NIC) through the PCI bus. To establish this interface, you must customize your NIC driver using the Optimal Data Exchange (ODX) Protocol. The Policy Accelerator and NIC then use the ODX protocol to pass packets back and forth through the PCI bus.

For information on how to customize a NIC driver using the ODX protocol, see *Customizing a NIC Driver Using the ODX Protocol*. A diagnostic utility for testing the NIC interface when you have completed the customization is available as part of the SDK installation at the following location:

`SDKinstallpath/diagnostics/odxloop`

After you have customized the driver, the NIC interface is available as interface C to the Policy Accelerator. Interface C behaves exactly like the built-in interfaces A and B on the Policy Accelerator boards. You can bind targets to it using the name `nbhwpenC`, where *n* is the number identifying the board. In this release, you can define a C interface for only one Policy Accelerator, `nbhwpe0`.

A usage demonstration application is included in the following location:

`SDKinstallpath/demo/ODXFilter`

For more information on binding and system ACE names, see *Developing Applications Using the IX-API SDK* and the *IX-API SDK Reference*.

New NCL Constructs

This release supports two new constructs in Network Classification Language (NCL):

- You can now specify conditional execution of classification rules. The new keyword `with` introduces a conditional clause, using the following syntax:

```
with boolean_exp {
  predicate pred_name { boolean_exp }
  rule rule_name { predicate } { action_ref }}
```

- You can now extend previously defined protocols by providing additional declarations for new fields outside the protocol definitions. Use the following syntax at the top level of the NCL file to add a field to an existing protocol definition:

```
protocol_name.field_name {definition }
```

For more information on these features, see Chapter 7, “Network Classification Language,” in the *IX-API SDK Reference*.

Diagnostic Utility

A new diagnostic utility, `pal00diag`, is available as part of the IX-API SDK installation at the following location:

```
SDKinstallpath/diagnostics/pal00diag
```

This tool allows you to test the installation of your Policy Accelerator 100. For more information, see Chapter 8, “Command-Line Tools,” in the *IX-API SDK Reference*, and Chapter 2, “Troubleshooting the Policy Accelerator,” in *Installing the IX-API SDK*.

New Demos

There are several new sample applications provided in the directory `SDKinstallpath/demos`. Both the new and existing sample applications are now operating-system-independent, and all applications now include Microsoft Visual C++ 6.0 project files (`.dsp` and `.dsw` files).

The following table briefly describes the techniques and concepts demonstrated by each of the sample applications.

Sample Application	Description
BasicApp	Shows how to construct the basic components of any application. Creates a single ACE that counts packets and uses an upcall to report the number of packets observed.
CountApp	Provides the source code used in the tutorial in <i>Developing Applications Using the IX-API SDK</i> . Simply counts packets and demonstrates the basics of creating applications.
Crosscall	Shows how to communicate between ACEs using crosscalls.
FilterApp	Shows how to construct a simple MAC address packet filter. An extension of BasicApp, in which only packets with a specific MAC destination address are forwarded. The ACE accepts packets from one MAC interface and forwards those that pass the filter criteria to the other MAC interface.

Sample Application	Description
ODXFilter	Shows how to transfer packets to and from a NIC whose driver has been customized using the Optimal Data Exchange (ODX) Protocol. Extends FilterApp to filter packets according to protocol before sending them to the NIC or dropping them.
FilterNic	Shows how to emulate a network interface card (NIC) in software. Each of the two ACEs accepts packets from one of the MAC interfaces, filters them, and sends those that pass the filter criteria to the host.
EventAppl	Shows how to use the <code>Event</code> class to schedule an activity that is not associated with data sets. This technique is far more efficient than using set element expiration for scheduling.
Firewall	Shows how to construct a real firewall application that determines which packets should be allowed into and out of the local area network, based on criteria that a user can set.
IPPairs	Shows how to use sets and searches to maintain a database about packet traffic. The application maintains a set of source–destination address pairs for IP packets that it has seen recently, and counts additional packets that match any known pair.
Killer	Shows how to construct an application that starts and stops the Resolver automatically. Only one such application can run on a Policy Accelerator at one time.
LoopApp	Shows how to construct a test to ensure that the IX-API SDK operating environment is configured correctly.
Simple	Shows how to use rules to classify packets of different types or with specific source or destination addresses.
StringSearch	Shows how to search for a string in packet data.
Tap	Shows how to construct a tap, in which the ACE “sniffs” a connection, looking at packets as they go by without redirecting them. In this case, the ACE keeps statistics about the packet flow.
TwoAceApp	Shows how to create and use an application with multiple ACEs. Extends BasicApp by making two separate ACEs in the same application that keep different counts.

Changes in This Release

In this release, the following features have changed or been eliminated:

Plumber and Factories Are No Longer Supported

The Plumber management application is no longer supported. Factories, which supported the Plumber, have been removed. The following changes in the host API remove Plumber-related complexities:

- The classes `NBFactory` and `NBPlumber` are no longer supported.
- In the `AceGroup` class constructor, you must pass `NULL` for the `argNBFactory` argument. Do not use the optional fourth argument, `list`.
- The `AceGroup` methods `getFactory` and `getFactoryID` have been removed.
- The `AceManager` method `export` has been removed.
- In the `NBApp1` constructor, the optional second and third arguments, `workingDirectory` and `cmdLine`, are no longer used.
- The Plumber-related methods of the base class `NBObject` have been removed. Only `getID` and `getType` remain.
- The `TargetManager` method `export` has been removed.

The sample applications in the `demo` directory have been updated to remove factories and related definitions.



NOTE: In this release, to ease porting, stubs remain for all of the removed functions and arguments, and existing code should run. In future releases, code that contains these references will break.

Microsoft Visual C++ 6.0 Project Is Required

The process for building applications on Windows NT has changed. In this release, you specify build and compilation information using the Microsoft Visual C++ 6.0 Project Setting dialog box, rather than in an exported makefile to be run on the command line. This enables you to build applications easily and interactively using Microsoft Visual C++ 6.0.

For details, see “Porting Applications from Previous Releases” on page 9.

System ACE NBSysApp Alias Is No Longer Supported

When specifying system ACE names for bindings, the use of `NBSysApp1` as an alias for the Policy Accelerator is no longer supported. Change all references to this alias to `nbhwpe0`. If an application attempts to create a binding using the alias, execution immediately terminates.

**Integer Type
Casting Is No
Longer
Automatic**

When you pass an integer of type `nuint16` where an integer of type `nuint32` is expected, previous releases would cast the type automatically. This is no longer the case. In this release, you must explicitly cast the type `nuint16` to the type `nuint32`. If you do not, the compiler reports an error.

Known Limitations of SDK 3.0

This section describes known problems or limitations in this IX-API SDK release.

**General
Limitations**

Only Static Libraries Are Available

This release contains only the static versions of the IX-API system libraries.

Multiple Policy Accelerators Are Not Supported

This release does not fully support the use of multiple Policy Accelerators installed in a single computer.

Number of Concurrent ACEs

No more than four ACEs can run on a Policy Accelerator. If an application attempts to load more than four ACEs, the system stops.

MAC Interface Always in Promiscuous Mode

You cannot control the configuration of the promiscuous/nonpromiscuous mode of the MAC interface through the driver set-up dialog box. The MAC interface is always set to promiscuous. Check the Intel Web site for an example of how to provide equivalent filtering functionality with an application.

Stopping and Starting Applications

If you stop an application, Intel recommends that you stop and restart the Resolver before restarting the application or starting additional applications.

Stopping the Resolver

You must stop all running applications before stopping the Resolver. If you do not, unresolved references can cause unpredictable system behavior.

Stopping and Starting the PA100 Drivers

In accordance with the Windows NT NDIS driver standards, some parts of the driver software cannot be stopped and restarted while the system is operating. Therefore, to stop and restart the PA100 drivers, you must reboot the system.

NCL and ASL Libraries

NCL Code Size Limitations

NCL code size is currently limited to 1024 instructions. If the Resolver detects NCL object code that is too large after compilation, it rejects the load.

Set Restrictions

Set searches for longwords match only longword-aligned keys. For example, searches on ARP source/target protocol addresses will not match correctly, because the source address is not on a 32-bit packet boundary.

NCL Syntax Errors

When you run an application that has syntax errors in its NCL file, the Resolver displays the appropriate error messages and terminates.

Static Initialization Fails in Action Code

If you declare a static variable within an action code file, then attempt to initialize it statically to anything other than 0, the initialization is not executed and can result in a runtime error. To initialize a global variable to anything other than 0, perform the initialization as part of the `init_actions()` function. The use of static globals is not recommended.

Compiler Warnings

When compiling with Microsoft level 4 warnings, the following warnings can occur:

```
c:\ixsdk\include\nbapi\upcall.h(33) : warning C4121:
'UpcallHandler' : alignment of a member was sensitive to packing

c:\ixsdk\include\nbapi\nbfactory.h(27) : warning C4121:
'NBFactory' : alignment of a member was sensitive to packing
```

These warnings are not associated with any known problems.

**Action Code
Debugger
(nbgdb)****Serial Port Connection Problem**

Occasionally `getaceid` or `nbgdb` can fail to connect to the serial port. When this happens, the command (`getaceid`, or within `nbgdb`, `target remote /dev/tty00`) fails to return.

As a workaround, take the following steps:

1. Modify the file `/etc/remote`, changing the default baud rate for `ttty00` to 57600.
2. Reset the port by connecting and disconnecting manually. For example, if you are using `ttty00` (the first serial port), type the following at the shell prompt:

```
> tip ttty00
> ~.
```

After making these changes, the commands connect properly, although the connection takes 80 seconds.

nbgdb Does Not Support More Than One ACE Sharing Action Code

If an application has more than one ACE with the same action code, the workaround is to duplicate the action code and change the global symbol names to associate with different ACEs.

Delete Breakpoints Before Detaching the Process

You must delete breakpoints before detaching the current process, or unexpected behavior will occur.

Use a Local Variable to Bypass Casting Bug in gdb

If a variable `varA` (a pointer) is cast to a class or more complex type (`typeT*`), `gdb` does not reflect its value correctly. As a workaround, define a local variable of the complex type (`typeT* varB`), and assign `varB = varA`. Use `varB` in `nbgdb` whenever you need to use `varA`.

**ODX NIC
Interface****Directly Connected NICs**

In testing, Intel has found that when two Windows NT systems with Policy Accelerators and Intel® Pro/1000 NICs were connected directly together NIC-to-NIC, packets were not transferred reliably between the systems. When the systems are connected through a switch (as in normal practice) this problem does not occur.

Monitoring Features Not Supported for Interface C

This release does not support the interface property access functions (`NBInterfaceProp` class and `NBLinkwatch` class), nor does it support remote monitoring (`NBRmon` class), for interface C. (Interface C is available only if you have customized a NIC driver to communicate with the Policy Accelerator.)

Reported Incidents Fixed in This Release

- Incident #270: The NCL set size hint is no longer limited to 100 kilobytes (Kbyte). However, sets are not optimized for any size larger than 64 Kbyte.
- Incident #271: Constants are now computed at build time.
- Incident #584: Added `cecomp` option to specify include path.
- Incident #597: Resolver now boots the Policy Accelerator system software (avoiding `nb_init`).
- Incident #656: The `getaceid` command now works consistently, allowing the debugger to be used.

Porting Applications from Previous Releases

Porting from the SDK 2.0 Release

If you have applications working with SDK 2.0, they will work with the SDK 3.0 release on a Windows NT system with the following changes:

- The use of `NBSystemAppl` as an alias for `nbhwpe0` in bindings is no longer supported. Change all references to this alias to `nbhwpe0`.
- The Plumber and related API classes (such as `NBFactory`) are no longer supported. In this release, to ease porting, stubs remain for all of the removed functions and arguments, and existing code should run. In future releases, code that contains these references will break. You should remove all such references.
- The Windows NT-specific types `DWORD` and `PCHAR` are defined by the IX-API SDK system as the standard types `unsigned long` and `char *`, so existing code is OS-independent. However, it is recommended that you use the standard types in your applications.
- If your existing application is not already a Microsoft Visual C++ 6.0 project, you must create such a project for this release. You must specify build and compilation information in the project, rather than in an exported makefile.

To obtain the proper project settings, refer to the project files for the sample applications in *SDKinstallpath/demos*. Note the settings in the following sections of the Project Setting dialog box:

- C/C++ and Link tabs, Project Options
- Custom Build tab, Commands

The options and commands are slightly different for the release and debug versions of the applications. You must replace filenames and paths as appropriate for your application.



NOTE: To configure Microsoft Visual C++ 6.0 for use with the IX-API SDK, choose Options from the Tools menu, then, in the Options dialog box Directories tab, add the following pathname:

SDKInstallPath/include

You need to set this configuration only once. It is not necessary to do so for each project.

Documentation for This Release

This release includes new documents and updates to existing documents to improve completeness, provide more examples, and cover new features.

Installation Instructions

The installation instructions for the IX-API SDK software have been removed from the Release Notes and are now in their own document, *Installing the IX-API SDK*.

Documents Formats

Most documents are available in standard HTML, viewable from any recent browser; in PDF files, viewable using Adobe Acrobat Reader; and in HTML Help files for Internet Explorer.

New Documents

The following documents are new for this release:

- *Customizing a NIC Driver Using the ODX Protocol*

Documents Updated

All of the product documentation has been updated with expanded information and new material for the SDK 3.0 release:

- *Installing the IX-API SDK*
- *Installing a Policy Accelerator 100 Board*
- *Developing Applications Using the IX-API SDK*
- *IX-API SDK Reference*

- Location** Documentation is located in *SDKInstallPath/documentation*. The file *index.html* contains links to all of the documents in all of the available formats.
- Errata** In *Developing Applications Using the IX-API SDK*, the “Tutorial” chapter and the “Compiling Applications” chapter state that you can compile and link applications directly from the command line. In this release, you must use Microsoft Visual Studio. Similarly, the makefile information in the “Demonstration Application” appendix is out of date. The demos now include Visual Studio project files that you use to build the applications.

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