Oracle® Communications Network Integrity

IP Network Links Assimilation and Reconciliation Cartridge Guide

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Oracle Communications Network Integrity IP Network Links Assimilation and Reconciliation Cartridge Guide, Release 7.5

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Preface

This guide describes the functionality and design of the Oracle Communications IP Assimilation cartridge. This guide is intended for Network Integrity administrators who want to understand the design and evaluate the functionality of this cartridge, and for Network Integrity developers who want either to build or to extend similar cartridges.

Audience

This guide is intended for Network Integrity administrators who want to understand the design and evaluate the functionality of this cartridge, and for Network Integrity developers who want to either build or extend similar cartridges.

Developers should have a good working knowledge of UIM operations, specifications, Network Integrity, UIM, and the use of Oracle Communications Design Studio for Network Integrity.

You should be familiar with the following documents included with this release:

- *Oracle Communications Network Integrity Concepts*
- *Oracle Communications Network Integrity Developer's Guide*
- *Oracle Communications Network Integrity MIB-II SNMP Cartridge Guide*
- *Oracle Communications Network Integrity UIM Integration Cartridge Guide*

This guide assumes that you are familiar with the following concepts and technologies:

- Internet Protocol (IP) domain standards and terminology.
- Development and extensibility of Network Integrity cartridge.

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Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

1
Overview

This chapter provides an overview of the Oracle Communications Network Integrity IP Assimilation cartridge.

This chapter contains the following sections:

About the IP Assimilation Cartridge

The IP Assimilation cartridge supports the modeling of IP links. It accepts the results of the MIB-II SNMP discovery scan as input and discovers links among the devices present in the result group of the input.

The IP Assimilation cartridge includes the following types of actions:

- **Import:** Retrieves IP connectivities and models them in Oracle Communications Information Model.
- **Discrepancy Detection:** Compares data imported from UIM with the discovered IP links and reports discrepancies.
- **Discrepancy Resolution:** Resolves discrepancies on connectivities in UIM.

About Cartridge Dependencies

This section provides information about the dependencies that the IP Assimilation Cartridge has on other entities.

Run-Time Dependencies

For the IP Assimilation cartridge to work at run time, you must:

- Deploy the Address_Handlers, UIM Integration and MIB-II SNMP cartridges to Network Integrity.
- Install UIM and make it accessible to Network Integrity.

The following components must be deployed to UIM:

- ora_ni_uim_assimilation
- UIM Integration Web Service

Design-Time Dependencies

The IP Assimilation cartridge has the following dependencies:

- Generic_Assimilation_Model
- NetworkIntegritySDK
- ora_uim_model
- UIM_Integration_Cartridge

See "Working with the UIM Sample Web Service" in *Network Integrity UIM Integration Cartridge Guide* for information about the operation of the web service and its dependencies.

Opening the Cartridge Files in Design Studio

To review and extend the IP Assimilation Cartridge, you must download the Oracle Communications IP Assimilation Cartridge software from the Oracle software delivery website:

https://edelivery.oracle.com

The software contains the IP Assimilation Cartridge ZIP file, which has the following structure:

- **\UIM_Cartridge_Projects**
- **\Network_Integrity_Cartridge_Projects**

See *SCD Modeling Network Integrity* in and *Network Integrity Developer's Guide* for information about opening files in Design Studio.

Building and Deploying the Cartridge

See *SCD Modeling Network Integrity* for information about building and deploying cartridges.

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About the Cartridge Components

This chapter provides information about the components of the Oracle Communications Network Integrity IP Assimilation Cartridge.

The IP Assimilation Cartridge contains the following actions:

- Assimilate IP Links
- Import IP Links from UIM
- Detect IP Links Discrepancies
- Resolve IP Links Discrepancies

Assimilate IP Links

Assimilate IP Links action reads the results of discovery scans and creates links between the discovered devices.

Assimilation is based on the characteristics of discovered devices, as given below:

- **Device Interface Configuration Item:** IP Address, IP Version and Subnet Mask values are considered to create links between device interfaces. Device interfaces are identified using the following characteristics: **ipAddress**, **ipVersion** (with value IPv4) and **prefix** (with subnet mask values 255.255.255.252 or 255.255.255.254).

  > **Note:**
  >
  > Assimilation is only supposerted for device interfaces with **ipVersion** value as IPv4.

- **Device Interface Characteristics:** Device Interface characteristics name, nativeEMSName, specification name, mgmtIPAddress, description, ifSpeed and highSpeed are considered in modeling pipes and pipe termination points.

If a link is discovered on a media interface, then a flow interface is created and assigned to the media interface upon reconciliation and the connectivity is closed on the flow interface. If a link is discovered on an interface with ifType "l2vlan", then a flow interface is created and assigned to parent interface of l2vlan, and connectivity is closed on the flow interface.

The format of a topological link name is *A side Logical Device*-*A side device interface*!*Z side Logical Device*-*Z side device interface*. This name is used as a connectivity identifier and is stored as a characteristic (tlName) in UIM.

The format of a Port Termination Point name is *Parent Device Interface*:*Device Interface*, and it is used to identify interfaces on UIM.

Pipes and Pipe Termination Points are created based on the collected characteristics from device interfaces.

This action contains the following processors run in the following order:

1. IP Links Collector Processor
2. IP Links Pipe Modeler Processor

IP Links Collector Processor

The IP Links Collector collects characteristics required to model Pipes and Pipe Termination Points. Device interfaces with defined device interface configuration items are analyzed to collect required parameters.

IPDeviceInterface entity is used to store required parameters to create links. The output of this processor is a Map with the IP Address value as key and IPDeviceInterface entity as value.

IP Links Pipe Modeler Processor

The IP Links Pipe Modeler models Pipes and Pipe Termination Points. This processor calculates the IP Address of a 'Z' device interface based on the IP address of the 'A' device interface. If a device interface with the calculated IP address exists, then a link (pipes and pipe termination points) is created between the two device interfaces.

An Inventory Group entity is created for the device and all the links discovered on the device are assigned as members to it. All the created Inventory Groups are then added to the result category IPLinks.

Import IP Links from UIM

The Import IP Links from UIM action imports a connectivity from UIM and transforms it to a Network Integrity connectivity. This action contains the following processors run in the following order:

1. Import IP Links Initializer Processor
2. IP Logical Device Finder Processor
3. IP Multithread Links Importer Processor

Import IP Links Initializer Processor

The Import IP Links Initializer processor provides the following variables as output:

- **filters:** Items of type DeviceFilter with default values populated.
- **uimImportContext:** Items of type UIMImportContext which contains a context used by multiple processors.

IP Logical Device Finder Processor

The IP Logical Device Finder processor uses the **filters** and **uimImportContext** variables as input parameters to perform one or more logical device find operations through the UIM web service API. This processor provides the following variables as output:

- **logicalDeviceIdNameMap:** Items of type Map with device ID as key and device name as value.
- **uimImportContext:** Items of type UIMImportContext which contains a context used by multiple processors.
- **uimLogicalDeviceIDs:** Items of type Set.

IP Multithread Links Importer Processor

The IP Multithread Links Imported Processor uses the **logicalDeviceIdNameMap**, **uimImportContext** and **uimLogicalDeviceIDs**. It collects the connectivities of the logical devices and transforms UIM connectivities to Network Integrity connectivities. Inventory groups for devices are created and added to the IPLinks result category, and links are added as members.

Scan Parameter Group

The Import IP Links from UIM action contains the scan parameter group IP Links Import parameters.

Table 2-1 lists the scan parameters that are available during scan creation:

Table 2-1 IP Links Import parameters

Parameter	Default Value	Mandatory	Description
deviceName	N/A	No	Import Devices with the names provided in this input field.
deviceNameFile	N/A	No	Import Devices with the names in the file path provided in this input field.
logicalDeviceSpecification	N/A	No	Import Devices with the specification provided in this input field.

Detect IP Links Discrepancies

The Detect IP Links Discrepancies action is used to detect discrepancies between IP Links discovered and IP Links imported from UIM.

The Detect IP Links Discrepancies action contains two processors:

1. IPLinksDDFiltersInitializer Processor
2. Discrepancy Detection (inherited)

IPLinksDDFiltersInitializer Processor

This processor implements the following filters:

- Ignores case sensitivity for entity relationship for port termination point.
- On a pipe, ignores the ID, physical location, description, partial, nativeEMSName and layerRate attributes.
- On a pipe termination point, ignores highSpeed, ifSpeed, ipAddress, description and rate attributes.
- Ignores partial containers.
- Ignores the attributes connectivityType, description, aDeviceSpecName and zDeviceSpecName on a pipe termination point of type ethTopologicalLink.

Resolve IP Links Discrepancies

Resolve IP Links Discrepancies is a Discrepancy Resolution Action, used to resolve discrepancies between IP links discovered and imported links from UIM.

This discrepancy resolution action extends the Abstract Resolve in UIM action (from the UIM Integration cartridge) and inherits all its processors. For information about the inherited processors, see *Network Integrity Developer's Guide*.

The Resolve IP Links Discrepancies into UIM action contains the following processors run in the following order:

1. UIM Resolution Framework Initializer (inherited)
2. UIM Resolution Initializer (inherited)
3. IP Links Resolution Initializer
4. UIM Resolution Framework Dispatcher (inherited)

IP Links Resolution Initializer

This processor registers the following handlers required for Connectivities and Service resolution:

- PipeHandler
- PipeTerminationPointHandler

Supported Creation Scenarios in UIM

This section describes the creation of a link (for INNI connectivity specifications) which is supported in UIM.

> **Note:**
>
> If devices are not already created in UIM, the **Entity+** discrepancies would be in **Ignored** state since they are created for a container. Once the devices are created in UIM and imported into Network Integrity, the discovery scan should be run again so that **Entity+** discrepancies can be resolved.

Creation of a Link

When a link (of type INNI connectivity specification) is discovered, and it does not exist in UIM, Network Integrity displays an **Entity+** discrepancy for the topological link. Discrepancy resolution creates the INNI connectivity, and the link is associated with the device.

Deletion of a Link
When a link exists in UIM but is not discovered, Network Integrity displays an **Entity-** discrepancy. If the link has only one design version and is in **In Progress** state, the link is deleted during the resolution of the **Entity-** discrepancy.

> **Note:**
>
> If multiple resolution requests sharing a common logical device are sent to UIM at the same time, it is possible that UIM may fail some of the requests with the **OptimisiticLockException** error. This can resolved by adding the **uim.inverserel.update.disable**=*true* property inside the **system-config.properties** file in UIM. For more information about this file, see "Setting System Properties" in *UIM System Administrator's Guide*.

Mismatched Data Scenarios

When a link in UIM has data that does not match the discovered data, Network Integrity displays a **Mismatch** discrepancy. Resolution of this discrepancy updates the mismatched link data attribute in UIM and sets the value in UIM to the discovered value.

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Using the Cartridge

This chapter provides instructions for using the Oracle Communications Network Integrity IP Assimilation Cartridge in Network Integrity.

Discovering Links Between Devices

The Assimilate IP Links scan is used to discover links between devices provided in the scope of the scan.

To create an Assimilate IP Links scan:

1. Create a new scan.

   For more information, see *Network Integrity Online Help*.
2. On the General tab, do the following:
   a. From the Scan Action list, select **Assimilate IP Links**. The Scan Type field displays *Assimilation*.
   b. On the Scope tab, select **MIB-II SNMP** discovery scan of devices which discovers and passes the information to the assimilate scan to discover links.
3. Save and run the scan.

Importing IP Links from UIM

The Import IP Links scan is used to import connectivities from UIM.

To create an Import IP Links scan:

1. Create a new scan.

   For more information, see *Network Integrity Online Help*
2. On the General tab, do the following:
   a. From the Scan Action list, select **Import IP Links from UIM**.

      The Scan Type field displays *Import*.
   b. In the Scan Action Parameters section, **IP Links Import Parameters** is selected by default. Fill the required parameters of the logical device if needed.
3. Save and run the scan.

> **Note:**
>
> In the initial import scan before reconciliation of IP links, empty inventory groups will be created on Network Integrity as result for the logic devices found on UIM. The import scan should be run at least once before reconciling the IP links.

Populating UIM with Discovered IP Connectivities

This procedure describes steps to populate UIM with data discovered by the Assimilate IP Links action.

> **Note:**
>
> It is assumed here that the devices passed as input to assimilation scan are reconciled to UIM before reconciling IP Links between those devices. This can be done using actions provided in MIB-II UIM cartridge. It is necessary to reconcile the devices discovered in the MIB-II SNMP scan and assign property location to them on UIM.

To populate UIM with discovered data:

1. Create a new scan.

   For more information, see *Network Integrity Online Help*.
2. On the General tab, do the following:
   a. From the Scan Action list, select **Assimilate IP Links**. The Scan Type field displays Assimilation.
   b. Select **Detect Discrepancies**.
3. On the Scope tab, select the **MIB-II SNMP** discovery scan for the devices which need to be passed as input to assimilate scan to discover links.
4. Save and run the scan.
5. Reconcile the discovery scan devices provided as input to Assimilation scan. For more information, see *Network Integrity MIB-II UIM Cartridge Guide*.
6. Assign property locations to devices on UIM.
7. Create a new scan.
8. On the General tab, do the following:
   a. From the Scan Action list, select **Import IP Links from UIM**.

      The Scan Type field displays *Import*.
   b. In the Scan Action Parameters section, **IP Links Import Parameters** is selected by default. Fill the required parameters of the logical device if needed.
9. Save and run the scan. The logical devices should be present as part of the scan result.
10. Rerun the **MIB-II SNMP** discovery scan.

    The scan generates **Entity+** discrepancies for each discovered device.
11. Right-click on the discrepancies you want to populate into UIM and select **Correct IP Links in UIM**.
12. Click **Submit**.
13. Verify that UIM is populated with the discovered data.

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About Cartridge Modeling

This chapter provides information on modeling the Oracle Communications Network Integrity IP Assimilation Cartridge.

Model Used to Discover Links

The Network Integrity IP Assimilation Cartridge models the collected data according to the Oracle Communications Information Model. The collected data is modeled into the following entities:

- Pipe
- PipePipeTPRel
- PipeTerminationPoint

See *Oracle Communications Information Model Reference* for more information about the Information Model.

Specifications

This section lists the specifications included in the Generic Assimilation Model.

Pipe

Table 4-1 shows the list of pipe specifications.

Table 4-1 Pipe Specifications

Specification	Cartridge
GenericTopologicalLink	Generic_Assimilation_Model

Pipe Termination Point

Table 4-2 shows the list of pipe termination point specifications.

Table 4-2 Pipe Termination Point Specifications

Specification	Cartridge
GenericPortTerminationPoint	Generic_Assimilation_Model

Model Used to Reconcile IP Links

The Oracle Communications Network Integrity IP Assimilation Cartridge models collected data according to the Oracle Communications Information Model.

- Pipe Specifications

- Pipe Termination Point Specifications

Shared Specifications

You must first model inventory (UIM) specifications in an inventory cartridge using Design Studio, define the cartridge dependency such that the Network Integrity cartridge is dependent on the inventory cartridge, and then use the inventory cartridge specifications in the Network Integrity cartridge model.

Specifications shared with UIM are defined in the ora_ni_uim_assimilation cartridge. These cartridges are used to directly deploy specifications to UIM.

Table 4-3 shows the list of specifications:

Table 4-3 Specifications defined in the ora_ni_uim_assimilation cartridge

Specification	Type	Usage
Generic Ethernet Terminates Packet Rider	Flow Interface	ora_ni_uim_assimilation
Generic Ethernet Terminates Packet Rider Configuration	Flow Interface Configuration	ora_ni_uim_assimilation
Generic INNI Connectivity	Connectivity	ora_ni_uim_assimilation

In the IP Assimilation Scan, INNI Connectivity, Ethernet Terminates Packet Rider and Ethernet Terminates Packet Rider Configuration specifications are used from the ora_ni_uim_assimilation cartridge.

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About Design Studio Construction

This chapter provides information on the composition of the Oracle Communications Network Integrity IP Assimilation Cartridge from the Oracle Communications Design Studio perspective.

Model Collections

Table 5-1 shows the IP Assimilation Cartridge model collection.

Table 5-1 IP Assimilation Cartridge Model Collection

Specification	Type	Usage
GenericTopologicalLink	Pipe	Represents Ethernet Link connectivity.
GenericPortTerminationPoint	Pipe Termination Point	Represents Port Termination Point which acts as a device endpoint.
GenericContainer	Inventory Group	

Assimilation Actions

The IP Assimilation Cartridge supports the Assimilate IP Links action.

Table 5-2 Assimilate IP Links action

Result Category	Address Handler	Scan Parameters	Model	Processors
IPLinks	N/A	N/A	IP Assimilation Cartridge	• IP Links Collector • IP Links Pipe Modeler

Assimilation Processors

The IP Assimilation Cartridge supports the following assimilation processors:

Table 5-3 Assimilate IP Links Processors

Processor	Input/Output Parameters
IP Links Collector	Input: N/A Output: • deviceInterfaceMap
IP Pipe Modeler	Input: • deviceInterfaceMap Output: N/A

Import Actions

IP Assimilation Cartridge supports the following actions to import data from UIM:

Table 5-4 Import IP Links from UIM

Result Category	Address Handler	Scan Parameters	Model	Processors
IPLinks	N/A	IP Links Import Parameters	IP Assimilation Cartridge	• Import IP Links Initializer • IP Logical Device Finder • IP Multithread Links Importer

Import Processors

Table 5-5 Import IP Links from UIM Action Processors

Processor	Input/Output Parameters
Import IP Links Initializer	Input: N/A Output: • Filters • uimImportContext
IP Logical Device Finder	Input: • Filters • uimImportContext Output: • uimLogicalDeviceIds • logicalDeviceIdNameMap • uimImportContext
IP Multithread Links Importer	Input: • uimLogicalDeviceIds • logicalDeviceIdNameMap • uimImportContext Output: N/A

Discrepancy Detection Action

The Detect IP Links Discrepancies action is used to detect discrepancies.

Table 5-6 Detect IP Links Discrepancies

Result Category	Result Source	Scan Parameters	Model	Processors
IPLinks	Assimilate IP Links	N/A	IP Assimilation Cartridge	• This action extends the Discrepancy Detection action included in the NetworkIntegritySDK cartridge. For more information, see Network Integrity Developer's Guide. • IPLinksDDFiltersInitializer

Discrepancy Detection Processors

Table 5-7 Detect IP Links Discrepancies Processors

Processor	Input/Output Parameters
IPLinksDDFiltersInitializer	Input: N/A Output: N/A

Discrepancy Resolution Action

The Resolve IP Links Discrepancies action is used to perform resolve discrepancies.

Table 5-8 Resolve IP Links Discrepancies

Result Category	Result Source	Scan Parameters	Model	Processors
IPLinks	Assimilate IP Links	N/A	Assimilate IP Links	• This action extends the Abstract Resolve in UIM action included in the Network Integrity UIM Integration cartridge. For more information, see Network Integrity UIM Integration Cartridge Guide. • IP Links Resolution Initializer

Discrepancy Resolution Processor

Table 5-9 Resolve IP Links Discrepancies Processors

Processor	Input/Output Parameters
IP Links Resolution Initializer	Input: • baseResolutionElement • uimResolutionContext Output: N/A