Network Endpoints 4.0

Network Endpoints allow you to link two actors running in separate application instances.

Network Endpoints manage a Message Stream. Message Stream is an abstract class that defines an API for transmitting Actor Framework messages between applications. Children of this class adapt specific protocols, like TCP/IP or Network Streams to the API. Message Streams will transmit and receive any message class. Message Streams are described in more detail later in this document.

Use **Write Message Stream.vi** to specify the Message Stream that will be used for the connection. You must set this value prior to launching the actor.

Network Endpoint is an abstract class. Use **Nested Endpoint**, **Notifying Nested Endpoint**, or **Caller Endpoint** in applications.

To use a network endpoint (Caller, Nested, or Notifying), place an endpoint constant on the block diagram. Use Write Message Stream.vi to set the instance of Message Stream to use for the session. Launch the network endpoint. The endpoint will attempt to connect to its remote counterpart. If the connection times out, the launch attempt will fail. If connection is established, the endpoint will run until it receives a Stop message; it will break the network connection and return Last Ack to its caller. An endpoint will also stop automatically if its remote connection is broken.

Use **Write timeout.vi** to set the amount of time the actor will wait while attempting to create an endpoint (i.e. while waiting for a connection). If this value is too small, you may experience difficulty obtaining a connection. If it is too large, you may observe a delay when attempting to stop the actor. You must set this value prior to launching the actor.

Network Endpoints have no message classes of their own; you can send any message class to an endpoint. Stop, Last Ack, Report Error, and Register Actor are handled locally; anything else is forwarded to the remote endpoint.

Nested Endpoints

A Nested Endpoint is a Network Endpoint that is launched by a calling actor. The nested endpoint will forward messages it receives from its caller across the network. Any message the nested endpoint receives from across the network will be passed up to its caller.

When used with a remote nested endpoint, the endpoints establish a sibling relationship between the actors.

When used with a remote Caller Endpoint, the endpoints establish a caller-nested relationship between the actors.

This package includes two children of Nested Endpoint: **Notifying Nested Endpoint** and **Legacy Nested Endpoint.** Both send a message to their caller when they have established a connection with their remote counterpart. The payload of this message is the nested endpoint's enqueuer; use this data when you are using multiple nested endpoints, and need to identify which endpoint has successfully connected.

Notifying Nested Endpoints send an **Endpoint Connected Msg**. This message is a member of the **Nested Endpoint Caller** actor interface. The recipient of this message must inherit this interface.

Legacy Nested Endpoints send a **Connected Msg**. Connected messages are abstract; the caller must provide the actual implementation to be used. *Because it uses an abstract message, Legacy Nested Endpoint is* ***deprecated.*** It is included to support Actor Framework applications built prior to LabVIEW 2020 SP1 that have been migrated to later versions. Since Nested Endpoint no longer sends an abstract message, you have the option to replace it with Legacy Nested Endpoint and preserve the original design.

Legacy Nested Endpoint Methods

Use **Write Connected Msg.vi** to set a concrete implementation of **Connected Msg** to send to the caller.

Caller Endpoints

A Caller Endpoint is a Network Endpoint that sits at the top of an actor tree. Caller endpoints launch a single nested actor that you specify. If a remote actor uses a nested endpoint to connect to a local caller endpoint, the caller endpoint's nested actor will act like a nested actor of the remote actor. Any messages sent from the nested actor to its caller will be forwarded across the network connection. Any messages received from across the network by the caller endpoint will be passed down to the nested actor.

If Caller Endpoint receives a Last Ack from its nested actor, it will forward the Last Ack across the network. Note that, due to restrictions in the Actor Framework API, the priority of the Last Ack message will be downgraded from Critical to High. The Caller Endpoint will remain active; it is the responsibility of the calling application to destroy it.

Use **Read/Write Nested Actor.vi** to get or set the nested actor called by the Caller Endpoint.

Message Streams

Message Streams transmit Actor Framework messages between applications. Children of the class implement specific protocols. Message Streams for TCP/IP and Network Streams are included in the Network Endpoint Actors package.

The API requires that one endpoint be the initiator, and the other the listener. To reflect this, each protocol is implemented as a pair of classes, Initiator and Listener. Passing an instance of TCP Stream Initiator to a network endpoint means the endpoint will attempt to connect to another endpoint. Passing an instance of TCP Stream Listener to a network endpoint means the endpoint will wait passively for a connection. In either case, if no connection is made within the timeout period, the endpoint will shut down and return an error.

Both Initiator and Listener classes include a Create method. Create methods take address information as inputs, and return a Message Stream object.

Message Streams can accept a Cipher plug-in, which you can use to encrypt/decrypt transmitted messages. Cipher is an abstract class; inherit from this class to add specific ciphers to your application. No ciphers are included in the Network Endpoint Actors package.

Support

As a free download, Network Endpoint Actors are not formally supported. Users of this package are encouraged to post their questions to the Actor Framework forum, ni.com/actorframework, and the Network Endpoint Actors forum document (https://forums.ni.com/t5/Actor-Framework-Documents/Network-Endpoint-Actors/ta-p/3525072).