UDSP Unit Test Plan

Overview

The Unit Test Plan (UTP) will follow the same section breakdown as the Requirements in the Scope & Requirement Document [1].

The following types of tests shall be included where it makes sense.

1. In-Range UT - these are the test cases which cover normal operations.
2. Out-of-Range UT - these are the test cases which cover out of range scenarios:
   a. border cases
   b. race conditions
   c. unexpected events
       i. EX: Tearing down an active Network Interface
3. Error UT
   a. Error parameters
   b. Error Conditions
       i. network goes down unexpectedly
       ii. Wire gets disconnected, etc

Performance Testing cases will be a separate section in this document.

Unit Test Plan

Configuration tests should be done through the DLC direct interface, as well as the YAML interface.

Basic API

This section lists unit test cases that verify basic functionality, i.e. adding, deleting and showing UDSP rules. These tests focus on UDSP API and don't generate any traffic. The tests are structured as follows:

1. Configuration
2. Dump UDSP rules and verify result (optional)
3. Add or Delete UDSP (command line or YAML)
4. Dump UDSP rules and verify result
5. Go to 3 (optional).
6. Clean up.

Configuration

UDSP rules can be created at any time, but are applied only if the node they are configured for is considered to be "reachable". Run discovery command on peers as part of configuration.

Expected Behavior

Basic UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	LUTF ID	Unit Test Description
cfg-095	cfg-160		test_udsp_basic_01	- Setup: configure single network, 3 NIDs on the network - Execute UDSP "Show" command - Verify that the resulting YAML file doesn't contain any policy description
cfg-125, cfg-100	cfg-115, cfg-125		test_udsp_basic_02 it seems the tc only add rule to 1 network instead of NID, also not lower the priority	- Setup: configure single network, 3 NIDs on the network - Add UDSP rule that gives two of the interfaces highest priority - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected - Add UDSP rule that lowers the priority of one of the NIDs with highest priority back to default - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected
cfg-110			test_udsp_basic_03 tc only delete rule on network, doesn't delete the rule on NID	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Add UDSP rule that gives the highest priority to one of the NIDs on the network with the highest priority - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected (for network and NID) - Delete UDSP rule that gives the highest priority to one of the NIDs - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected (for network) - Delete UDSP rule that gives the highest priority to one of the networks - Execute UDSP "Show" command - Verify that the resulting YAML file doesn't contain any policy description
cfg-115			test_udsp_basic_04 tc doesn't delete rule	- Setup: configure single network, 3 NIDs on the network locally, 3 NIDs on the remote peer - Add UDSP rule that gives priority to one of the remote peer's NIDs - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected - Delete UDSP rule that gives the highest priority to the remote peer's NID - Execute UDSP "Show" command - Verify that the resulting YAML file doesn't contain any policy description

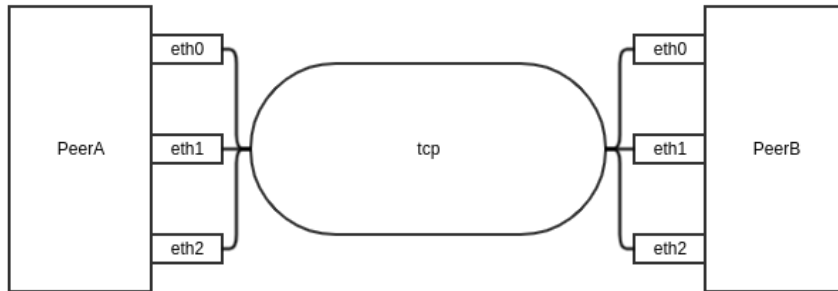| cfg-120			test_udsp_basic_05 tc doesn't delete rule	- Setup: configure single network, 3 NIDs on the network locally, 3 NIDs on the local peer - Add UDSP rule that gives priority to a pair of the local NID and peer's NID - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected - Delete UDSP rule that gives the highest priority to the NID pair - Execute UDSP "Show" command - Verify that the resulting YAML file doesn't contain any policy description
			test_udsp_basic_06 tc doesn't delete rule	- Configure single local network with two NIDs on the network - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a pair of a router and remote peer NID as preferred - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected - Delete UDSP rule that gives the highest priority to the router/remote NID pair - Execute UDSP "Show" command - Verify that the resulting YAML file doesn't contain any policy description
TODO: add N:1, 1:N, N:N mapping tests				
TODO: update requirements to cover router-related rules				

Error UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	LUTF ID	Unit Test Description
cfg-105		basic-cfg-err-001	test_udsp_basic_err_01	- Setup: configure single network, 3 NIDs on the network - Add UDSP rule that gives two of the interfaces highest priority - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected - Execute UDSP "Delete" command providing policy index that doesn't exist - Verify that the command failed with an error
		basic-cfg-err-002	test_udsp_basic_err_02	- Setup: configure single network, 3 NIDs on the network - Verify that attempts to add UDSP rule for source or dst network fail: "0tcp", "0o2ib", "tcpp", "t", "tcp100000000000000000000000000000000000000000000000001"
		basic-cfg-err-003	case missing	- Setup: configure single network, 3 NIDs on the network - Verify that attempts to add UDSP rule for source or dst NID fail: "@tcp", "1@tcp", "1.1.1@tcp", "1.1.1.1@tcp"

Issues

Unit Test ID	Description	Status
basic-cfg-err-001	"add" command with bad syntax yields "Success" description in the result along with errno -22	fix ready
basic-cfg-err-001	"del" command with "idx" parameter value that doesn't match any existing policy yields no error	ignore
basic-cfg-err-001	"del" command with bad syntax ("idxx" instead of "idx") causes info for the "add" command to be printed	fix ready

basic-cfg-err-001	"add" command that duplicates existing policy yields "cannot add udsp: Unknown error -114"	fix ready
basic-cfg-err-001	"add" command that duplicates existing policy except assigning a (different) priority yields a duplicated policy with the specified priority	fix ready

Single Network Configuration

Expected Behavior

In-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	LUTF ID	Unit Test Description
			test_udsp_single_net_01	- Setup: configure single network, 3 NIDs on the network - Add UDSP rule that gives one of the local interfaces highest priority - Start traffic TODO: need to specify direction? - Stop traffic - Verify that the NID with the highest priority was used
			test_udsp_single_net_02	- Setup: configure single network, 3 NIDs on the network - Add UDSP rule that gives two of the local interfaces highest priority - Start traffic - Stop traffic - Verify that two NIDs with the highest priority were used
			test_udsp_single_net_03	- Setup: configure single network, 3 NIDs on the network - Add UDSP rule that gives two of the interfaces highest priority - Start traffic - Stop traffic - Verify that two NIDs with the highest priority were used - Add UDSP that lowers the priority of one of the NIDs with highest priority back to default - Start traffic - Stop traffic - Verify that the remaining highest-priority NID was used
			test_udsp_single_net_04	- Setup: configure single network, 3 NIDs on the network - Add UDSP rule that gives two of the interfaces highest priority - Start traffic - Stop traffic - Verify that two NIDs with the highest priority were used - Add UDSP that lowers the priority of both of the NIDs with the highest priority back to default - Start traffic - Stop traffic - Verify that all NIDs were used

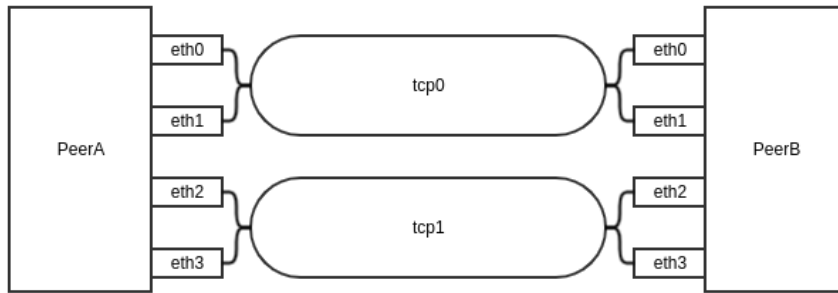|			test_uds p_single _net_05	• Setup: configure single network, 3 NIDs on the network, 3 NIDs on the local peer • Add UDSP rule that gives the highest priority to one of the local peer NIDs • Start traffic • Stop traffic • Verify that local peer NID with the highest priority was used
			test_uds p_single _net_06	• Setup: configure single network, 3 NIDs on the network, 3 NIDs on the local peer • Add UDSP rule that gives one of the local NIDs highest priority • Add UDSP rule that pairs the highest priority local NID with a certain peer NID • Start traffic • Stop traffic • Verify that the paired peer NID was used
		singlenet-006	07?	• Setup: configure single network, 3 NIDs on the network, 3 NIDs on the local peer • Add UDSP rule that creates 3 NID pairs such that one of the peer NIDs is not in any pair • Start traffic • Stop traffic • Verify that the peer NID that is not part of any pair was not used (less used?) • Delete UDSP rule • Start traffic • Stop traffic • Verify that all NIDs are used

Out-of-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	Unit Test Description
			• Setup: configure single network, 3 NIDs on the network • Add UDSP rule that gives highest priority to a NID that doesn't exist • Execute UDSP "Show" command • Verify that the resulting YAML file contains policy description as expected
			• Setup: configure single network, 3 NIDs on the network • Add UDSP rule that gives one of the interfaces highest priority • Start traffic • Verify that the NID with the highest priority was used • Bring the highest priority NID down • Verify that remaining NIDs are used • Stop traffic

Issues

Unit Test ID	Description	Status
singlenet-006	NID pair UDSP doesn't appear to be taking effect	fix ready
singlenet-006	Deleting NID-pair UDSP that specifies multiple source NIDs causes kernel crash	fix ready

Multiple Network Configuration

Expected Behavior

In-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	LUTF ID	Unit Test Description
			test_udsp_multi_net_01	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Start traffic - Stop traffic - Verify that NIDs on the network with the highest priority were used
			test_udsp_multi_net_02	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Start traffic - Stop traffic - Verify that NIDs on the network with the highest priority were used - Add UDSP rule that reverses networks priorities - Start traffic - Stop traffic - Verify that NIDs on the new network that has the highest priority were used
			test_udsp_multi_net_03	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Add UDSP rule that gives the highest priority to one of the NIDs on the network with the highest priority - Start traffic - Stop traffic - Verify that the NID with highest priority on the network with highest priority was used
			test_udsp_multi_net_04	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Add UDSP rule that gives the highest priority to one of the NIDs on the network with the lowest priority - Start traffic - Stop traffic - Verify that the NIDs on the network with highest priority were used
			test_udsp_multi_net_05	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - On the peer add UDSP rule that gives the highest priority to the other network - Start traffic - Stop traffic - Verify that the local network with highest priority was used

Out-of-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	LUTF ID	Unit Test Description
			test_uds p_multi_ net_err_ 01	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives highest priority to a network that doesn't exist - Execute UDSP "Show" command - Verify that the resulting YAML file contains policy description as expected
			test_uds p_multi_ net_err_ 02	- Setup: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Start traffic - Verify that the network with the highest priority was used - Bring the highest priority network down - Verify that the remaining network is used - Stop traffic

Issues

Unit Test ID	Description	Status
LU-13193	"Oops" when adding a destination nid UDSP	pending commit

Routed Network Configuration

Remote layout 1:

Remote layout 2:

Remote layout 3:

Expected Behavior

In-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	LUTF ID	Unit Test Description
			test_udsp_routed_net_01	- Configure single local network with two NIDs on the network (RemoteLayout1) - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a pair of a router and remote peer NIDs as preferred - Add UDSP rule that gives the same remote peer NID highest priority - Start traffic - Stop traffic - Verify that the preferred remote peer NID and router NID were used
				- Configure single local network with two NIDs on the network (RemoteLayout1) - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Assign higher route priority to the route using gateway 1 - Add UDSP rule that designates a pair of a router (gateway 2) and remote peer NIDs as preferred - Start traffic - Stop traffic - Verify that the higher priority route was used (gateway 1)
				- Configure two local networks (net1, net2) with two NIDs on each network (RemoteLayout2) - Configure remote peer to have access to the remote network with two NIDs - On peerA add UDSP rule that designates gateway 1 as preferred for all NIDs on peerB - Start traffic (peerA to peerB) - Stop traffic - Verify that if net1 was used then the paired router was used

Out-of-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	Unit Test Description
			- Configure single local network with two NIDs on the network - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a pair of a router that doesn't exist and a local network as preferred - Start traffic - Stop traffic - Verify that both routers were used
			- Configure single local network with two NIDs on the network - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a pair of a router and a local network that doesn't exist as preferred - Start traffic - Stop traffic - Verify that both routers were used
			- Configure single local network with two NIDs on the network - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a pair of a router that doesn't exist and a remote peer NID as preferred - Add UDSP rule that gives the same remote peer NID highest priority - Start traffic - Stop traffic - Verify that the all peer NIDs and both routers were used

			- Configure single local network with two NIDs on the network - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a pair of a router and a peerB NID as preferred - Start traffic - Verify that the preferred router was used - Bring down the preferred router - Verify that the remaining router was used - Stop traffic

Interoperability with LNet Health feature

Tests cases listed in this section are intended to verify that UDSP and LNet Health features work properly when both are enabled. The expected behaviour is that UDSP decisions come second to the health-based decisions, such that, for example, given healthier alternatives, NID with a lower health score won't be chosen even if it is preferred according to a UDSP rule. More detail on how to simulate events that affect the health score can be found here: LNet Health Test Plan [3].

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	Unit Test Description
			- MR Node with Multiple interfaces - Add UDSP rule that gives one of the local interfaces highest priority - Send a PING - Verify that the NID with the highest priority was used - Send a PING - Simulate an <error> - PING msg should be queued on resend queue - PING msg will be resent on a different interface - Failed interface's health value will be decremented - Failed interface will be placed on the recovery queue - Eventually health score should recover so then only the preferred interface will be used (sensitivity > 0)
			- MR Node with Multiple interfaces: configure two networks, two NIDs on each network - Add UDSP rule that gives one of the networks highest priority - Start traffic - Stop traffic - Verify that NIDs on the network with the highest priority were used - Start traffic - Simulate an <error> (drop on one of the NIDs on the highest priority network) - Failed interface's health value will be decremented - Failed interface will be placed on the recovery queue - Verify that the remaining interface on the failed network is used - Eventually health score should recover so then only both interface on the preferred network will be used (sensitivity > 0)
			- Configure single local network with two NIDs on the network - Configure two routers/gateways each providing access to a remote network - Configure remote peer to have access to the remote network with two NIDs - Add UDSP rule that designates a router as preferred for all remote peer NIDs - Start traffic - Stop traffic - Verify that the preferred router was used - Add a PUT drop rule on the router to drop traffic on one of the interfaces. - Verify that traffic goes to the other interfaces of the preferred router. There shouldn't be any drop in traffic. - Add a PUT drop rule on the router to drop traffic on all interfaces. - Verify that traffic goes through the non-preferred router until one of the interfaces of the preferred router recovers.

Compatibility with Non-MR Nodes

Expected Behavior

In-Range UT

Primary Requirement ID	Secondary Requirement ID	Unit Test ID	Unit Test Description
			- Setup: configure single network, 2 NIDs on the network, peer with MR disabled - Add UDSP rule that gives one of the interfaces highest priority - Start traffic - Stop traffic - Verify that the NID with the highest priority was used
			- Setup: configure single network, 2 NIDs on the network, peer incapable of MR ("down-rev") - Add UDSP rule that gives one of the interfaces highest priority - Start traffic - Stop traffic - Verify that the NID with the highest priority was used
			- Setup: configure single network, 2 NIDs on the network, 2 NIDs on the local peer with MR disabled - Add UDSP rule that gives the highest priority to one of the local peer NIDs - Start traffic - Stop traffic - Verify that local peer NID with the highest priority was used
			- Setup: configure single network, 2 NIDs on the network, 2 NIDs on the local peer incapable of MR ("down-rev") - Add UDSP rule that gives the highest priority to one of the local peer NIDs - Start traffic - Stop traffic - Verify that local peer NID with the highest priority was used

Functional Requirements

Performance Requirements

Glossary

Term	Meaning
LNet	
UDSP	User Defined Selection Policy
UTP	Unit Test Plan
DLC	Dynamic LNet Config (e.g. let, lnetctl scripts)
NI	Network Interface
RPC	Remote Procedure Call
FS	File System
o2ib	Infiniband Network
tcp	Ethernet based Network
NUMA	Non-Uniform Memory Access
RR	Round Robin
CPT	CPU Partition
CB	Channel Bonding

NID	Network Identifier

References

#	Title
1	UDSP Scope and Requirements
2	Multi-Rail Scope and Requirements Document
3	LNet Health Test Plan
4	MR Cluster Setup