



Foreign LUN Import (FLI) Technical FAQ

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October 2016

Version 1.0	June 2016	Updated for clustered Data ONTAP 8.2
Version 2.0	October 2016	Updated for ONTAP 9.1

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1 General Questions

What is Foreign LUN Import and how does it work?

Answer: Foreign LUN Import is a Fibre Channel SAN data migration solution included with Data ONTAP 8.3 environment with no license costs. The first iteration of FLI shipping with Data ONTAP 8.3 was FLI offline, which required that the host consuming the LUN be offline for the entire import and optionally, for the verification as well.

It requires a SAN-attached client to have LUNs hosted by a supported third party source array, and those LUNs are de-presented from the SAN-attached client and then presented to the destination Data ONTAP 8.3 storage node. Data ONTAP commands are used to copy the LUN from the third-party source array, resulting in a new NetApp LUN residing in a NetApp volume. Then the third-party source array LUNs are de-presented from the NetApp and the new NetApp LUN is presented to the SAN client.

The infrastructure and setup process is much like V-Series or FlexArray, except instead of the source third-party storage array presenting array LUNs to create aggregates, FLI commands are used to copy the SAN Client LUNs into new NetApp LUNs. FLI can import LUNs from E-Series storage arrays but not FAS storage arrays, and is targeted generally towards other third-party storage arrays (EMC, HDS, IBM, HP, etc....).

Data ONTAP 8.3.1 shipped with several FLI enhancements:

- FLI online allows the host to stay online and even running IO to the LUN while it is being imported. There is a brief disruption window (measured in minutes) while the host is repointed from the source to the destination LUN. There are no other disruptions unless you choose to verify the LUN once import is complete, this is because verification requires the LUN to be offline.
- FLI 7-mode-to-cDOT is a transition workflow designed to address transitions where where the 7-mode LUN is either hosted on a 32-bit aggregate and/or has IO alignment problems Both of these can be resolved by FLI while it imports the LUN. In most other circumstances you should consider 7MTT as NetApp's primary transition tool.
- FLI throughput throttling is a per import anti-starvation mechanism that stops a given import for starving other imports or workloads.

Is FLI supported on All Flash FAS (AFF)?

Answer: ONTAP 9.1 adds native FLI support on AFF assuming the destination is running ONTAP 9.1 or later. AFF nodes running previous versions of ONTAP will still need to submit a PVR to allow AFF FLI support.

2 Supportability

What is the maximum size array LUN supported by FLI?

Answer: You should check the [Hardware Universe](#) for that, since it does change periodically. ONTAP 9 increases the maximum array LUN size to 16TB.

Is there a minimum size LUN supported by FLI?

Answer: You should check the [Hardware Universe](#) for that, since it does change periodically. Currently the smallest LUN supported is 1.05GB

Any Hitachi USPv (AMS/HUS)-based customers using FLI yet?

Answer: Yes, there have been migrations from a variety of HDS arrays including AMS/HUS to cDOT. I think about 8 of the 30ish customers that have used FLI, based on AutoSupport data were migrating from HDS arrays.

Is All Flash FAS target aggregate/disk supported in 8.3.1 for FLI? If not, when?

Answer: AFF as target is supported in cDOT 8.3.2; however, requires a PVR to be raised

Can PowerPath and NetApp DSM/MPIO software exist on a host at the same time? This speaks to having a fall back plan in the case of an un-successful cutover to the NetApp.

Answer: yes. Refer to the [NetApp Interoperability Matrix Tool \(IMT\)](#) for supported versions

Does clustered Data ONTAP require a dedicated initiator port configured to see source(s) lun(s)?

Answer: Yes, that's right. Clustered Data ONTAP (target) acts as initiator and does require initiator ports. Refer [TR-4380](#) for more details. Also, note the zoning best practices, and [TR-3461](#) for FlexArray best practices.

Zoning Best Practices:

- Do not mix source storage target ports and destination storage target ports in the same zone.
- Do not mix destination storage initiator ports and host ports in the same zone.
- Do not mix destination storage target and initiator ports in the same zone.
- Zone with at least two ports from each controller for redundancy.
- NetApp recommends single initiator and single target zoning.

Which source storage array models and microcode versions are supported to use with Foreign LUN Import?

Answer: FLI is qualified to work with any source storage array supported as a FlexArray source for Data ONTAP 8.3 or later. For more information, see the [NetApp Interoperability Matrix Tool \(IMT\)](#).

Is iSCSI support for FLI in the near future?

Answer: Currently FC LUNs are supported directly. However, FLI can also handle iSCSI LUNs that requires temporarily mapping LUNs to FC igroup, migrate using FLI, and then, remap to iSCSI igroup. That would work if the customer has a FC environment but, not if they are entirely iSCSI

There are plans to provide iSCSI native support in an up coming release of Data ONTAP

Does FLI support FCoE migration?

Answer: No.

Does FLI only support offline LUN migration?

Answer: As of Data ONTAP 8.3.0, offline copy and migration is the only supported FLI migration method. Data ONTAP 8.3.1 added an online copy and migration workflow in addition to both online and offline transition workflows.

From the hosts perspective, will it see same LUN SN# or it will detect new LUN SN# assigned from CDOT?

Answer: The host will see new serial number assigned by cDOT, serial numbers are unique for each vendor

What interoperability checking do I need to perform prior to running FLI?

Answer: There are two areas of interoperability that need to be checked:

1. You need to check if FLI is supported this is done by reviewing the FLI Interoperability Matrix (IMT).
2. You also need to check that the complete end-to-end configuration, after the import(s) is/are complete is a supported configuration. This is done from the FAS/AFF Interoperability Matrix (IMT).

What is the FLI IMT?

Answer: The FLI IMT is very similar to the FlexArray IMT but was added as a distinctly different Interoperability tool in order to more aggressively support the source array's NetApp qualifies to work with FLI. Unlike FlexArray there isn't a very long term and much stricter interoperability requirement. Because of this, the FLI IMT was created to allow FLI more flexibility to support a greater number of source arrays. The list of supported Backend Arrays for FLI (both offline and online) is much larger than the existing support for Backend arrays by FlexArray Virtualization. To check for a supported configuration for FLI follow the steps below:

1. Go to <http://mysupport.netapp.com/matrix/#search>
2. Search for the array model
3. Select the solution "Foreign LUN Import (FLI) Back-end Interoperability"
4. Select the FAS model, ONTAP version to determine the supported configurations
5. For front end supported host configuration click on build end to end view with "FAS SAN host"
6. For switch supported configuration click on build end to end view for "San-Switch" from "FAS San host" tab.

How to check the NetApp Interoperability Matrix Tool (IMT) for FlexArray and Foreign LUN Import supportability?

Answer: The NetApp Interoperability Matrix Tool needs to be checked for three main criteria against the target Data ONTAP 8.3 version:

- The source storage platform model and microcode version.
 - The SAN switch model and microcode version.
 - The NetApp controller, the customer environment (switches, HBAs, firmware, server hardware, etc...) and SAN attached clients who actually mount the LUNs post migration.
- If any of these three components are not supported, some remediation might be necessary to ensure full success and support during and after the migration process.

What if the source storage array, microcode version, switch, host, host OS, or other component is not listed as supported on the NetApp support matrix? Can FLI still migrate the data?

Answer: If one or more components is not listed on the Support Matrix, consider alternate tools and methods for SAN data migration or talk with your NetApp Account Team about if a Support PVR can be filed to support your configuration. If the host or host OS, HBA, or HBA firmware is unlisted, it is likely that you will need to perform some remediation in order to successfully import your LUNs and end up in a supported configuration.

3 Performance and Scalability

How fast can FLI migrate data?

Answer: There are a large number of variables that will impact throughput, like source and destination array capabilities and load, fabric speed and load, OS's involved, etc... in QA lab testing, speeds of 500GB/hr and 1500GB/hr, per destination storage node have been recorded. However, NetApp's recommendation is to perform multiple dry run migrations, as outlined in TR-4380, in order to be able to extrapolate a throughput in your environment.

Is there a maximum amount of LUNs that FLI can migrate concurrently?

Answer: The FLI maximum is 32 LUN concurrent to a single destination storage node.

What is the recommended amount of concurrent LUN import jobs?

Answer: NetApp recommends a between 8-16 concurrent imports to a given node. During QA testing it was noted there was a throughput impact beyond ~16 concurrent imports.

Can FLI be used to migrate to eight SAN attached destination storage nodes concurrently?

Answer: Yes.

Does migrating to multiple target storage nodes at the same time to improve overall throughput?

Answer: Yes, as long as the source third-party array is not overwhelmed.

Does FLI copy load balance between multiple FC Initiator links or does it only use one path to transfer the data?

Answer: It will use two paths actively on the node which is hosting the destination LUN.

How do you plan an FLI migration to support the maximum amount of concurrent bandwidth for very large scale migrations?

Answer: Perform several dry run migrations in order to establish expected throughput. If you want to tweak throughput further, consider spreading out copy jobs across multiple source RAID groups, multiple destination aggregates, and multiple sets of Initiator/Target ports for maximum performance.

Are there any WFA automation for Foreign LUN Import?

Answer: Yes. See the [NetApp Automation Store](#) to download the WFA Offline Foreign LUN Import pack for a head start.

4 Configuration

What is the level of effort to configure and perform Foreign LUN Import migrations?

Answer: The level of effort for FLI migrations is documented in ServiceBuilder guides. There is also a [Level of Effort \(LOE\)](#) spreadsheet that can be downloaded on the NetApp Field Portal.

What types of FC Initiator ports are supported with FLI?

Answer: Onboard UTA2 ports can be used in Initiator mode, expansion FC initiator can be added to the NetApp controller, or expansion UTA2 cards can be added to the controller.

Are more than two paths to the source third-party storage array LUN allowed?

Answer: No.

If I am migrating to a single storage node, do all the storage nodes on the storage cluster need to be configured for the FLI migration with Initiator ports?

Answer: No. Follow the [Scalable SAN Best Practices Guide](#) for how *target port* connectivity on the storage cluster should be designed to support the SAN Clients after the data copy job is complete. This does not apply to initiator ports.

Do source third party storage platform target ports need to be dedicated for FLI or can source ports be shared with other SAN client initiator / host groups?

Answer: Dedicating source third party storage target ports is not required, but it is recommended for best performance and supportability.

What kind of zoning do we perform for Foreign LUN Import configuration?

Answer: Single Initiator Single Target, just like [TR3461: V-Series and FlexArray best practices](#) indicate.

5 Troubleshooting and Implementation

The destination storage node does not identify the source array LUNs after zoning and LUN masking is complete. Why?

Answer: Reset the switch ports where the destination storage node initiator ports are connected to by disabling the port on the SAN switch and re-enabling, and the array LUNs should be present after the reset.

What happens if one FC link fails on the destination storage node while the copy job is in progress?

Answer: It continues without an issue.

What happens if one FC link on the partner storage node fails while a copy job is in progress?

Answer: FLI only uses the local FC links of the storage node which is hosting the job, so other nodes having issues do not impact FLI.

What happens if the source third party storage platform incurs a failure or failover during a FLI migration?

Answer: It depends on the severity of a failure. One target port will not cause a full failure, but more severe than that and the FLI job will likely fail and need to be completely restarted from the beginning. There is a feature to pause an in-progress FLI job in case there is planned maintenance going to occur on the source third party storage platform.

Is the verification speed as fast as the copy speed?

Answer: No. Verification is a little slower than copy, because in addition to performing a read on both the source and destination it also has to perform a compare. Always use dry run migrations to determine throughput and as the basis for your planning.

What EMS events are useful for troubleshooting Foreign LUN Import?

Answer: Start with events beginning with FLI. Consider creating EMS destination email alerting for FLI events during FLI projects for immediate feedback during FLI migrations.

6 Training

What skills should I know to perform a FLI migration successfully?

Answer: V-Series and FlexArray, including information covered in [TR-3461:FlexArray and V-Series Best Practices](#) and the [FlexArray Virtualization Implementation Guide for Third-Party Storage](#) are critical to understanding for quick start on Foreign LUN Import due to the nature of how the destination storage cluster is zoned and cabled with a source storage array. Next is clustered Data ONTAP and Heterogeneous SAN migration techniques, including SAN client operating system remediation. Review the [7-Mode Transition Tool 2.0 SAN Host Transition and Remediation Supplemental Guide](#) for detailed remediation information by Operating System type and version.

What type of training is available for FLI?

Answer: There is a technical report ([TR-4380: SAN Migration Using Foreign LUN Import on Foreign LUN Import](#)) which has detailed step by step guide on the different FLI workflows. There is also an FLI Webinar. There are also ServiceBuilder guides which have much detail as well. There is a [Brainshark video recording](#) of a Foreign LUN Import process from start to finish. The 8.3 New Features Web Based Training covers concepts of Foreign LUN Import. Testing with a lab Data ONTAP 7-Mode source array and an 8.3 storage cluster is another option to gain field experience before a production migration.

Do normal V-Series and FlexArray best practices apply to Foreign LUN Import?

Answer: Generally, yes.

Are there documented steps on how to perform a FLI migration?

Answer: ServiceBuilder team has documented step by step. Search the [Support site](#) for 'Servicebuilder Data Migration'. Documented steps for each of the FLI workflows are also provided in [TR-4380: SAN Migration Using Foreign LUN Import](#) and in the FLI Webinar.