

Intel® Omni-Path Fabric Software in SUSE* Linux* Enterprise Server 15 SP1

Release Notes

Rev. 1.0

June 2019



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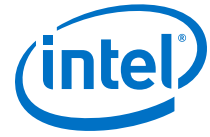
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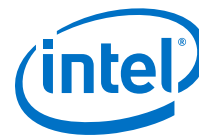
Contents

1.0 Overview of the Release.....	5
1.1 Audience.....	5
1.2 Document Versions.....	5
1.3 Software License Agreement.....	6
1.4 If You Need Help.....	6
1.5 Packages in This Release.....	6
1.6 Supported Features.....	7
1.7 Supported MPI Libraries.....	8
1.8 Intel Hardware.....	8
1.9 Intel® OPA Compatibility Matrix.....	9
1.10 Installation Requirements.....	9
1.10.1 Installation Instructions.....	9
1.11 Product Constraints.....	11
1.12 Product Limitations.....	11
2.0 Issues.....	13
2.1 Resolved Issues.....	13
2.2 Open Issues.....	14



Tables

1	Supported Document Versions.....	5
2	Supported MPI Libraries.....	8
3	Supported Hardware.....	8
4	Intel® OPA Compatibility Matrix.....	9
5	Issues Resolved in this Release.....	13
6	Open Issues.....	14



1.0 Overview of the Release

These Release Notes are intended for Intel® Omni-Path Fabric software provided in-box with the OS release. This document provides a brief overview of the changes introduced into the Intel® Omni-Path Software by this release. References to more detailed information are provided where necessary. The information contained in this document is intended as supplemental information only; it should be used in conjunction with the documentation provided for each component.

These Release Notes list the features supported in this software release, open issues, and issues that were resolved during release development.

1.1 Audience

The information provided in this document is intended for installers, software support engineers, service personnel, and system administrators.

1.2 Document Versions

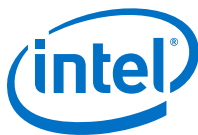
Intel® Omni-Path publications are available at the following URLs. For documents compatible with this release, refer to the V10.8 documents listed in the table below.

- Intel® Omni-Path Switches Installation, User, Reference Guides, and Release Notes
<http://www.intel.com/omnipath/SwitchPublications>
- Intel® Omni-Path Software Installation, User, Reference Guides, and Release Notes (includes HFI documents)
<http://www.intel.com/omnipath/FabricSoftwarePublications>

The following table lists the end user document versions supported by this release.

Table 1. Supported Document Versions

Title	Doc. Number	Revision
Intel® Omni-Path Fabric Quick Start Guide	J57479	5.0
Intel® Omni-Path Fabric Setup Guide	J27600	9.0
Intel® Omni-Path Fabric Switches Hardware Installation Guide	H76456	7.0
Intel® Omni-Path Host Fabric Interface Installation Guide	H76466	5.0
Intel® Omni-Path Fabric Software Installation Guide	H76467	10.0
Intel® Omni-Path Fabric Switches GUI User Guide	H76457	10.0
Intel® Omni-Path Fabric Switches Command Line Interface Reference Guide	H76458	10.0
Intel® Omni-Path Fabric Suite FastFabric User Guide	H76469	10.0
Intel® Omni-Path Fabric Suite Fabric Manager User Guide	H76468	10.0
Intel® Omni-Path Fabric Suite Fabric Manager GUI User Guide	H76471	10.0
<i>continued...</i>		



Title	Doc. Number	Revision
Intel® Omni-Path Fabric Host Software User Guide	H76470	10.0
Intel® Performance Scaled Messaging 2 (PSM2) Programmer's Guide	H76473	10.0
Intel® Omni-Path Fabric Performance Tuning User Guide	H93143	12.0
Intel® Omni-Path IP and LNet Router Design Guide (Old title: Intel® Omni-Path IP and Storage Router Design Guide)	H99668	7.0
Building Containers for Intel® Omni-Path Fabrics using Docker* and Singularity* Application Note	J57474	5.0
Intel® Omni-Path Management API Programmer's Guide	J68876	4.0
Configuring Non-Volatile Memory Express* (NVMe*) over Fabrics on Intel® Omni-Path Architecture Application Note	J78967	1.0
Intel® Omni-Path Fabric Software Release Notes	K21143	1.0
Intel® Omni-Path Fabric Manager GUI Release Notes	K21144	1.0
Intel® Omni-Path Fabric Switches Release Notes (includes managed and externally-managed switches)	K21142	1.0
Intel® Omni-Path Fabric Unified Extensible Firmware Interface (UEFI) Release Notes	K21145	1.0
Intel® Omni-Path Fabric Thermal Management Microchip (TMM) Release Notes	K21147	1.0
Intel® Omni-Path Fabric Firmware Tools Release Notes	K21148	1.0

1.3 Software License Agreement

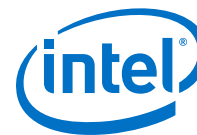
This software is provided under license agreements and may contain third-party software under separate third-party licensing. Please refer to the license files provided with the software for specific details.

1.4 If You Need Help

Technical support for Intel® Omni-Path products is available 24 hours a day, 365 days a year. Please contact Intel Customer Support or visit <http://www.intel.com/omnipath/support> for additional detail.

1.5 Packages in This Release

Intel® Omni-Path Software Packages
Packages created by Intel
opa-address-resolution-10.8.0-7.25.x86_64
opa-basic-tools-10.8.0-7.19.x86_64
opa-fastfabric-10.8.0-7.19.x86_64
opa-fm-10.8.0-5.19.x86_64
opa-fmgui-10.1.0.0.115-8.20.noarch
opa-libopamgt-10.8.0-7.19
libfabric1-1.6.2-5.19.x86_64
<i>continued...</i>



Intel® Omni-Path Software Packages
libpsm2-2-11.2.78-1.4.x86_64
Firmware binaries delivered by Intel
8051 firmware version 1.27.0
SBus Master firmware version 0x10130001
PCIe SerDes firmware version 0x4755
Fabric SerDes firmware version 0x1055
Packages used by Intel
rdma-core-22.1-2.4.x86_64
openmpi2-2.1.6-1.8.x86_64
mpitests-3.2-1.13.x86_64
mpitests-openmpi2-3.2-1.26.x86_64
mpitests-mvapich2-3.2-1.23.x86_64
mvapich2-psm2-2.2-10.14.x86_64
mvapich2-2.2-10.19.x86_64
mpitests-mvapich2-psm2-3.2-1.16.x86_64

HFI Programmable Firmware

To download Intel programmable firmware for HFIs, refer to the following:

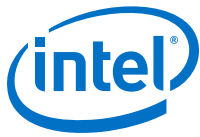
- [Unified Extensible Firmware Interface \(UEFI\)](#)
- [Thermal Management Module \(TMM\)](#)
- [Firmware Tools](#)

NOTE

Refer to the [Intel® OPA Compatibility Matrix](#) on page 9 for the firmware versions compatible with this release.

1.6 Supported Features

- The list of supported hardware is in [Table 3](#) on page 8.
- Product constraints are described in [Product Constraints](#) on page 11.
- Support for multiple virtual fabric security.
- Support for libfabric OFI Version 1.6.
- UEFI, TMM, and Firmware Tools are now standalone rpms.
- Active Optical Cables. For details, see the Cable Matrix at: <https://www.intel.com/content/www/us/en/products/network-io/high-performance-fabrics/omni-path-cables.html>
 - Support for active optical cables (AOC) on server platforms using integrated HFI for OPA (commonly known as "-F").



- Support for Power Class 2 active optical cables (AOC). See [Product Constraints](#) on page 11 for more information.
- Legacy BIOS Boot Mode Enhancements to support boot over fabric, custom board descriptions, and pre-boot platform configuration data for AOC support.
- Multi-endpoint functionality. See the *Intel® Performance Scaled Messaging 2 (PSM2) Programmer's Guide* for details.
- Support for OpenFabrics Interfaces (OFI), a framework that includes libraries (including libfabric) and applications used to export fabric communication services to applications.
- Support for NVMe over Fabric Protocol
- Virtual Fabric creation has been enhanced to better support advanced topologies, including the ability to place multicast traffic on a separate SL from unicast traffic. For details, see the *Intel® Omni-Path Fabric Suite Fabric Manager User Guide*, section 2.
- Support for the Enhanced Hypercube Routing Engine is outside the scope of Intel® OPA support. However, Intel partners may offer such support as part of their solutions. In addition there is an open source community who may be able to answer specific questions and provide guidance with respect to the Enhanced Hypercube Routing Engine.

1.7 Supported MPI Libraries

The table below lists the different MPI libraries supported by Intel® Omni-Path Fabric Software. Note that the second column indicates whether the MPI library is included in the distribution.

Table 2. Supported MPI Libraries

MPI Implementation	Included in Distribution?	Runs Over
Open MPI 2.1.2	Yes	PSM2
MVAPICH2-2.3B	Yes	PSM2

1.8 Intel Hardware

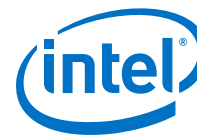
The following table lists the Intel hardware supported in this release.

NOTE

The Intel® PSM2 implementation has a limit of four (4) HFIs.

Table 3. Supported Hardware

Hardware	Description
Intel® Xeon® Processor E5-2600 v3 product family	Haswell CPU-based servers
Intel® Xeon® Processor E5-2600 v4 product family	Broadwell CPU-based servers
Intel® Xeon® Scalable Processors	Skylake CPU-based servers
2nd Generation Intel® Xeon® Scalable Processors	Cascade Lake CPU-based servers
continued...	



Hardware	Description
Intel® Xeon Phi™ x200 Product Family	Knights Landing CPU-based servers
Intel® Xeon Phi™ 72x5 Processor Family	Knights Mill CPU-based servers
Intel® Omni-Path Host Fabric Interface 100HFA016 (x16)	Single Port Host Fabric Interface (HFI)
Intel® Omni-Path Host Fabric Interface 100HFA018 (x8)	Single Port Host Fabric Interface (HFI)
Intel® Omni-Path Switch 100SWE48Q	Managed 48-port Edge Switch
Intel® Omni-Path Switch 100SWE48U	Externally-managed 48-port Edge Switch
Intel® Omni-Path Switch 100SWE48UFH	Externally-managed 48-port Edge Switch, hot-swap power and fans
Intel® Omni-Path Switch 100SWE48QFH	Managed 48-port Edge Switch, hot-swap power and fans
Intel® Omni-Path Switch 100SWE24Q	Managed 24-port Edge Switch
Intel® Omni-Path Switch 100SWE24U	Externally-managed 24-port Edge Switch
Intel® Omni-Path Director Class Switch 100SWD24	Director Class Switch 100 Series, up to 768 ports
Intel® Omni-Path Director Class Switch 100SWD06	Director Class Switch 100 Series, up to 192 ports

1.9 Intel® OPA Compatibility Matrix

The following component versions are compatible with Intel® Omni-Path software in SLES* 15 SP1.

Table 4. Intel® OPA Compatibility Matrix

UEFI	TMM	Managed Switch	Externally-Managed Switch	FM GUI
1.9.0.1.0	10.9.0.0.208	10.8.0.0.186	10.8.0.0.186	10.9.2.0.7
1.8.1.0.0	10.8.0.0.214	10.8.0.0.186	10.8.0.0.186	10.8.0.0.206
1.7.2.0.0	10.7.0.0.3	10.7.0.0.146	10.7.0.0.144	10.7.0.0.145

1.10 Installation Requirements

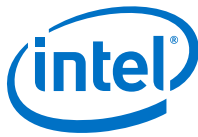
This section provides instructions and information on installing the software.

1.10.1 Installation Instructions

Perform the steps in this section to install the default Intel® Omni-Path Software configuration.

Assumptions

- You are logged in as root or with root privileges.
- You have a list of IPv4 addresses and netmasks for each IPoIB interface you are going to set up.



References

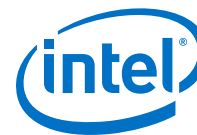
- Refer to the *Intel® Omni-Path Fabric Software Installation Guide* for related software requirements and next steps.
- Refer to the *Intel® Omni-Path Fabric Switches Hardware Installation Guide* for related firmware requirements.

Procedures

Perform the following steps to install the default Intel® Omni-Path Software configuration using SLES* OS:

Step	Task/Prompt	Action
Install OPA-Basic Software		
1.	At the command prompt, enter the installation command for opa-basic-tools.	Type zypper install -y opa-basic-tools and press Enter .
2.	At the command prompt, reboot the server.	Type reboot and press Enter .
3.	Check your link using opainfo.	Type opainfo and press Enter . Example output: <pre>hfi1_0:1 PortGID: 0xfe80000000000000:001175010163f931 PortState: Active LinkSpeed Act: 25Gb En: 25Gb LinkWidth Act: 4 En: 4 LinkWidthDnGrd ActTx: 4 Rx: 4 En: 3,4 LCRC Act: 14-bit En: 14-bit,16-bit, 48-bit Mgmt: True LID: 0x00000010-0x00000010 SM LID: 0x0000000c SL: 0 QSFP: AOC , 5m FINISAR CORP P/N FCBN425QB1C05 Rev A Xmit Data: 0 MB Pkts: 251 Recv Data: 0 MB Pkts: 251 Link Quality: 5 (Excellent)</pre>
4.	Install the rdma-core rpm.	Type zypper install -y rdma-core and press Enter .
5.	On all compute nodes: install the PSM2 library.	Type zypper install -y libpsm2-2 and press Enter .
Install Intel® Omni-Path Fabric Suite Components on the Management Node		
6.	Install FastFabric.	Type zypper install -y opa-fastfabric and press Enter .
8.	Install Fabric Manager.	Type zypper install -y opa-fm and press Enter .
9.	Start the Fabric Manager.	Type systemctl start opafm and press Enter .
Set up IPoIB IPV4 Configuration		
10.	Manually edit or create the ifcfg-ibX file.	NOTE Use the OS distribution-supplied instructions for setting up network interfaces. Type cat /etc/network/ifcfg-ib0 and press Enter .

continued...



Step	Task/Prompt	Action
		Example output: <pre>BOOTPROTO=static IPADDR=192.168.0.1 BROADCAST=192.168.0.255 NETWORK=192.168.0.0 NETMASK=255.255.255.0 STARTMODE=auto IPOIB_MODE='connected' MTU=65520</pre> NOTE: To configure datagram mode for AIP, change <code>IPOIB_MODE=datagram</code> and remove (comment out) <code>MTU=</code> of the <code>ifcfg-ib0</code> file. Further details can be found in the <i>Intel® Omni-Path Fabric Performance Tuning User Guide</i>.
11.	Bring up the <code>ib0</code> interface.	Type <code>ifup ib0</code> and press Enter .
12.	Perform a test ping.	Type <code>ping <remote IPoIB address></code> and press Enter. For example: <pre>ping 10.228.200.161 PING 10.228.200.161 (10.228.200.161) 56(84) bytes of data: 64 bytes from 10.228.200.161: icmp_seq=1 ttl=64 time=0.863 ms</pre>
(Optional) Install the Fabric Manager GUI		
13.	On one node in the fabric: install the Fabric Manager GUI.	NOTE Intel recommends not to install the Fabric Manager GUI on the Management Node where the Fabric Manager is being used. Type <code>zypper install -y opa-fmgui</code> and press Enter.
End Task		

1.11 Product Constraints

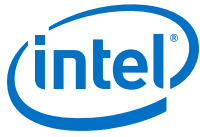
- The minimum firmware version for Intel® Omni-Path Host Fabric Interface Silicon 100 Series Switch ASIC is 10.7.
- Power class 2 AOC are supported. You must use UEFI version 1.5 or newer for proper operation. Servers using integrated HFI (-F) requires a specific BIOS level to support power class 2 AOC; contact your BIOS vendor for more information.
- Before using Intel® MPI provided by Intel® Parallel Studio 2018, please verify its OS compatibility.

1.12 Product Limitations

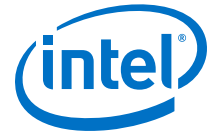
This release has the following product limitations:

- Performance Administration (PA) Failover should not be enabled with FMs running on differing software versions.

To disable PA failover, edit the `/etc/opa-fm/opafm.xml` file and in the `<Pm>` section, change `<ImageUpdateInterval>` to 0.



- Enabling UEFI Optimized Boot on some platforms can prevent the HFI UEFI driver from loading during boot. To prevent this, do not enable UEFI Optimized Boot.



2.0 Issues

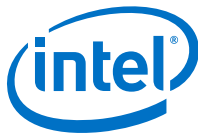
This section lists the resolved and open issues in the Intel® Omni-Path Software.

2.1 Resolved Issues

The following table lists issues that are resolved in this release.

Table 5. Issues Resolved in this Release

ID	Description	Resolved in Release
134494	Open MPI uses srand() family functions at MPI_Init() time. Therefore, if the user sets srand() before calling MPI_Init(), the values will be altered.	SLES* 15 SP1
135390	Very old HFI adapters may be programmed with an obsolete version of the AOC platform configuration file. In these cases, errors such as the following may be observed: <pre>[26.903186] hfi1 0000:d5:00.0: hfi1_0: parse_platform_config:Bad config file [26.903186] hfi1 0000:d5:00.0: hfi1_0: parse_platform_config:File claims to be larger than read size [27.351555] hfi1 0000:d5:00.0: hfi1_0: tune_serdes: Unknown port type</pre>	SLES* 15 SP1
135975	After performing an OPA software configuration update, switches will show the new settings when queried by opaswitchadmin tools, however, individual ports will continue to operate using the previous settings, including LinkWidth enable.	SLES* 15 SP1
136728	If hundreds of links are bouncing while the FM is sweeping, the FM sweep time may be significantly extended. This can result in unexpected delays in FM responsiveness to fabric changes or host reboots. (The issue is that active links bounce between the time FM discovers one side of the link versus the other side of the link.)	SLES* 15 SP1
139550	Infrequently, an AOC may exhibit an unexpectedly high local link integrity error rate after the link comes up, relative to the error rate on previous link up occasions. This can be determined by observing a link quality of <5. These links may eventually experience a link width downgrade.	SLES* 15 SP1
140691	When running opaswitchadmin against multiple externally-managed switches simultaneously, it sends schedule requests in parallel to those hosts. It is possible that some hosts may intermittently fail due to timeouts at high levels of parallelism.	SLES* 15 SP1
140881	In rare cases when an LNI failure occurs, the link will not come up after manually disabling and re-enabling the link.	SLES* 15 SP1
140911	The OFI verbs provider does not support FI_EP_RDM End Point type. This End Point type is needed for Open MPI OFI support. Therefore, Open MPI OFI support will not run over the verbs provider.	SLES* 15 SP1
141005	In this version, the output of the module parameter num_user_contexts has been changed. The value of the module parameter num_user_context used at driver init time determines the number of receive contexts reserved for PSM. The default value of -1 caused the driver init sequence to determine how many CPUs are available, and assigned the context count to that value. <i>It would then update the module parameter num_user_contexts with that value.</i> This incorrect behavior has been fixed. num_user_contexts is no longer updated.	SLES* 15 SP1
continued...		



ID	Description	Resolved in Release
141793	Use of a static buffer could produce an incorrect device name (hfi1_x) in dmesg logging.	SLES* 15 SP1
143449	PM will scroll LQI=0 and Integrity Exceeded Threshold logs when an additional VF with QoS enabled and a device group that is not "All". NOTE This issue does not occur when running against the default opafm.xml configuration file.	SLES* 15 SP1
144165	Nodes unable to ping on IPoIB. NOTE This issue occurs when a host port disappears and reappears from the FM's topology (usually due discovery timeout or major fabric disruption), while the port remains ACTIVE the entire time. This results in the host port not being a member of the IP multicast groups. The primary symptom is the inability to resolve IP addresses via ARP.	SLES* 15 SP1
144795	ESM assigns invalid MLIDs. IPoIB and other applications that use multicast will not function correctly with invalid MLIDs.	SLES* 15 SP1
STL-46318	If the Admin VF is not running on VL0, the HSM may get into a state where it is unable to talk to the fabric. The sweep will log the following errors: <pre>opamgt ERROR: [<pid>] omgt_send_mad2: send failed; Invalid argument, agent id 2 MClass 0x81 method 0x1 attrId 0x11 attrM 0x0 WARN [topology]: SM: sm_send_stl_request_impl: Error Sending to Path:[1] Lid:[0xffffffff] [Can't find node in topology!]. AID:[NODEINFO] TID:[0x0000000000000031] Status:[OK (0x00000000)] WARN [topology]: SM: topology_main: TT: too many errors during sweep, will re-sweep in a few seconds rc: 108: unrecoverable error</pre>	SLES* 15 SP1

2.2 Open Issues

The following table lists the open issues for this release.

Table 6. Open Issues

ID	Description	Workaround
STL-48734	Some applications compiled with older compilers may use a personality bit that signifies that READ should imply EXECUTE permissions. To improve system security, the hfi1 driver does not allow execute permissions on PSM memory maps. Therefore, applications that use READ implies EXECUTE will fail to run.	As root, run the execstack tool to clear the executable bit on the binary: <code>execstack -c <binary></code> Alternatively, recompile the binary to not set this personality bit.
STL-49732	The Subsystem Vendor and Subsystem Device ID in the PCI configuration space of Intel® Omni-Path discrete HFI cards may not indicate the correct OEM vendor and device. As a result, the <code>lspci</code> command may show incorrect Subsystem Vendor and Device ID information. This issue affects Intel server boards for Intel® Xeon® Processor v3 and v4 Product Family configured in Legacy OS boot mode.	Reconfigure the system from Legacy OS boot mode to UEFI boot mode.
142330	MPI applications that leverage the PSM2 library's access to the HFI ASICs Memory Mapped IO and that access the MMIO directly (not via PSM2) can potentially cause an "unsupported opcode" error which some servers handle as a critical error.	Disable upstream error reporting using the AER mask register.
continued...		



ID	Description	Workaround
		- For discrete HFI ASICs, use <pre>setpci -d 8086:24f0 ECAP_AER +8.1=00100000:00100000</pre> - For integrated HFIs, use <pre>setpci -d 8086:24f1 ECAP_AER +8.1=00100000:00100000</pre>
STL-47003	Due to a kernel setting, hfidiaags cannot work while the HFI driver is loaded. The tool and driver are mutually exclusive.	Boot the kernel with <code>iomem=relaxed</code> . This turns off the resource exclusivity check.
STL-46550	Running workloads with more than 78 ranks with the Open MPI OFI MTL over OFI Verbs;OFI_RXM provider may result in a hang with message sizes larger than 65 KB.	To avoid this issue, increase the TX/RX size by setting the following environment variables on the <code>mpirun</code> command line: <code>-x FI_VERBS_RX_SIZE=2000</code> <code>-x FI_VERBS_TX_SIZE=2000</code>
STL-46077	For systems running on SLES* 15.1, there is a known issue with <code>irqbalance</code> .	Contact Intel Customer Support for more information.
STL-55021	Due to changes in the kernel, a user space application cannot access a hardware resource if that resource is being used by a kernel driver. The result is that the <code>hfi1_eprom</code> cannot access the EEPROM on an HFI when <code>hfi1</code> kernel driver is using the device.	Perform the following workaround: - Unload <code>hfi1</code> kernel driver: <code>rmmod hfi1</code> - Run <code>hfi1_eprom</code> commands. - Reload <code>hfi1</code> kernel driver: <code>modprobe hfi1</code>
STL-46606 STL-47956 STL-48661	Bouncing a link or rebooting a device under certain fabric conditions may cause a switch in the fabric to be removed from the Fabric Manager's internal view of the topology leading to fabric disruptions and instability.	Contact Intel Customer Support for more information.
STL-46790	In cases where GSI services are active and the FM is receiving capability change traps (common after node reboots), FM responsiveness may be impacted. This could result in data traffic disruption or unexpected FM failovers. GSI traffic would include the PM, SA, and DBSync (FM failover).	Or, apply the following manual workaround: - Disable trap handling via the <code><IgnoreTraps></code> FM XML config option. Note that this prevents event-driven sweeps, so the FM will only handle fabric changes based on the configured regular sweep interval (default is every 5 minutes). - Disable the PM. This may mitigate the most likely cause of failure, given the higher volume of PM traffic. Note that this disables performance counter collection, and may not completely mitigate the issue.
STL-47546	When an ISL goes down in the middle of an FM sweep (due to a disruption in the fabric such as a reboot), the SA copy of topology becomes invalid when the Fattree routing algorithm is used. SA queries that use this topology (e.g., path record query) fail. NOTE A path record query failure can be seen in FM log as "INVALID TOPOLOGY" messages. The issue will resolve after the FM's next successful sweep.	To avoid this issue, use the Shortestpath routing algorithm instead of Fattree.