

# Using System x Features on Demand



Introduces the feature licensing offering for System x rack, tower and blade servers, options, and switches

Explains how to acquire, install, and manage the license keys

Describes what to do when you replace key hardware components

David Watts  
Alexander Frank  
Jonathan Hiott  
Bob Loudon

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## **Using System x Features on Demand**

October 2014

**Note:** Before using this information and the product it supports, read the information in “Notices” on page vii.

## **Second Edition (October 2014)**

This edition applies the following systems:

IBM PureFlex System  
IBM Flex System Enterprise Chassis  
IBM Flex System Manager  
IBM Flex System x220 Compute Node  
IBM Flex System x222 Compute Node  
IBM Flex System x240 Compute Node  
IBM Flex System x240 M5 Compute Node  
IBM Flex System x440 Compute Node  
IBM Flex System x280 X6 Compute Node  
IBM Flex System x480 X6 Compute Node  
IBM Flex System x880 X6 Compute Node  
IBM Flex System V7000 Storage Node  
IBM 42U 1100mm Enterprise V2 Dynamic Rack  
IBM PureFlex System 42U Rack and 42U Expansion Rack

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# Preface

Almost any IT infrastructure investment that you make includes capabilities that are well beyond those capabilities that you initially need. In some cases, your environment might grow to need those other capabilities in subsequent months or years while in other cases, you might never need them.

IBM® Features on Demand (FoD) is a licensing procedure that makes it easier for you to pay for the capabilities that you need now with your System x®, BladeCenter®, and Flex System servers, adapters, and switches while also giving you the opportunity to upgrade your initial investment to support more capabilities when you need them.

Conveniently, these capabilities are added through a software key activation without requiring hardware changes; the features are already present in the switch, server, or adapter, and are unlocked with their respective FoD activation key.

This paper describes the processes that are involved with activating and installing the FoD upgrades. We also cover activation key backup and what to do when you are servicing a system that has FoD upgrades already installed. This paper is meant for IBM employees, Business Partners, and customers who want to better understand the FoD offerings and must purchase, install, or service a system with FoD upgrades.

## Authors

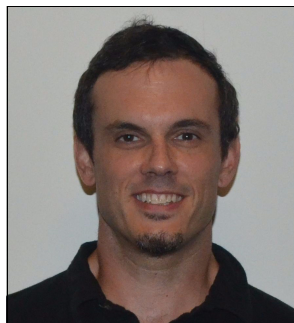
This paper was produced by a team of specialists from around the world working at the International Technical Support Organization, Raleigh Center.



**David Watts** is a Senior IT Consultant in the Lenovo Enterprise Business Group in Morrisville, North Carolina, USA. He manages residencies and produces pre-sale and post-sale technical publications for hardware and software topics that are related to System x®, Flex System, and BladeCenter® servers. He has authored over 300 books and papers. Before working for Lenovo starting in 2014, David worked for the IBM Redbooks organization (1997 - 2014) and as a pre-sale technical specialist for IBM Australia (1989 - 1996). David holds a Bachelor of Engineering degree from the University of Queensland (Australia).



**Alexander Frank** is a German corporate student and attends the IBM university program in Berlin, Germany. He studies International Business Administration at the Berlin School of Economics and Law and works as an intern for IBM in the United States at the IBM ITSO Center in Raleigh. He has been with IBM Germany since 2012.



**Jonathan Hiott** is a Remote Support Technician for BladeCenter, PureFlex®, and System x in Atlanta, Georgia. He has been with IBM since December 2008 and has 11 years of experience in Information Technology. His areas of expertise include assisting clients to determine and solve problems regarding BladeCenter, PureFlex, and System x hardware.



**Bob Louden** is a Senior Systems Engineer specializing in networking for Lenovo. Bob holds a BS in Computer Science from Virginia Tech and an MS in Computer and Communications Science from the University of Michigan. Through 32 years in the IT industry (in roles that ranged from product development to technical sales support to consulting), Bob has helped organizations apply technologies to solve business problems or to realize opportunities.

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**IBM Development:**

- ▶ Warren Bailey
- ▶ Kathy Brown-Fitzpatrick
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- ▶ David Watts
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# Introduction

Almost any IT infrastructure investment that you make includes capabilities that are well beyond those capabilities that you initially need. In some cases, your environment might grow to need those other capabilities in subsequent months or years while in other cases, you might never need them.

This chapter includes the following topics:

- ▶ 1.1, “IBM Features on Demand” on page 2
- ▶ 1.2, “Components that offer FoD upgrades” on page 3
- ▶ 1.3, “Available tools” on page 4
- ▶ 1.4, “Minimum firmware levels” on page 6

## 1.1 IBM Features on Demand

IBM Features on Demand (FoD) makes it easier for you to pay for the capabilities that you need now with your System x, BladeCenter, and Flex System servers, adapters, and switches while also giving you the opportunity to upgrade your initial investment to support more capabilities when you need them, as shown in the following examples:

- ▶ Adding FCoE to network adapters

The IBM Flex System can support separate Fibre Channel and Ethernet networking infrastructures (common today) or the newer Fibre Channel Over Ethernet (FCoE) technology, which carries Fibre Channel traffic over the Ethernet and eliminates the need for a separate Fibre Channel infrastructure.

If your organization is not ready to implement FCoE, you can start with Flex system x240 compute nodes that feature a two-port 10 Gb LAN on Motherboard (LOM) but not pay the cost of the IBM Virtual Fabric Advanced Software Upgrade that is required for the LOM to support FCoE. Then, if you choose to implement FCoE at some time, you can purchase only the upgrade.

- ▶ Adding ports to switches

The base version of each IBM Flex System Fabric EN4093R 10Gb Scalable Switch supports 240 Gb of connectivity, which uses the available internal or external 10 Gb ports or the external 40 Gb ports, as required. This connectivity provides enough bandwidth for one 10 Gb internal connection to each of 14 compute node IO adapters and 10 external 10 Gb uplinks to the rest of the network. This configuration is ideal if you are using two-port I/O adapters. (I/O adapters connect to each of two IO modules.)

However, if the applications that you are running on your 14 compute nodes require four-port IO adapters, you can apply an IBM Flex System Fabric EN4093 10Gb Scalable Switch Upgrade to add an increment of 220 Gb of supported connectivity to your switch, which supports two internal 10 Gb connections to each compute node along with more uplink capacity.

Conveniently, these capabilities are added through a software key activation without requiring hardware changes. The features are already present in the switch, server, or adapter, and are unlocked with their respective FoD activation key.

If you purchase an FoD upgrade feature as part of a server or switch order, the IBM factory or IBM Business Partner enables the feature as part of the configuration and testing of the server and you can begin using the feature when you receive the server.

Alternatively, if you purchase an FoD upgrade that is separate from the server or switch order, you must complete the feature activation. In this case, an authorization code with instructions for activating the feature is mailed to you.

An authorization code is a 22-character alphanumeric string that is the proof of purchase and entitles you to upgrade one or more units with a particular feature. The authorization code and instructions for requesting an activation key are on a printed document that is mailed to you. If you order directly from IBM, the authorization code and instructions can also be sent to the email address that you provide when you register on the FoD website.

Either way, after keys are applied to the system, they are permanently stored in a key repository in the system. For upgrades to computing systems, such as adding features to network adapters, the key repository (which is also known as the keystore) is the Integrated Management Module II (IMM2) in the server. For upgrades to switches, the key repository is in the switch. Therefore, it is easy to move a system or switch without having to reapply the upgrades.

The use of IBM FoD includes the following benefits:

- ▶ Upgrade as you go

For example, as with most servers, the IBM System x3530 M4 has two active Gigabit Ethernet ports. The server also has two more Ethernet ports, but you do not need to enable those ports until you need them. When you are ready, you purchase and install the activation key and those ports are now available for use.

- ▶ Lower up front cost

Purchase keys later and add to existing hardware. For example, if you do not need premium features, such as RAID 6 and 60 in your RAID controller or FCoE in an Emulex 10 GbE adapter, you do not need to purchase them when you initially order the server.

- ▶ Software-based key upgrades

FoD is software-based. There are no other hardware components to install, so remote deployment is much easier and key deployment can be scripted (if needed) to upgrade multiple systems at once.

- ▶ Various key management options

Various components of the IBM ToolsCenter support FoD, including IMM2, IBM Advanced Settings Utility (ASU), IBM Systems Director, and IBM Dynamic System Analysis (DSA).

In this paper, we describe server-based and switch-based feature upgrades.

## 1.2 Components that offer FoD upgrades

Various components support FoD upgrades and the list continues to grow. For a complete list of FoD upgrades that were available at the time of this writing, see Appendix A, “FoD Component reference” on page 155.

The following I/O Module upgrades are included:

- ▶ Increasing the bandwidth that is supported through Ethernet switches
- ▶ Increasing bandwidth or adding advanced capabilities to Fibre Channel switches

The following system upgrades are included:

- ▶ Upgrading IMM2 to support remote presence or a web interface
- ▶ Activating more Ethernet ports
- ▶ Activating FCoE and iSCSI on 10 Gb Ethernet ports
- ▶ Activating RAID 6 or other premium features

Figure 1-1 shows the rear of the IBM System x3530 M4 with two active Gigabit Ethernet ports and two ports that can be activated via an FoD upgrade.

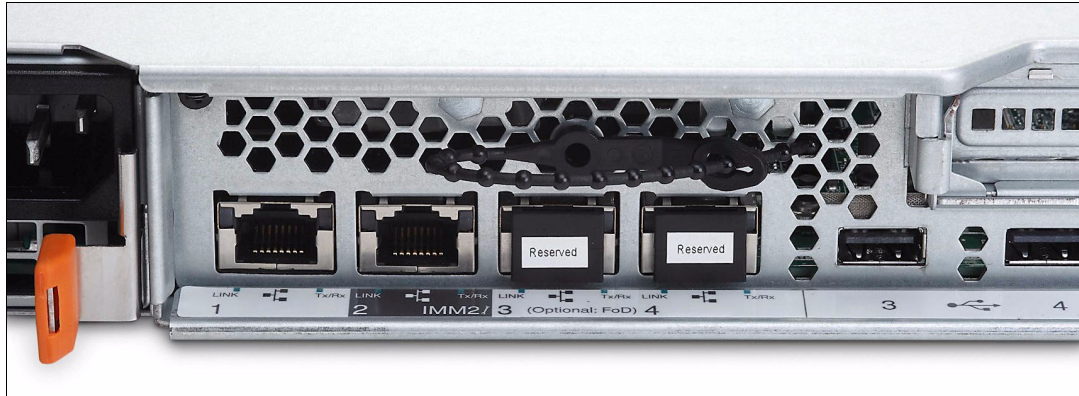


Figure 1-1 IBM System x3530 M4 with four Gigabit Ethernet ports: two active and two via FoD

Most FoD features are per device, such as the Intel I-350 Embedded Dual Port GbE NIC, Emulex VFA IIIr, and the Integrated Management Module II Remote Presence feature. Each of these devices requires its own FoD activation key.

For the Emulex VFA IIIr, each ASIC, or chip, requires its own activation key.

ServeRAID cards, such as the M5200 series, can use one key for multiple cards that are installed in a single system.

### 1.3 Available tools

The tools that are listed in Table 1-1 are available to help install and manage FoD features for servers and I/O modules.

Table 1-1 Tools that can be used for managing FoD upgrades

Tool name and description	Servers	I/O Modules
<p>IBM Integrated Management Module II (IMM2)</p> <p>The IBM Integrated Management Module provides a server-based management interface with which users can install, remove, and backup FoD activation keys.</p>	<p>Yes. For more information, see 3.1, “Installing a key by using IMM2” on page 52.</p>	<p>No</p>
<p>IBM Advanced Settings Utility (ASU)</p> <p>The IBM ASU provides command line-based tools with which you can install and manage FoD activation keys across both servers and IO modules. For more information, see this website:</p> <p><a href="http://ibm.com/support/entry/portal/docdisplay?Indocid=T00L-ASU">http://ibm.com/support/entry/portal/docdisplay?Indocid=T00L-ASU</a></p>	<p>Yes. For more information, see 3.5, “Installing a key by using ASU” on page 76.</p>	<p>Yes, see 4.2, “Installing FoD keys by using ASU” on page 100</p>

Tool name and description	Servers	I/O Modules
<p>IBM ToolsCenter Suite (TCS)</p> <p>IBM TCS is a consolidation of server management tools that help simplify the management of IBM System x, BladeCenter servers, and Flex servers. For FoD management, TCS provides FoD mass activation key management, including the inventory, acquisition, and installation FoD keys for multiple end points. All tasks can be done in a simple, unified web-based single-user GUI. For more information, see this website:</p> <p><a href="http://ibm.com/support/entry/myportal/docdisplay?lndocid=T00L-TCSUITE">http://ibm.com/support/entry/myportal/docdisplay?lndocid=T00L-TCSUITE</a></p>	<p>Yes. For more information, see 3.6, “ToolsCenter Suite FoD Mass Activation Tool” on page 85. (Also can perform mass activation.)</p>	<p>No</p>
<p>IBM Preboot Dynamic System Analysis (DSA)</p> <p>IBM DSA provides preboot tools with which users can install and manage FoD activation keys on servers. For more information, see this website:</p> <p><a href="http://ibm.com/support/entry/portal/docdisplay?lndocid=SERV-DSA">http://ibm.com/support/entry/portal/docdisplay?lndocid=SERV-DSA</a></p>	<p>Yes. For more information, see 3.2, “Installing a key by using Preboot DSA” on page 59.</p>	<p>No</p>
<p>I/O Module Industry Standard Command Line Interface (ISCLI)</p> <p>The ISCLI provides a direct method for collecting switch information and performing switch configuration. By using a basic terminal, you can view information and statistics about the switch and perform any necessary configuration with the ISCLI.</p> <p>For more information about the ISCLI, see the ISCLI Reference at this website:</p> <p><a href="http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7943.pdf">http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7943.pdf</a></p>	<p>No</p>	<p>Yes. For more information, see 4.3, “Installing FoD keys by using the Industry Standard CLI” on page 106.</p>
<p>I/O Module Browser Based Interface (BBI)</p> <p>By using the BBI software, you can use your web browser to access switch information and statistics perform switch configuration.</p> <p>For more information about the BBI, see the BBI Quick Guide at this website:</p> <p><a href="http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7944.pdf">http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7944.pdf</a></p>	<p>No</p>	<p>Yes. For more information, see 4.4, “Installing FoD keys by using the Browser Based Interface” on page 112.</p>
<p>I/O Module Menu-Based CLI</p> <p>As with the ISCLI, the Menu-Based CLI provides a direct method for collecting switch information and performing switch configuration. With the Menu-Based CLI, the various commands are logically grouped into a series of menus and submenus. Below each menu is a prompt where you can enter any command that is appropriate to the current menu.</p> <p>For more information about the Menu-Based CLI, see this website:</p> <p><a href="http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7942.pdf">http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7942.pdf</a></p>	<p>No</p>	<p>Yes. For more information, see 4.5, “Installing FoD keys by using the Menu-Based CLI” on page 123.</p>

The following tools also are used to manage IBM FoD capabilities:

- ▶ FoD website

At the IBM FoD website, you can generate FoD activation keys from FoD authorization codes, retrieve authorization codes and activation keys that you received, reassign keys to new hardware (for example, in case of hardware replacement), and obtain 90-day trial keys to try out new capabilities. For more information, see this website:

<https://www-304.ibm.com/systems/x/fod/index.wss>

- ▶ IBM Systems Director

By using the IBM Systems Director Feature Activation Manager, you can centrally manage FoD keys for Integrated Management Module II (IMM2), Chassis Management Module (CMM), or switches that support FoD. For more information, see this website:

<http://ibm.com/systems/software/director/>

- ▶ IBM ToolsCenter

The IBM ToolsCenter is a download portal for server management tools, such as DSA, ASU, and the ToolsCenter Suite. For more information, see this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=TOOL-CENTER>

- ▶ IBM Portable Dynamic System Analysis (DSA)

IBM Portable DSA provides command line-based operating system tools with which users can install and manage FoD activation keys on computing systems. For more information, see this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=SERV-DSA>

**Notes:** Consider the following points:

- ▶ We recommend the use of ASU instead of portable DSA. ASU offers FoD management capabilities for servers and I/O modules.
- ▶ Portable DSA is a different tool to Preboot DSA.

## 1.4 Minimum firmware levels

The following firmware levels are required for systems that are using FoD:

- ▶ DSA version 9.20 or later must be installed to use FoD functionality.
- ▶ IMM2 must be present (M4 or later servers). There is no support for FoD that uses IMM in System x M3 or older servers.
- ▶ UEFI firmware level must be at the designated required level for the hardware option that you are adding.



# Acquiring FoD activation keys

An IBM Features on Demand (FoD) activation key provides the means to unlock a feature on an IBM server, chassis, switch, or option.

This chapter describes the methods that are available to obtain the FoD activation keys. It also provides the necessary information that is required to maintain and report on existing activation keys.

For more information about the procedures to install the keys into computing systems, see Chapter 3, “Installing Server FoD keys” on page 51. For more information about the procedures for installing keys into Flex System I/O modules, see Chapter 4, “Installing I/O Module FoD keys” on page 97.

This chapter includes the following topics:

- ▶ 2.1, “Overview of FoD upgrade activation processes” on page 8
- ▶ 2.2, “Authorization codes” on page 16
- ▶ 2.3, “How to find the Unique Identifiers” on page 17
- ▶ 2.4, “Using the IBM FoD website” on page 35

## 2.1 Overview of FoD upgrade activation processes

IBM FoD upgrades are orderable part numbers that are similar to any other System x option. To use the upgrades, they must be activated first for the specific system or component on which they are used. The FoD upgrade is activated in one of the following ways:

- ▶ Automatically during manufacturing (if the FoD part numbers are ordered as part of a configure-to-order (CTO) or Special Bid configuration).
- ▶ Electronic delivery of Features on-Demand keys (eFoD)
- ▶ Manually after delivery via the web interface or other tools (if the FoD part numbers are ordered separately).

These methods are described in the following sections:

- ▶ 2.1.1, “FoD part numbers that are included in the server configuration” on page 8
- ▶ 2.1.2, “FoD part numbers purchased separately from the server or chassis” on page 9

### 2.1.1 FoD part numbers that are included in the server configuration

If you configure an FoD upgrade as part of a server or chassis order, IBM manufacturing or the IBM Business Partner enables the feature as part of the configuration and testing of the server or chassis. You can begin using the feature when you receive the server or chassis. This process includes the following steps, as shown in Figure 2-1 on page 9:

1. A purchase order is placed to IBM by the IBM Business Partner or customer directly.
2. An activation key is requested internally by IBM fulfillment. This key is generated by the Features on Demand website, which is also referred to as the IBM Key Management System (KMS).
3. The activation key is made available to manufacturing to activate the required features on the purchased systems. The systems are then delivered to the customer with the relevant features activated.

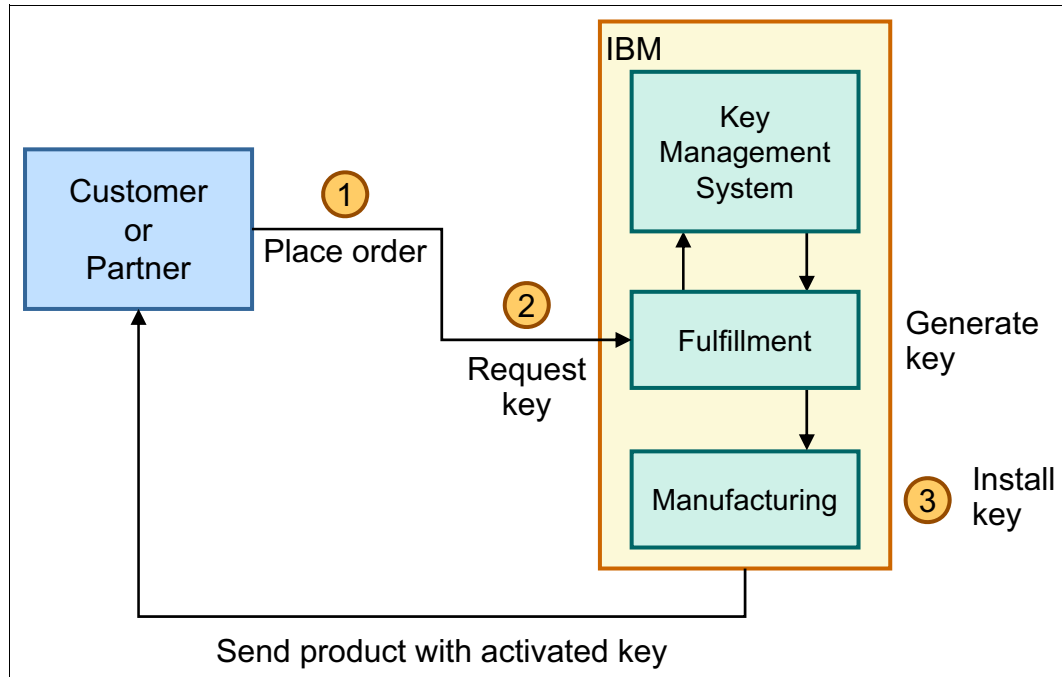


Figure 2-1 FoD order process where the FoD keys are installed by IBM manufacturing

**Install FoD:** When you are ordering systems, it is best to purchase the FoD upgrades with the order and have them installed by IBM manufacturing, where possible.

### 2.1.2 FoD part numbers purchased separately from the server or chassis

In the following sections, we describe the process for upgrading FoD when keys are purchased separately. We also describe the eFoD procedure, which is receiving keys through electronic means versus paper delivery.

If you purchase an FoD option or upgrade separately from a server or chassis order, you must activate the feature yourself by using one of the supported interfaces, such as the IMM2 web interface for System x servers. In this case, an authorization code (AC) with instructions for activating the feature is mailed to you.

An authorization code is a 22-character alphanumeric string that is the proof of purchase and entitlement to upgrade one or more units with a particular feature. For more information about obtaining activation keys from authorization codes, see 2.2, "Authorization codes" on page 16.

The process for obtaining an activation key by using an authorization code include the following steps, as shown in Figure 2-2 on page 10:

1. A purchase order is placed to IBM by the IBM Business Partner or customer directly.
2. IBM fulfillment provides the IBM Business Partner or customer with an authorization code.
3. The authorization code is submitted by the IBM Business Partner or customer to IBM via the FoD website (with its back-end system, KMS).
4. The KMS generates an activation key, which is downloaded by the IBM Business Partner or customer.

5. The activation key is installed on the relevant system that requires a feature activation.

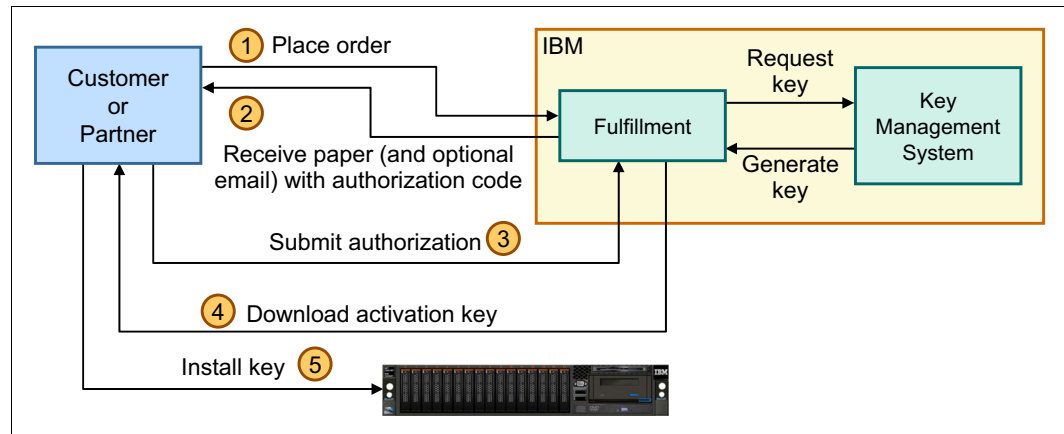


Figure 2-2 FoD order process when the FoD keys are ordered separately

### eFoD electronic feature key activation

eFoD is a new fulfillment method that provides electronic delivery of FoD upgrades (authorization codes). eFoD is typically used by distributors.

The use of eFoD includes the following benefits:

► **Speed**

Instead of waiting for the factory to print, pack, and ship the authorization code letters (nine business days on average), eFoD provides access to orders when they are sent for production (usually within one business day of order entry.)

You can customize notifications that are sent to authorized users under User Preferences on the FoD website. Authorized users are sent notifications after the eFoD keys are ready to be used. Users can select what type of information is in the sent notification and whether notification should be sent at all, which is all done via User Preferences on the FoD website.

► **Flexibility**

By default, every eFoD order splits the original order into multiples of 1. For example, ordering 10 activation keys for an option upgrade results in 10 quantity 1 authorization codes. It is then up to the receiver of the order to decide how those 10 authorization codes are delivered. There are multiple methods to obtain an overview of all available electronic inventory, including search functionality that is based on distributor feedback.

Starting August 2014, further enhancements were made so that users can decide whether to split their orders by default or keep the full ordered quantity on one Authorization Code.

► **Easy management**

Any eFoD order always is visible and available for further action through the Inventory Management section of the FoD site that is dedicated to IBM Distributors and Tier 1 Business Partners.

eFoD provides a central electronic warehouse that is always available to manage, track, and distribute FoD keys. Most common use cases involve the use of the Inventory management page on the website as a way to handle and maintain stock inventory, as shown in the following examples:

- Client shows up at the door, the Tier 1 Business Partner or Distributor uses electronic stock to build and deliver (via email) a client-tailored order.

- User can add more information (for example, local order numbers or comments) to orders and include them in email that is sent during order closure with their client.
- Allows easy integration of option upgrades. Select the upgrade, select integration, and provide hardware details for intended system.

► Security

A user can access inventory that shipped under their own customer number only. Authorization is granted manually through FoD support and access is allowed only to the customer's own number.

**Signing up for eFoD**

Complete the following steps to set up eFoD on the IBM FoD website:

1. Use your existing IBM ID to log in to the following FoD website:

<https://www-304.ibm.com/systems/x/fod/index.wss>

2. Go to the Inventory management menu (as shown in Figure 2-3) and request electronic delivery for your customer number. To obtain access, send an email to FOD@us.ibm.com and provide your IBM ID, SHIP TO customer number (or numbers) and request Distributor access with electronic delivery.

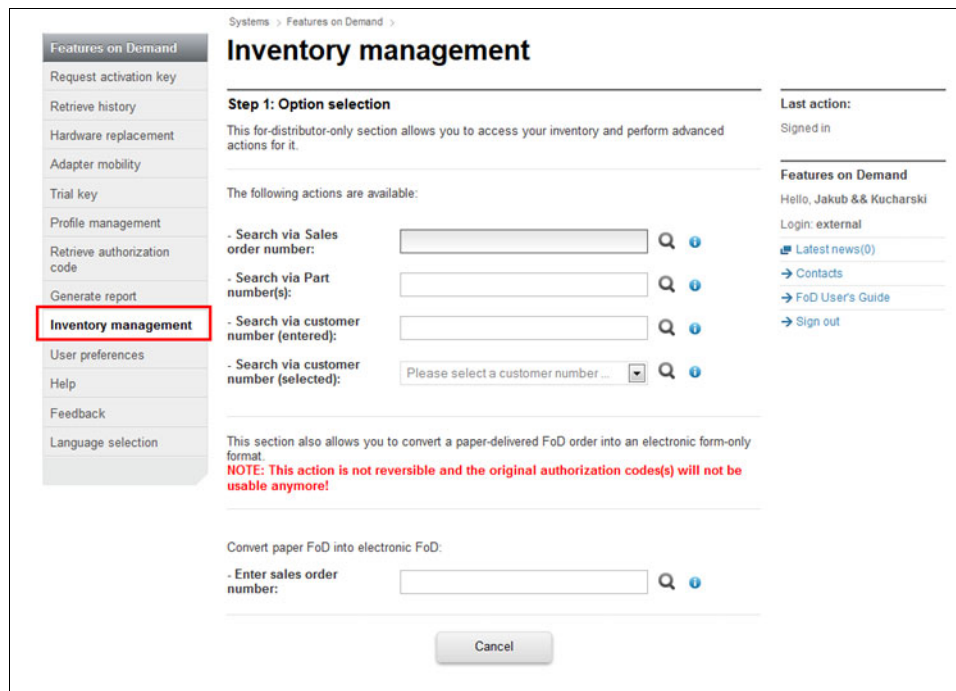


Figure 2-3 Inventory management menu on FoD site

**Paper-to-eFoD conversion:** Convert paper FoD into electronic by entering a sales order number in the appropriate field.

**Use of eFoD**

Complete the following steps to manage and use eFoD by using the IBM sales order number or IBM customer number:

1. Select **Inventory Management**.

2. Search via IBM sales order number (10 characters) or IBM customer number, as shown in Figure 2-4.

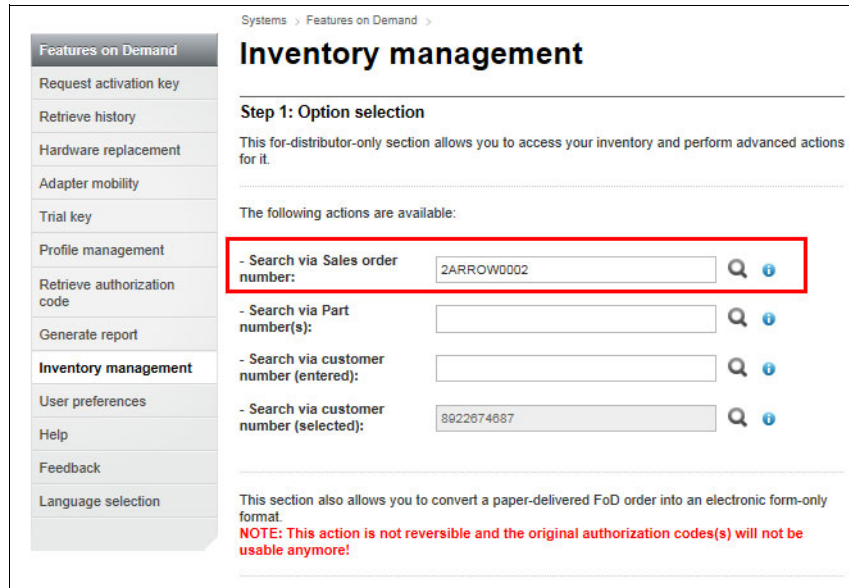


Figure 2-4 Enter IBM sales order number

3. Select one or more codes, as shown in Figure 2-5.

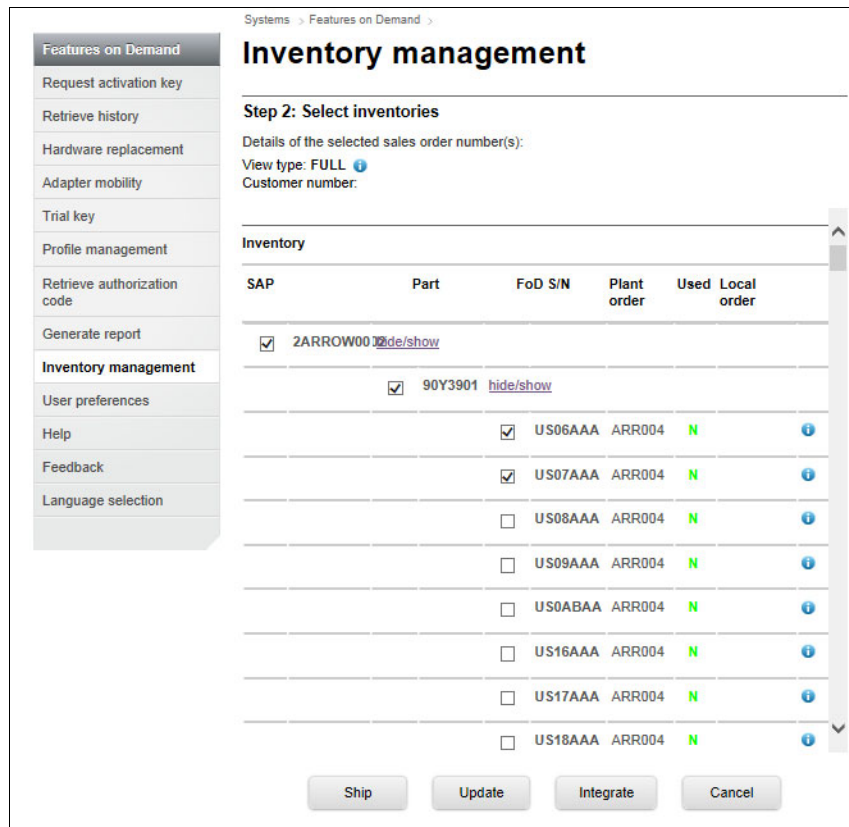


Figure 2-5 Code selection

4. After the codes are selected, enter the client's email address.

5. Enter your own purchase order numbers for easier overview later. (Although this step is optional, it is recommended.)
6. Enter any comments for you and your client to see. (Although this step is optional, it is recommended.)
7. Click **Ship**.

You receive an email with the authorization code (or codes).

### ***Search by using an FoD part number***

Complete the following steps to search by using an FoD part number:

1. If you know the FoD part number, select **Inventory Management** on the FoD site, as shown in Figure 2-6.

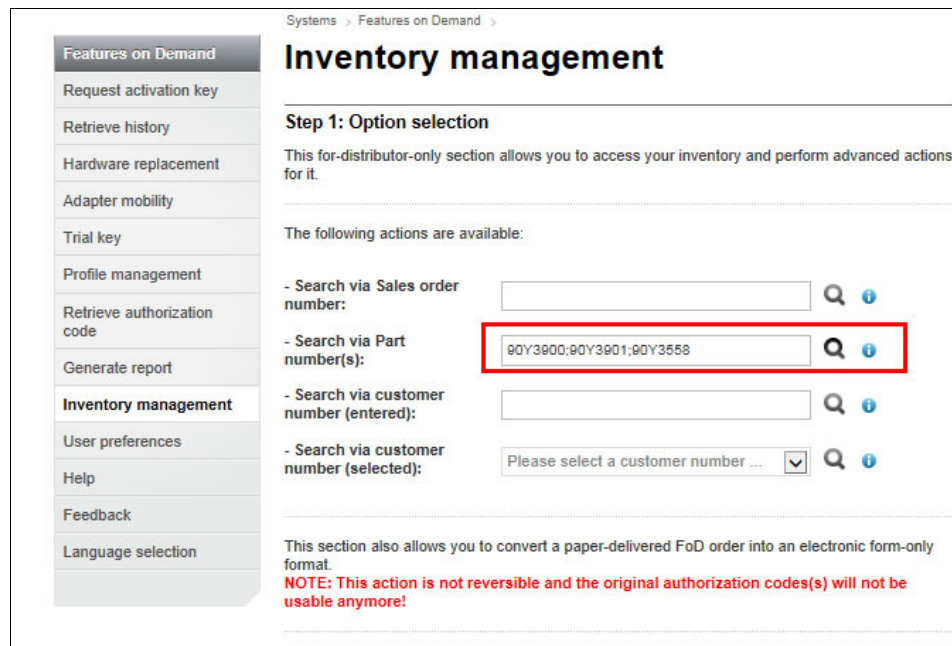


Figure 2-6 Search via FoD part number

2. Select as many FoD keys as needed for your client, as shown in Figure 2-7.

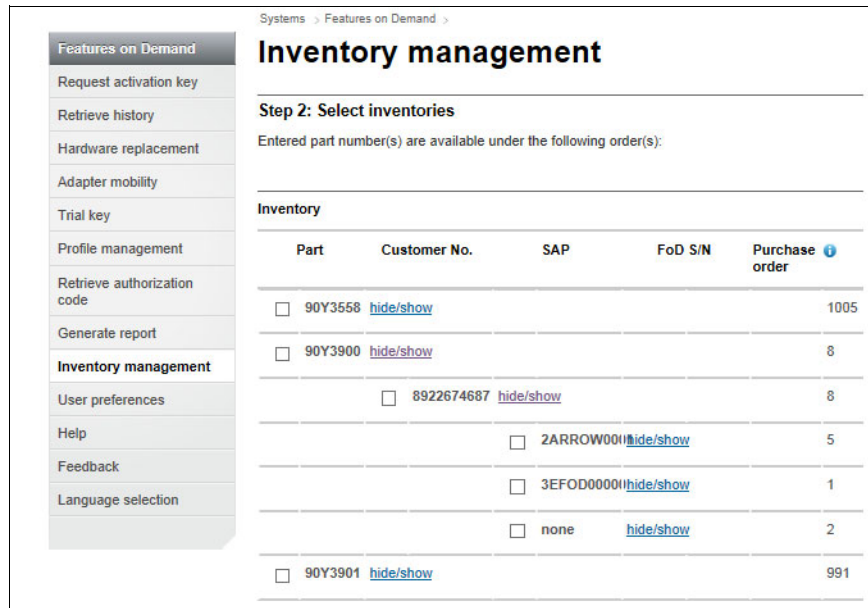


Figure 2-7 FoD inventory selection

3. Enter the client's email address.
4. Enter your own PO numbers for easier overview later. (Although this step is optional, it is recommended.)
5. Enter comments for you and your client to see. (Although this step is optional, it is recommended.)
6. Click **Ship**. (More order details are shown in Figure 2-8.)

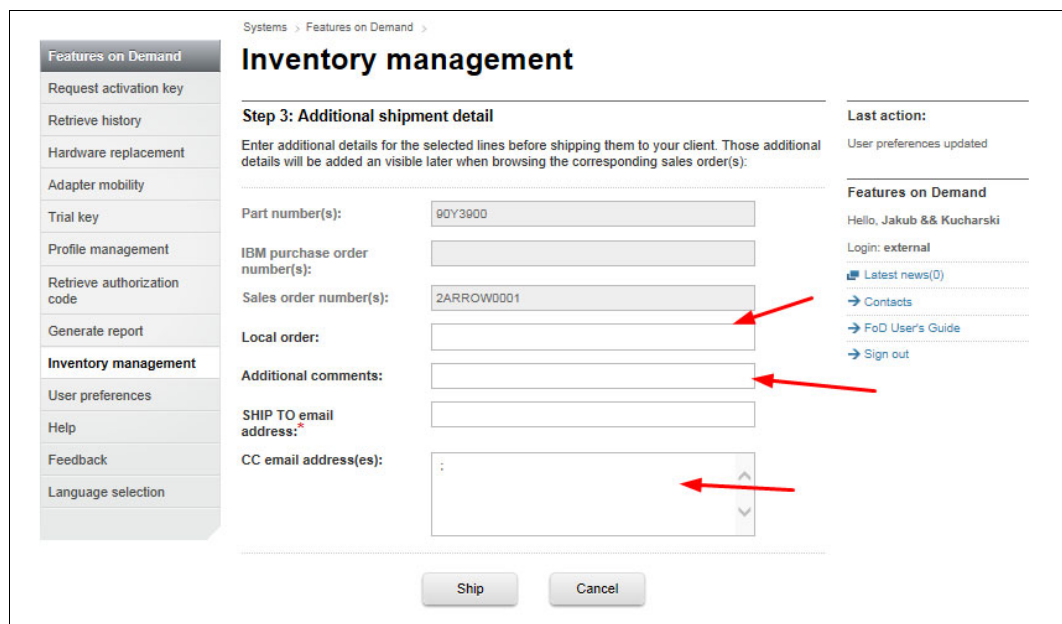


Figure 2-8 More order details

You receive an email with the authorization code (or codes).



### **eFoD tips**

The following tips are useful when you are using eFoD:

- ▶ Use Inventory Management when you are emailing the AC vouchers to your clients.
- ▶ Try to use your own PO orders and comments, when possible. By doing so, a resend is easier to facilitate.
- ▶ Copy yourself or anyone else to ensure that emails are received by anyone who needs them.
- ▶ When you are building custom solutions at your local integration center, pre-activate the upgrades via Inventory Management on the system. Clients can then download the key for their systems after their solution is delivered.
- ▶ Create your own stock in advance to have immediate access for client needs

There is no need to place orders with IBM each time a new customer requests an FoD key. Instead, use Inventory Management to generate a customer order from stock inventory after your local invoicing is complete.

- ▶ Set up your profile on FoD site under the User preferences section, as shown in Figure 2-9.

<b>Features on Demand</b>	<h2>User preferences</h2>
Request activation key	This option allows you to set up how and if the website communicates with you via email. IBM Business Partners with access to Inventory management can also set up how their delivery emails are created. when they are being sent to their customers.
Retrieve history	
Hardware replacement	
Adapter mobility	
Trial key	
Profile management	
Retrieve authorization code	
Generate report	
<b>User preferences</b>	
Help	
Feedback	
Language selection	

**My preferences:**  
Receive emails from the website when my trial keys expire in  
 7 days  
 30 days

Receive emails from the website when orders are shipped  
 Yes  
 No

Include .pdf of the authorization code(s) as attachment(s) in the emails  
 Yes  
 No

Figure 2-9 User preferences section

## 2.2 Authorization codes

Authorization codes (ACs) are used when an order for FoD part numbers is placed separately.

An AC is a 22-character alphanumeric string that is the proof of purchase and entitlement to upgrade one *or more* instances of a component with a particular feature. Authorization codes are entered into a document and printed and sent to you or emailed to you. The document contains the following information:

- ▶ Name and part number of the FoD upgrade
- ▶ Quantity ordered
- ▶ Your order number
- ▶ One authorization code
- ▶ Instructions on how to use the authorization code to obtain activation keys

When an FoD upgrade is purchased separately, an authorization code is mailed to the IBM Business Partner or customer through postal mail or eFoD, as described in 2.1.2, “FoD part numbers purchased separately from the server or chassis” on page 9. eFoD is now the preferred method for FoD key administration and delivery. To receive the authorization code via postal mail, email, or both, the IBM Business Partner or customer must register on the website. For more information about the registration process, see 2.4.1, “Register an account with IBM” on page 35.

**Tip:** Register on the FoD website before placing your FoD order. Doing so ensures that you receive the authorization code via email and postal mail at the time of order.

The authorization code is used to generate activation keys from the IBM Features on Demand website. The authorization code is entered on the website and the subsequent activation keys are generated.

**Authorization codes are one-to-many:** A single authorization code might be associated with a single activation key or multiple activation keys for the same type of component. The number of activations you can receive from a single authorization code is printed on the document that you are sent. It is also listed on the website.

You also can use the authorization code on the website to retrieve the history of all activation keys that are generated from that authorization code and to regenerate keys, if needed. For more information about the use of an authorization code to retrieve a feature activation key, see 2.4.2, “Requesting an activation key” on page 38.

### 2.2.1 Tips for managing authorization codes and activation keys

This section provides some general useful tips for managing authorization codes and activation keys.

#### Distributors and resellers

Consider the following tips for distributors and resellers:

- ▶ Have IBM manufacturing install the feature activation keys as part of the order purchase where possible to save time and administration.

- ▶ Create stock in advance to have immediate access for client needs. As a result, there is no need to place an order with IBM each time a new client requests an FoD key. Instead, use Inventory Management on the FoD site to generate a customer order from your stock inventory after local invoicing is complete.
- ▶ Place one order for keys per customer so that a unique authorization code is generated for that customer.
- ▶ Determine who is responsible to receive and process FoD authorization codes. Ensure that more than one person is registered to receive the authorization codes for redundancy purposes.

## Customers

Consider the following tips for customers:

- ▶ Have IBM manufacturing install the feature activation keys as part of the order purchase where possible to save time and administration.
- ▶ Determine who is responsible to receive and process FoD authorization codes. Ensure that more than one person is registered to receive the authorization codes for redundancy purposes.
- ▶ Store the paper authorization codes in a safe place.
- ▶ Ensure that the emailed electronic copies of the authorization codes are backed up and kept in a central location for those requiring access to them.
- ▶ Learn how to browse the FoD website for managing FoDs.
- ▶ Store downloaded activation keys in a central location that is backed up. This configuration is useful to technical staff that might require quick access to the keys if there is an emergency. The keys also can always be retrieved from the FoD website.

## 2.3 How to find the Unique Identifiers

In this section, we describe how to find Unique Identifiers (UIDs) that are needed to activate FoD upgrades. The UID that is needed varies based on the type of FoD upgrade you are activating. Consider the following points:

- ▶ IMM2 or ServeRAID upgrades and similar components use System UIDs.
- ▶ Flex System switches and adapters (for example, the QLogic 8200 Virtual Fabric Adapter) and similar components use the serial number of the component.
- ▶ Emulex adapters and similar components use the unique ID of each ASIC on the adapter

For more information about what type of UID is needed for each FoD component that is offered, see Appendix A, “FoD Component reference” on page 155.

Having your UIDs available is essential if there is a hardware replacement, such as with a network switch or adapter that uses FoD.

This section includes the following topics:

- ▶ 2.3.1, “System UIDs” on page 18
- ▶ 2.3.2, “Flex system network switch UIDs” on page 18
- ▶ 2.3.3, “QLogic adapter UIDs” on page 21
- ▶ 2.3.4, “Emulex adapter UIDs” on page 22

**Tip:** Preboot DSA and similar tools automatically find (and display) the UID as part of the FoD process if you have internet connectivity. This configuration means that you do not need the procedures that are described in this section if you are using Preboot DSA to activate FoD keys.

### 2.3.1 System UIDs

The System UIDs are a concatenation of the machine type and serial number (MTSN) of the server. Obtain the System UIDs physically from the component (for example, from the label on the front of the server) or remotely via the IMM web interface.

Complete the following steps by using the IMM web interface:

1. Log in to the IMM.
2. Click **System Status** then click **System Information**. We see the MTSN 7914KQoD09K, as shown in Figure 2-10. The Machine type is the first four digits of the Machine Type Model value.

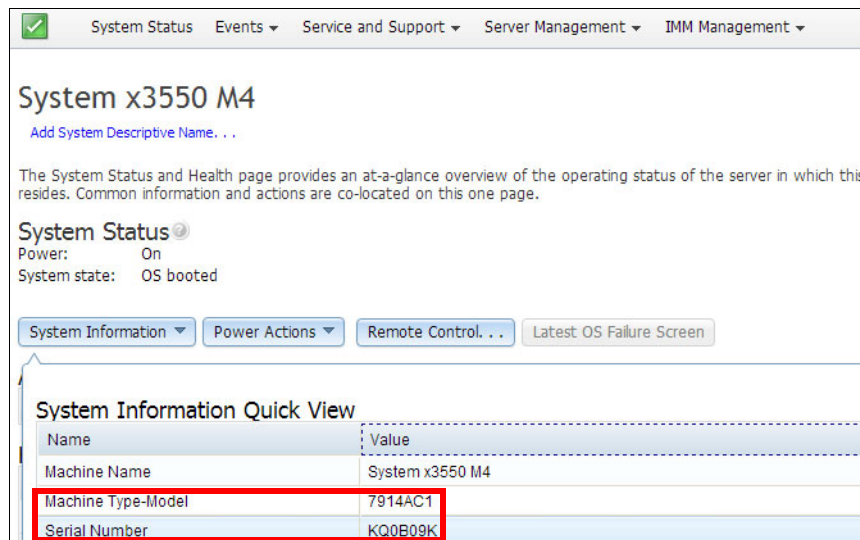


Figure 2-10 Obtain System UIDs

### 2.3.2 Flex system network switch UIDs

In this section, we describe how to find the UIDs for Flex System switches. In most cases, the UID is the switch serial number. However, depending on the switch vendor, there are a few exceptions, as shown in Table 2-1.

Table 2-1 Switch UIDs

Switch	UID format
Flex System EN2092, EN4093, EN4093R, SI4093, CN4093	Switch serial number For example: Y250VT1BW11
Flex System EN4023 (Brocade)	Switch World Wide Name (WWN) For example: 10:00:00:27:F8:D2:00:00
Flex System IB6131 (Mellanox)	FRU part number + serial number For example: 90Y3452Y00000000003

Switch	UID format
Flex System FC5022 (Brocade)	Switch World Wide Name (WWN) For example: 10:00:00:27:F8:D2:00:00

In the following example, we demonstrate how to locate the UIDs for the IBM Flex System EN4093:

1. Log in to the CMM.
2. Browse to the Chassis Management menu, then select **IO Modules**, as shown in Figure 2-11.

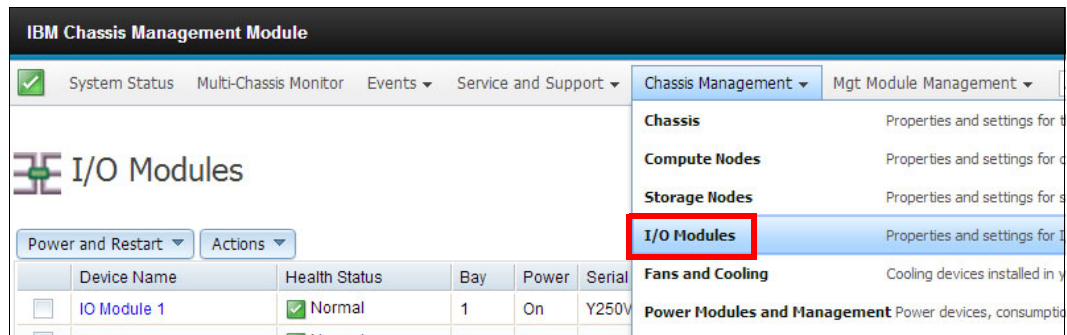


Figure 2-11 IO Module menu

Figure 2-12 shows a listing of all IO modules that are installed in the chassis. From here, you can obtain the serial number for each module as indicated.

The screenshot shows a detailed view of the 'I/O Modules' section in the CMM. A table lists the installed IO modules with their serial numbers highlighted in a red box. The table has columns for 'Device Name', 'Health Status', 'Bay', 'Power', 'Serial Number', and 'Part Number'.

Device Name	Health Status	Bay	Power	Serial Number	Part Number
IO Module 1	Normal	1	On	Y250VT1BW111	49Y4272
IO Module 2	Normal	2	On	Y010CM2BV156	95Y3311
IO Module 3	Normal	3	On	Y251NY26K054	69Y1932

Figure 2-12 IO Module serial numbers

The IO module serial numbers are also viewable in the CMM by clicking **System Status** → **Chassis Table view**.

Additionally, complete the following steps to find the UIDs by logging in to the switch directly:

1. From the same menu that is shown in Figure 2-12, select the switch that you want to log in to, then click **Actions**.

2. Select **Launch IOM Console**, as shown in Figure 2-13.

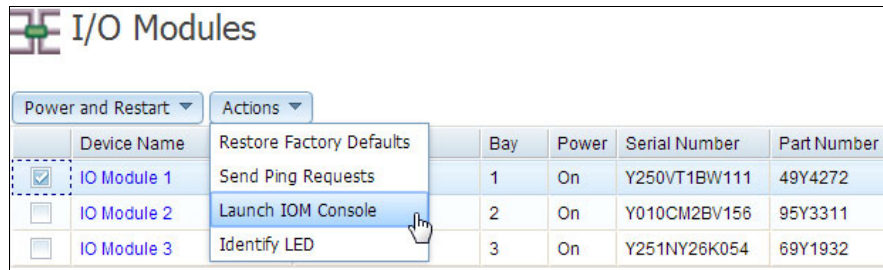


Figure 2-13 Launch IOM console

3. In the switch Login to window, enter the login credentials, as shown in Figure 2-14.

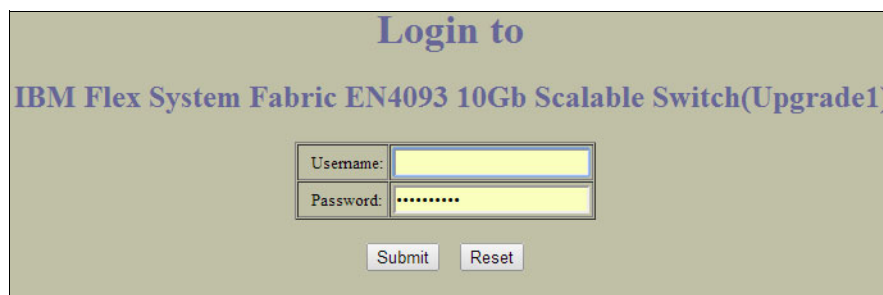


Figure 2-14 EN4093 login

4. From the Switch Dashboard, locate the serial number, as shown in Figure 2-15.

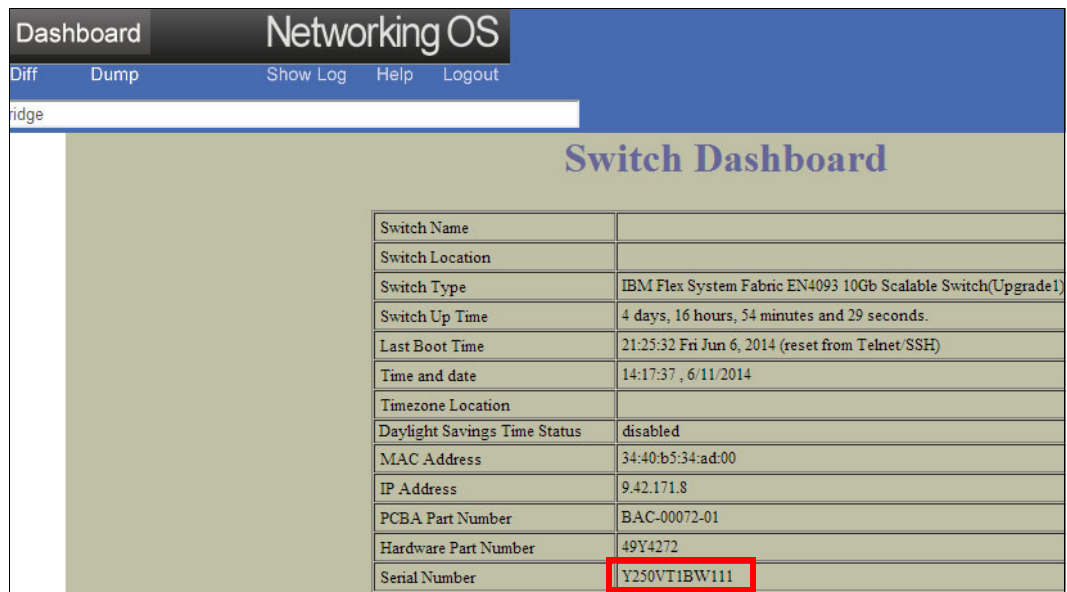


Figure 2-15 EN4093 serial number

### 2.3.3 QLogic adapter UIDs

Adapters (such as the QLogic 8200 Virtual Fabric Adapter Family) offer upgrades to full hardware offload for Fibre Channel over Ethernet (FCoE) and iSCSI processing through FoD activation. The adapter is similar to the Emulex VFA in that the FoD activation is not tied to the system planar, but to the adapter instead.

**Replacing an adapter:** When an adapter is replaced, you must update the UIDs that are recorded in the IMM. For more information about this process, see 5.3, “Replacing an adapter” on page 140.

The following methods can be used to identify QLogic UIDs:

- ▶ Run Preboot DSA and follow same steps as described in “Obtaining an FoD Identifier by using Preboot DSA” on page 25. Be sure to select the QLogic entry from the Inventory collection window.
- ▶ Run <F1> Setup and follow the same steps as described in “Using <F1> Setup to identify FoD ID” on page 31. Be sure to look for a QLogic Card serial number when you are browsing through the MAC addresses. You are looking for a panel that shows the serial number, as shown in Figure 2-16.

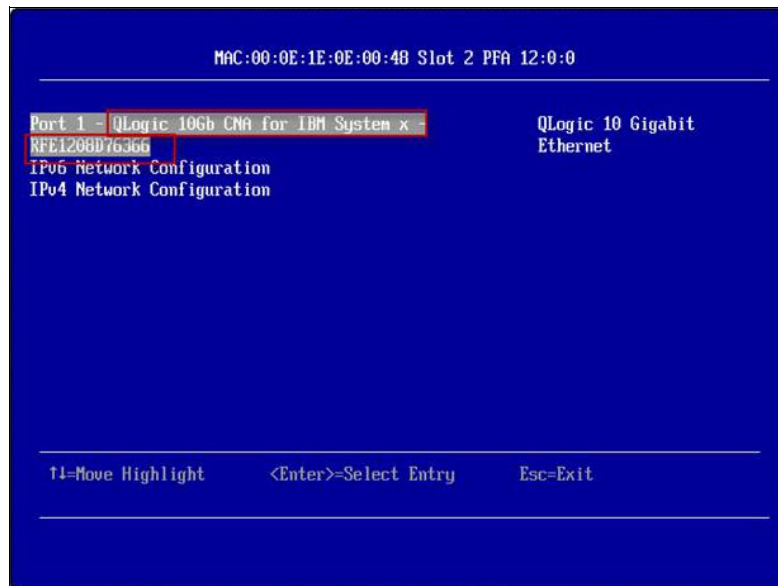


Figure 2-16 F1 setup panel that shows an example output for a QLogic card



- ▶ Inspect the QLogic card to determine serial number (SN), as shown in Figure 2-17.



Figure 2-17 Physical inspection example of a QLogic card that shows the serial number

### 2.3.4 Emulex adapter UIDs

Unlike most system and adapter FoD upgrades, Emulex adapters use a special Unique Identifier (UID) for FoD upgrades and that UID is linked to ASIC on the adapter. For more information about the adapters, see Appendix A, “FoD Component reference” on page 155.

The following tools are available to obtain the FoD Identifier for an Emulex adapter:

- ▶ Emulex OneCommand Manager (HbaCmd)
- ▶ Preboot DSA
- ▶ F1 Setup

It is important to note the following points before we describe the tools that are used to identify UIDs on Emulex adapters:

- ▶ Each application-specific integrated circuit (ASIC) on an Emulex adapter has its own FoD identifier (UID). Therefore, in the case of the IBM Flex System CN4054 Virtual Fabric Adapter, there are two FoD identifiers because the adapter contains two ASICs. Both of the FoD identifiers are required to obtain the activation keys for the card because activation is done at the ASIC level.
- ▶ The Emulex activation key that is derived from the UID unlocks only the ability to change the card personality to iSCSI or FCoE. You still must use the OneCommand Manager tool to set the personality after the key is installed and the system is restarted.
- ▶ The Emulex adapters and controllers that support FoD upgrades are listed in Appendix A, “FoD Component reference” on page 155. Ensure that the correct FoD upgrade part number is ordered; the process of applying the activation key is unsuccessful if you attempt to use the wrong key.



Even after you install the key (as described in Chapter 3, “Installing Server FoD keys” on page 51), the IMM2 cannot read the Emulex ASIC identifier; therefore, it marks the keys as installed, but the key must be validated by the Emulex firmware during UEFI system initialization before it is activated. The IMM2 status for these keys does not change if they are in use or not in use by the Emulex options that are installed in the system.

- ▶ Appendix A, “FoD Component reference” on page 155 also lists the FoD type that is used for each FCoE/iSCSI upgrade. Depending on the software tool that is used, you see a four-digit hexadecimal descriptor type or a five-digit decimal descriptor type. Consider the following points:
  - Emulex OneCommand Manager (HbaCmd) displays the FoD descriptor type in hexadecimal notation (for example, 800b).
  - F1 Setup displays the FoD descriptor type in hexadecimal notation (for example, 800b).
  - IBM Dynamic System Analysis displays the FoD descriptor type in decimal notation (for example, 32779).

If an FoD part number is ordered, the authorization code you receive creates an activation key for the specific FoD descriptor type only. The activation key that you download from the FoD website has a file name as shown in the following format example:

```
ibm_fod_type_identifier_anyos_noarch.key
```

In this name, *type* is the four-digit descriptor type in hex notation as shown in Appendix A, “FoD Component reference” on page 155 and *identifier* is the last 16 digits of the Emulex FoD identifier that you entered to create the key.

The remainder of this section describes how to retrieve the Emulex FoD identifier by using Emulex OneCommand Manager, IBM Preboot DSA, and the F1 Setup panels.

### **Obtaining an FoD Identifier using Emulex OneCommand Manager**

Emulex OneCommand Manager is a tool that is used to manage Emulex adapters. The tool can be downloaded at the following website:

<http://www.emulex.com/downloads/ibm.html>

After the tool is installed, complete the following steps to obtain a UID for an ASIC:

1. Open OneCommand Manager. In our example, as shown in Figure 2-18, we have two Emulex III VFAs. The first adapter that is shown is an Emulex Dual Port 10GbE SFP+ Embedded VFA III for IBM System x (00D9117). The second adapter is the Emulex Dual Port 10GbE SFP+ VFA III for IBM System x (95Y3764). We obtain the FoD identifier for the first adapter only.

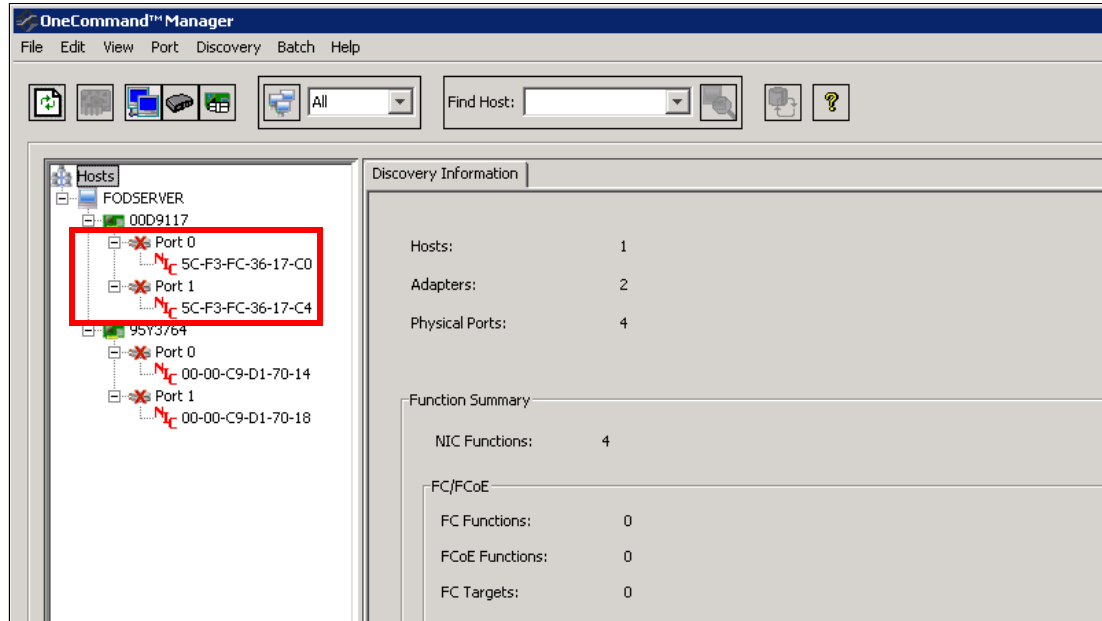


Figure 2-18 OneCommand Manager console that shows two Emulex VFA III adapters (x3650 M4)

2. Note either of the MAC addresses that are shown for the first adapter, as shown in Figure 2-18. This information is used to identify the FoD identifier of the card.

**Tip:** If the card has two ASICs (as is the case with the IBM Flex System CN4054 10Gb Virtual Fabric Adapter), one MAC address from each ASIC must be noted. Both FoD identifiers are required to obtain the activation keys for the card because activation is done at the ASIC level.

3. We use the Emulex HbaCmd CLI tool that is included with OneCommand Manager to identify the FoD identifier for the card. Browse to the tool, which is in the OneCommand Manager installation directory. For example, in Windows, the tool might be in the following locations:

C:\Program Files\Emulex\Util\OCManager

4. To obtain the FoD identifier for the ASIC on the first adapter, enter:

```
hbacmd getfodinfo MAC address
```

*MAC address* is the address of one of the MAC addresses on the first adapter.

For our example, the output is as shown in Figure 2-19.

```
C:\Program Files\Emulex\Util\OCManager>hbaCmd getfodinfo 5c-f3-fc-36-17-c0
FoD Identifier:  FK3W8VCZNTAL73W1X5XDJJ126T7R9WKW9
FoD Status:      disabled
FoD Type:        8005 (LOM)
```

Figure 2-19 Obtaining the FoD Identifier by using the HbaCmd utility

5. Copy the **FoD Identifier** value and enter it onto the FoD website as described in 2.4.2, “Requesting an activation key” on page 38.

**Tip:** The FoD Type number that is shown in Figure 2-19 can be cross-referenced with the FoD descriptor type that is available from the HbaCmd column in Appendix A, “FoD Component reference” on page 155 to ensure that the correct feature upgrade is ordered for the Emulex adapter.

### Obtaining an FoD Identifier by using Preboot DSA

Preboot Dynamic System Analysis (DSA) is a diagnostics tool that is integrated in the server’s firmware. Depending on version of Preboot DSA that is installed, figures that are used in this section might differ. (Preboot DSA version 9.60 was used in our lab.)

To retrieve an FoD Identifier by using Preboot DSA, complete the following steps:

**Tip:** If your server is connected to the Internet, there is another way to obtain the FoD Identifier. For more information, see 3.2.2, “Download and install from the Internet” on page 65. When you are selecting the Emulex and click **Install from IBM Website**, the FoD Identifier is automatically read and displayed, as shown in Figure 3-22 on page 66.

1. Power on the system and press F2 when the UEFI window appears, as shown in Figure 2-20.

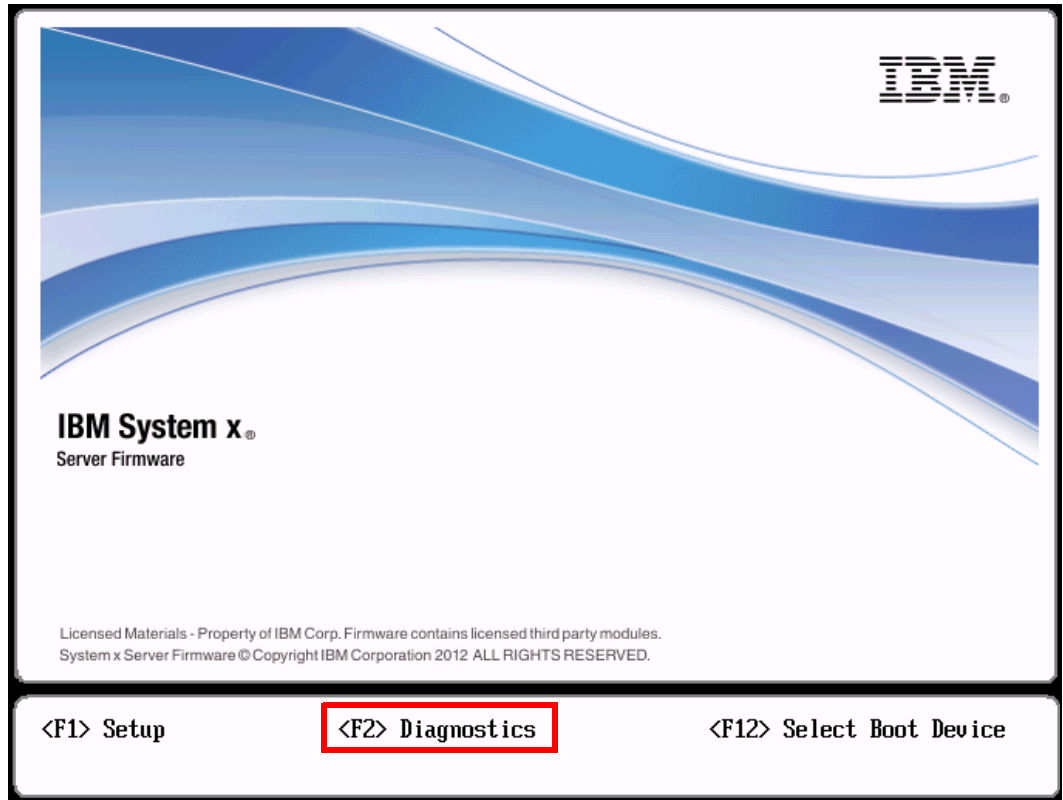


Figure 2-20 F2 option to enter diagnostics

2. The IBM Memory Test page opens. Use the arrow keys to select **Quit** and press Enter to exit the memory test, as shown in Figure 2-21.

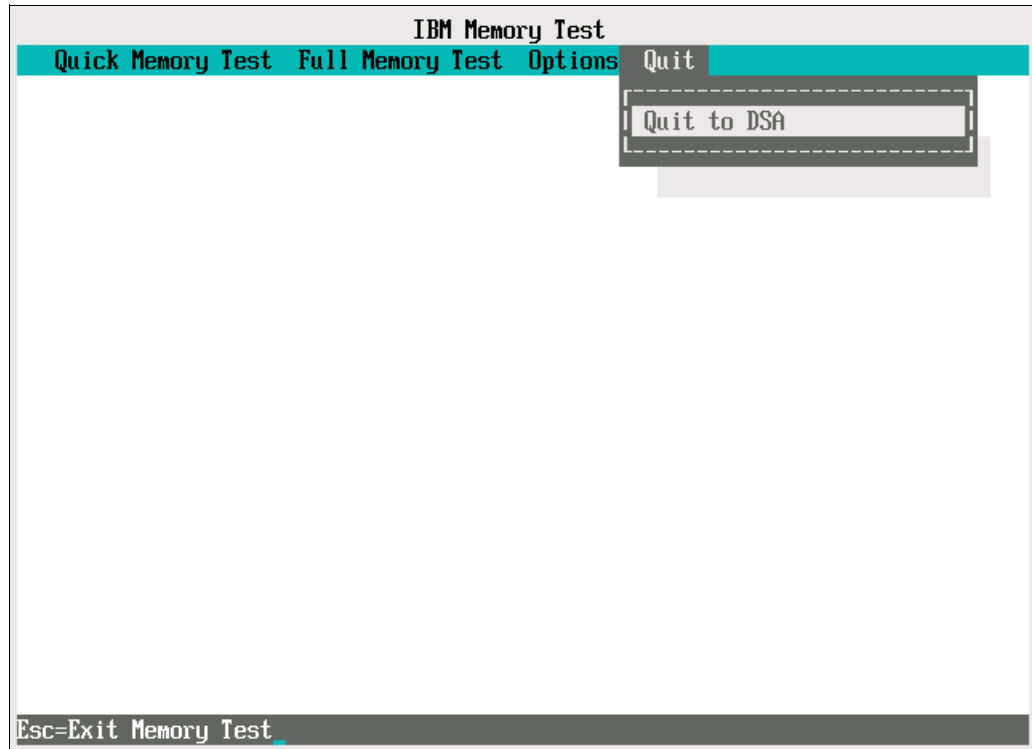


Figure 2-21 System memory test page

3. Wait as the Linux kernel loads and many text messages scroll past.
4. The user interface selection menu opens, as shown in Figure 2-22. Enter `gui` and press Enter to proceed to the DSA GUI.

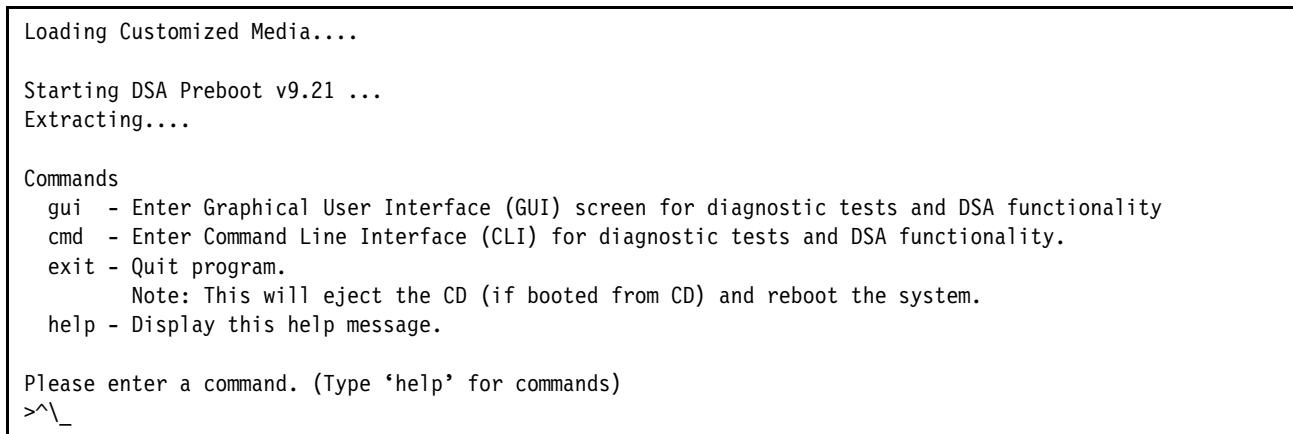


Figure 2-22 Preboot DSA user interface selection menu

5. Click **I accept the terms in the license agreement** when prompted to do so.  
The Preboot DSA Welcome page opens, as shown in Figure 2-23.

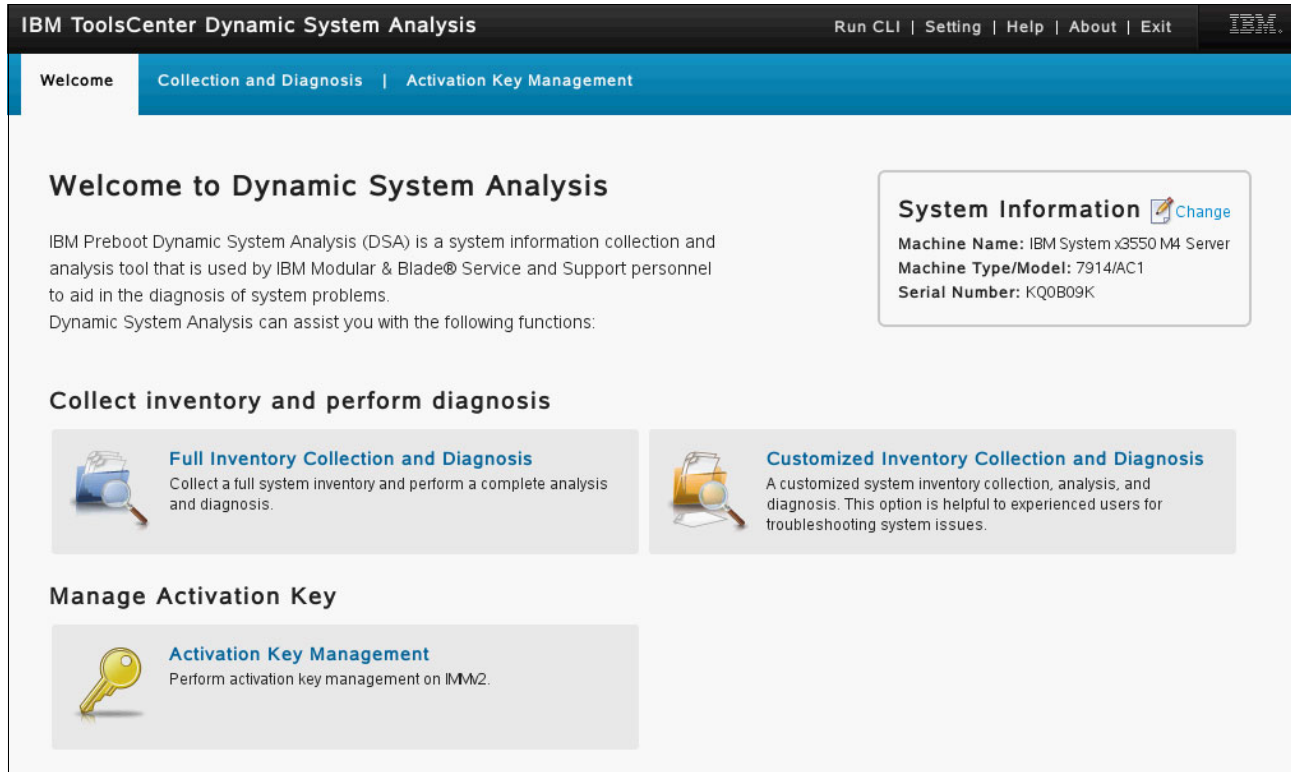


Figure 2-23 Preboot DSA Welcome page

6. If no Internet connectivity is available, continue with step 8 on page 29.
7. If you have Internet access and a Preboot DSA version of 9.6 or higher, see 3.2.2, “Download and install from the Internet” on page 65. During the installation process, the FoD identifier is shown in the Unique ID field after you click **Install from IBM Website**.

- Click **Customized Inventory Collection and Diagnosis** from main menu. A System Inventory menu appears, as shown in Figure 2-24. Clear all options except Emulex. Click **OK**.

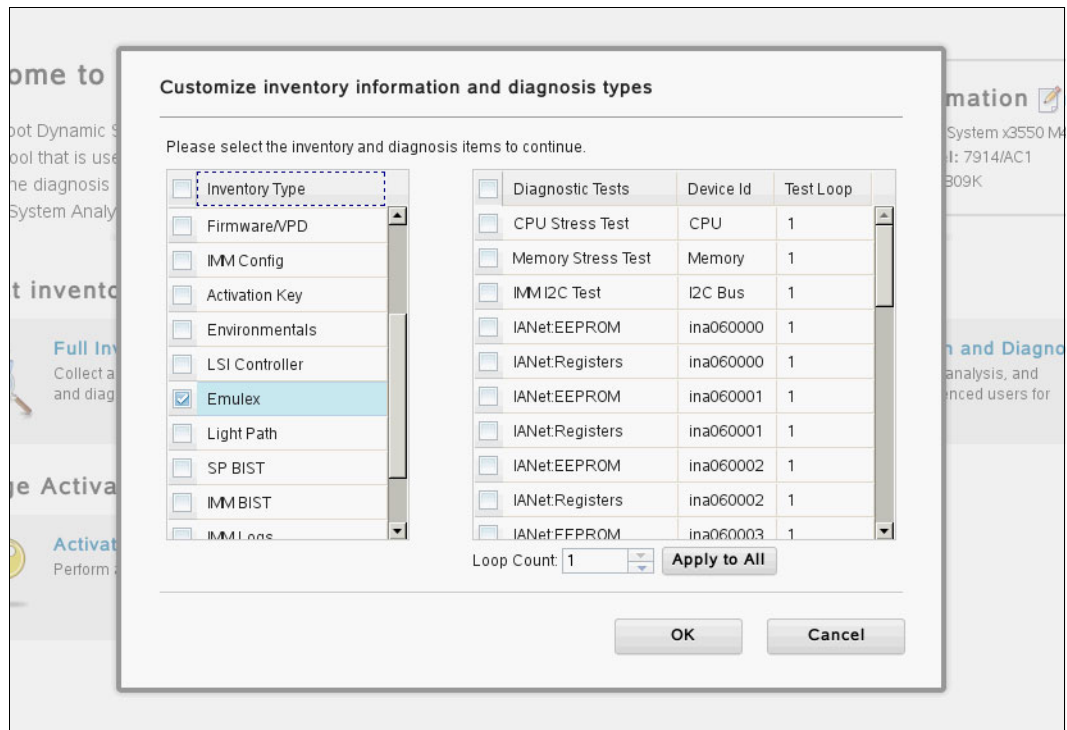


Figure 2-24 Inventory list

Emulex inventory is complete, as shown in Figure 2-25.

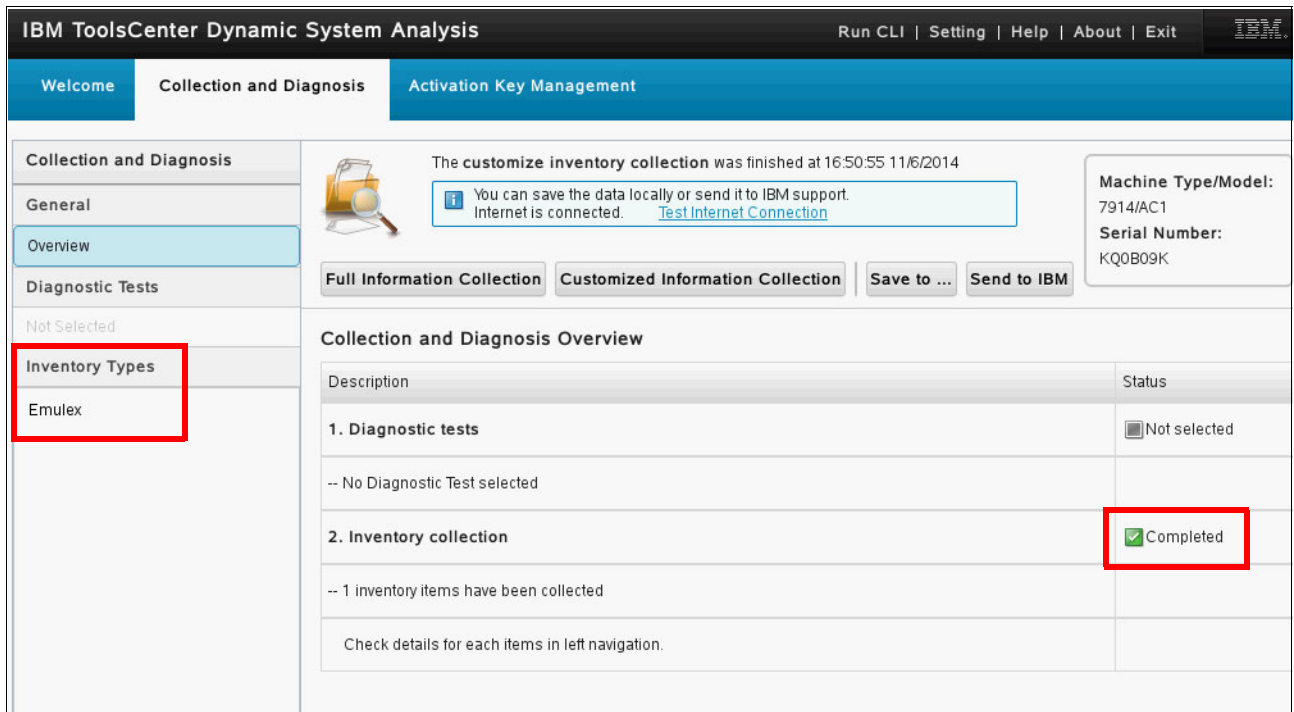


Figure 2-25 Emulex Inventory completed

- Click the **Emulex** listing under the Inventory Type menu. A sample of the Emulex inventory is displayed, as shown in Figure 2-26.

The screenshot shows the IBM ToolsCenter Dynamic System Analysis interface. The top navigation bar includes 'Welcome', 'Collection and Diagnosis', and 'Activation Key Management'. The main content area is titled 'Collection and Diagnosis' and shows a notification that the 'customize inventory collection' was finished at 16:50:55 11/6/2014. A message box indicates that data can be saved locally or sent to IBM support, with a 'Test Internet Connection' link. The machine type/model is 7914/AC1 and the serial number is KQ0B09K. The 'Inventory Types' menu on the left has 'Emulex' selected. The main display area shows a table of Emulex inventory items, followed by sections for 'EMXCNA Firmware', 'EMXCNA Driver', and 'Emulex FoD Activation Information'. The 'FoD ID' field in the 'Emulex FoD Activation Information' table is highlighted with a red box.

Name	IdentifyingNumber
Emulex95Y3764	11S95Y3764Y250HY22X0EX

Name	Version
Emulex.95Y3764 (00-00-c9-e9-67-7c)	4.2.433.3
Emulex.95Y3764 (00-00-c9-e9-67-80)	4.2.433.3

Name	VersionString
be2net.ko (00-00-c9-e9-67-7c)	10.2.129.2
be2net.ko (00-00-c9-e9-67-80)	10.2.129.2

Emulex FoD Activation Information	
Instance ID	ELX:FoDID:11S95Y3764Y250HY22X0EX
FoD ID	CSU5NJK4U4NCWXJ437J9SVTJAU7S1LZ8
Type	800
State	0

Figure 2-26 Emulex FoD Identifier and Type shown in Preboot DSA (x3550 M4)

**Note:** The FoD Type value that is shown in Figure 2-26 is incorrect. It should be a four-character value; in our case, 800B. You can check the FoD Type for Emulex by using F1 Setup, as described in “Using <F1> Setup to identify FoD ID” on page 31. The FoD Type value that is shown can be cross-referenced with the FoD type in the DSA column in Appendix A, “FoD Component reference” on page 155 to ensure that the correct upgrade part number is ordered for the Emulex adapter type.

- Copy the FoD Identifier value (as shown in Figure 2-26) and enter it onto the FoD website as described in 2.4.2, “Requesting an activation key” on page 38.



## Using <F1> Setup to identify FoD ID

This section describes how to obtain the FoD ID by using the <F1> Setup.

**Tip:** In our lab environment, the use of the <F1> Setup proved to be a faster way to obtain the FoD ID than Preboot DSA.

To obtain the FoD ID by using <F1> Setup, complete the following steps:

1. Power on the system and press F1 when the UEFI window opens, as shown in Figure 2-27.

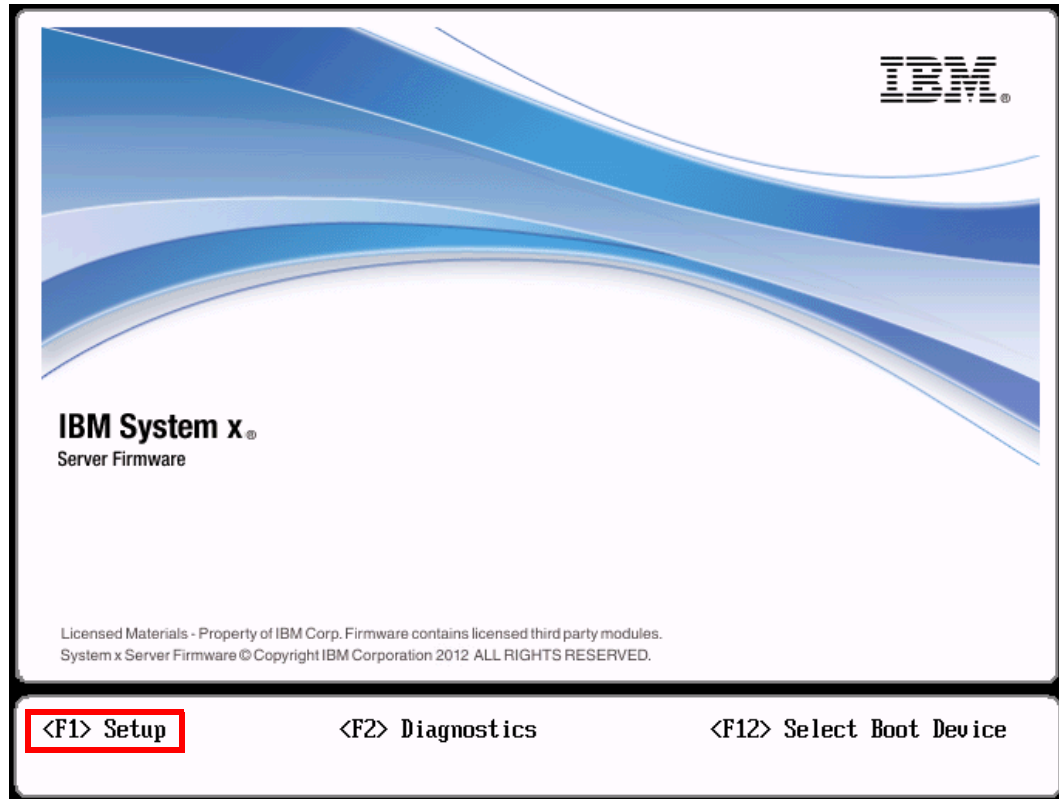


Figure 2-27 F2 option to enter setup

2. Select **System Settings**, as shown in Figure 2-28.

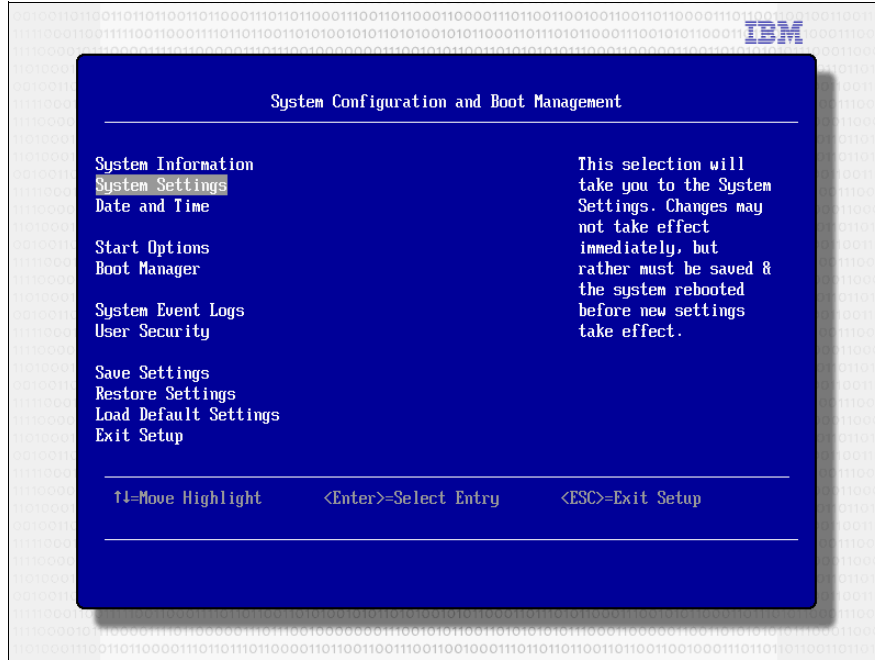


Figure 2-28 F1 Setup main screen

3. In the System Settings menu, select **Network**, as shown in Figure 2-29.

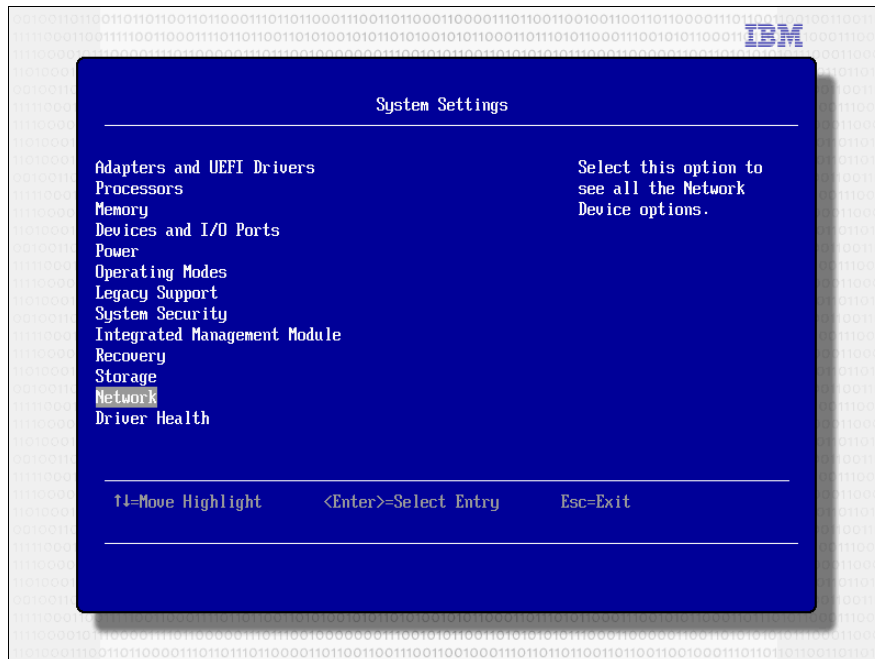


Figure 2-29 System Settings menu

- In the Network menu, you are provided with a list of all network devices within your server and the corresponding MAC addresses, as shown in Figure 2-30. If you know the MAC address of the Emulex, select it. If you do not know the MAC address, select list item by list item until the window shows the Emulex information, as shown in Figure 2-31.

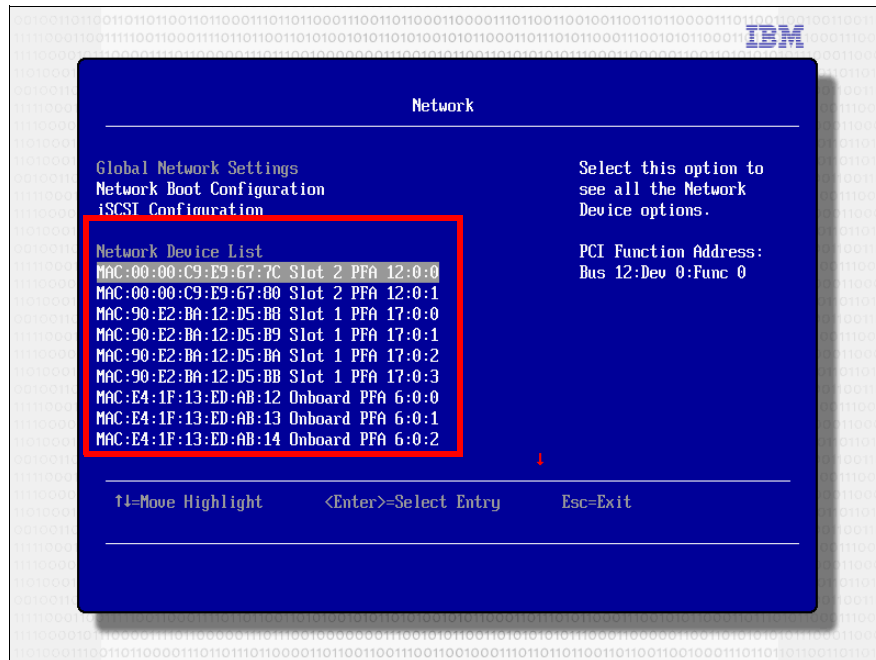


Figure 2-30 Network menu

- Select the Emulex adapter (in our case, **Emulex 10G NIC:Dev:Func 0C:0:0 - 00:00:C9:E9:67:7C**), as shown in Figure 2-31.

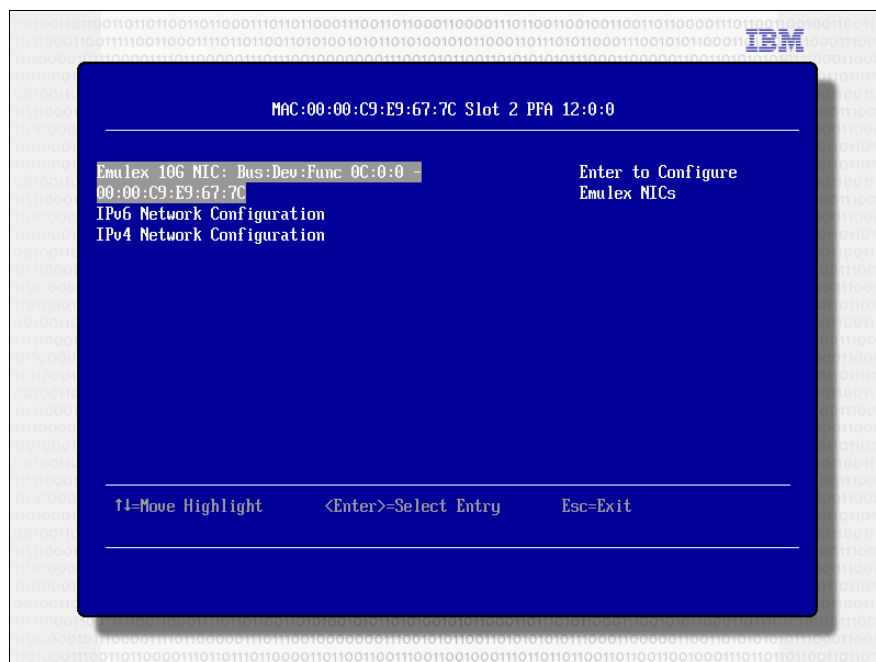


Figure 2-31 Example that shows Emulex

6. Select **Feature On Demand**, as shown in Figure 2-32.

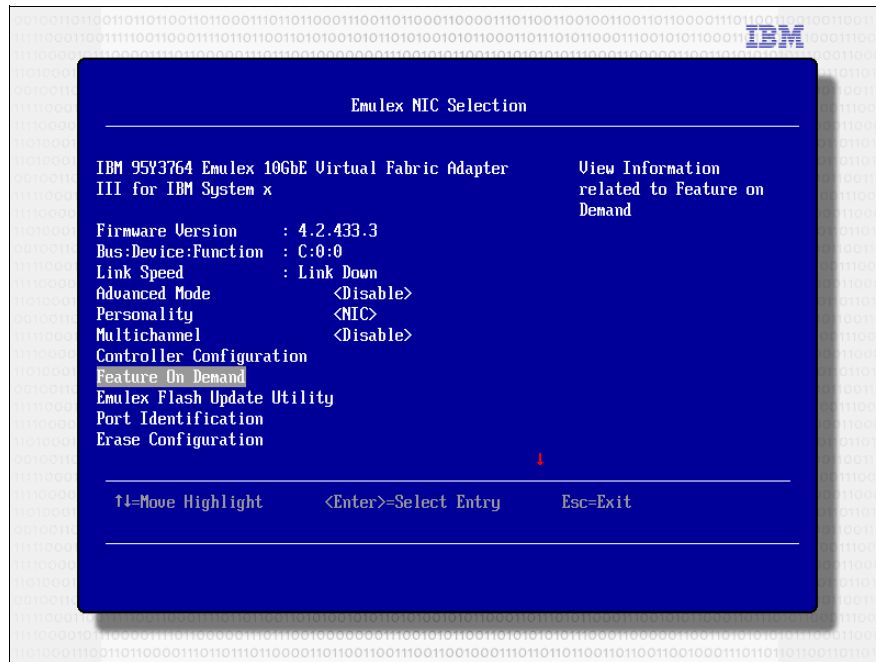


Figure 2-32 Example that shows Emulex NIC selection

You see the FoD Type and FoD UID, as shown in Figure 2-33.

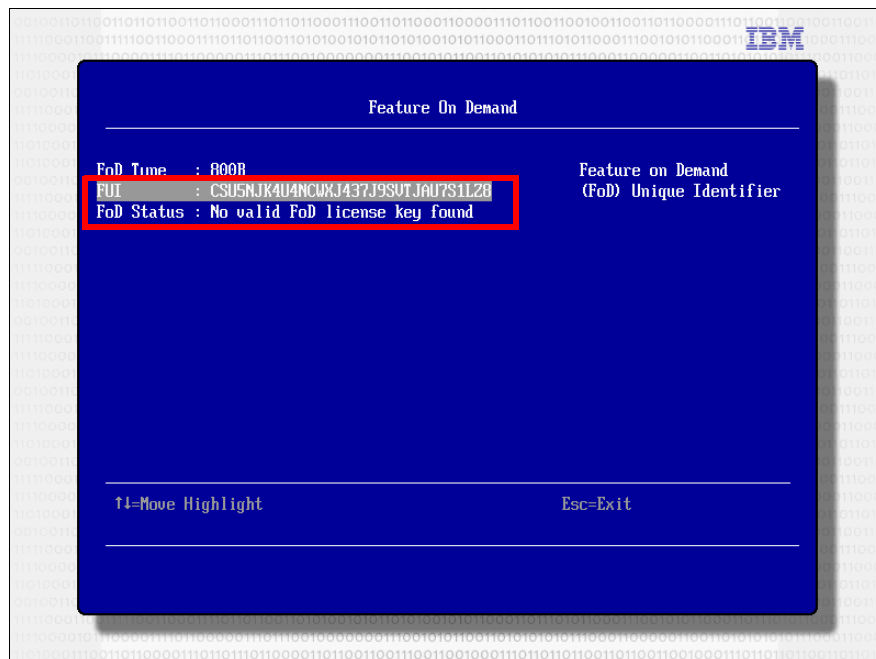


Figure 2-33 Feature On Demand menu

## 2.4 Using the IBM FoD website

The following IBM FoD website is the primary tool that is used to manage FoDs:

<https://www-304.ibm.com/systems/x/fod/index.wss>

The website is used to accomplish the tasks that are described in the following sections:

- ▶ 2.4.1, “Register an account with IBM” on page 35
- ▶ 2.4.2, “Requesting an activation key” on page 38
- ▶ 2.4.3, “Retrieve history” on page 43
- ▶ 2.4.4, “Hardware Replacement” on page 45
- ▶ 2.4.5, “Adapter Mobility” on page 45
- ▶ 2.4.6, “Manage an IBM customer number” on page 45
- ▶ 2.4.7, “Retrieve an authorization code” on page 47
- ▶ 2.4.8, “Generate a report” on page 48

### 2.4.1 Register an account with IBM

It is necessary to register an account with IBM before an authorization code can be used to obtain single or multiple activation keys. Complete the following steps to register an account:

1. Browse to the following website and click **register** at the bottom of the page:

<https://www-304.ibm.com/systems/x/fod/index.wss>

2. Enter the information that is requested in Step 1 of the My IBM Registration page, as shown in Figure 2-34 and then, click **Continue**.

**My IBM profile**

- IBM ID registration
- Help and FAQ
- Help desk

## IBM ID registration

Step 1 of 2

Your IBM ID provides access to IBM applications, services, communities, support, on-line purchasing, and more.

**Note:** All fields below are required.

To learn what is acceptable, see [guidelines for IBM IDs and passwords](#).

**\* IBM ID:** (valid email address)

**\* Password:** (Min 8 characters)

**\* Verify password:**

Please enter a security question that only you can answer. Then, enter the answer to the question. Occasionally, you may be asked to answer this question to confirm your identity. Enter a question that is simple to answer and is easy to remember.

**\* Security question:**

**\* Answer to security question:**

Select the country of your residence to set warranty. [Learn more](#)

**\* Country/region of residence:**

Figure 2-34 Registering an account


3. Enter the user details in Step 2 of the registration process, as shown in Figure 2-35. Click **Submit**.

My IBM profile

**IBM ID registration**

Help and FAQ

Help desk



## IBM ID registration

Step 2 of 2

---

Asterisks (\*) indicate fields required to complete this transaction.

---

### User information

Preferred language: (for marketing communications)

Salutation:

\* First name:

Initials:

\* Last name:

Suffix: (e.g. Jr., Sr.)

Daytime phone:

Ext:

Evening phone:

Fax number:

Cell number:

Pager number:

Pin:

Job title:

### Company address

Figure 2-35 User and company registration details

4. Click **Continue** after the registration process is complete. If the registration was not successful, click **Help and FAQ** (on the left side of the page), as shown in Figure 2-36. You can also refer to the following website:

<https://www.ibm.com/account/profile/us?page=reghelpdesk>

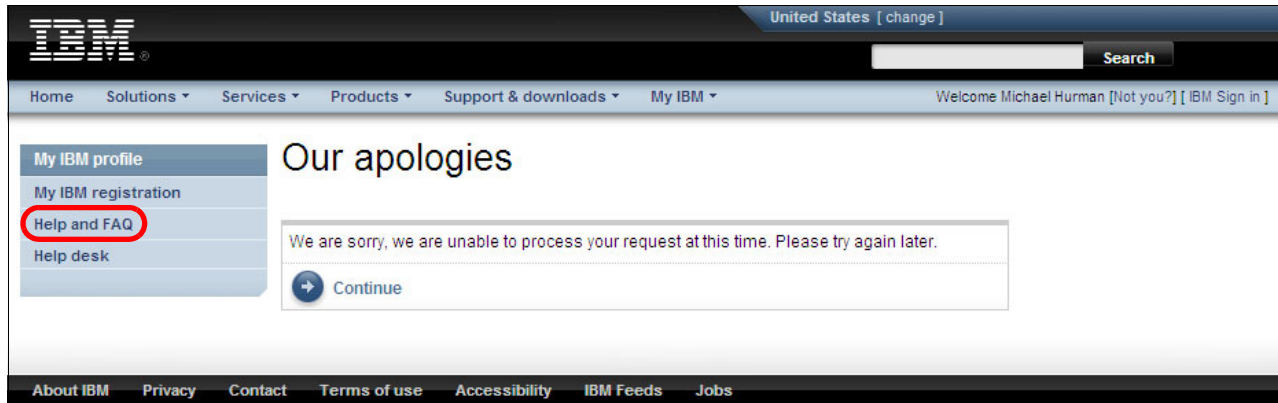


Figure 2-36 Obtaining help for an unsuccessful registration

## 2.4.2 Requesting an activation key

This section describes how to create an activation key from the authorization code that you received in the mail from IBM.

Before you begin, make sure that the following items are available:

- ▶ Authorization code that is at the top of the IBM Feature Activation Instructions document.
- ▶ Access to the hardware or software that you want to activate so that you can determine the UID that is required to identify the component that you want to upgrade.

Complete the following steps to activate a Features on-Demand feature by using an authorization code:

1. Browse to the following FoD website:

<https://www-304.ibm.com/systems/x/fod/index.wss>



2. Click **Sign In** on the Features on Demand main page, as shown in Figure 2-37.

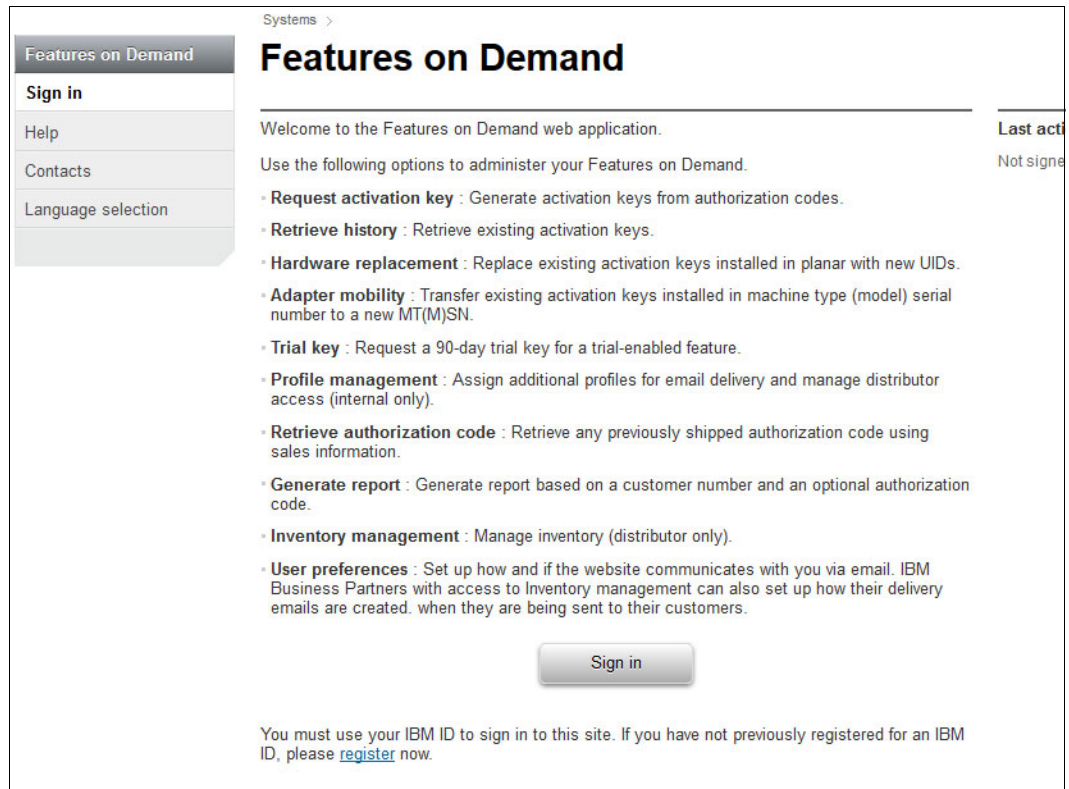


Figure 2-37 Features on Demand sign in page

3. In the Sign in page that is shown in Figure 2-38, enter your IBM ID and password and click **Submit**.

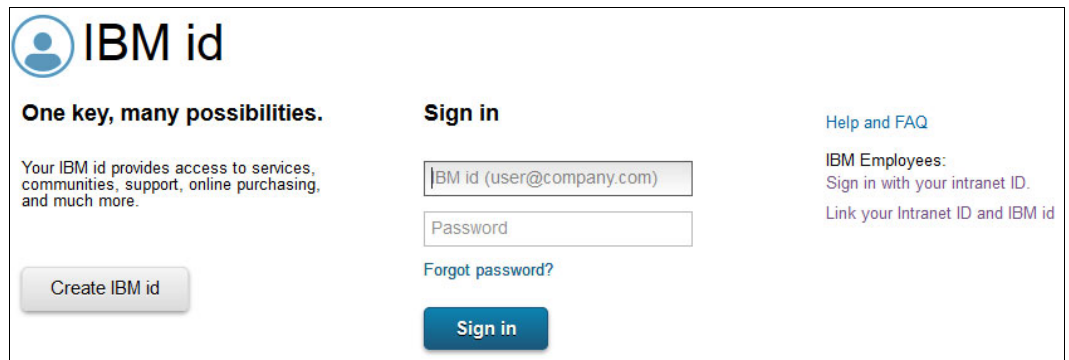


Figure 2-38 Features on Demand sign in page

4. In the Welcome page, select **Request activation key** from the center or left of the page, as shown in Figure 2-39.

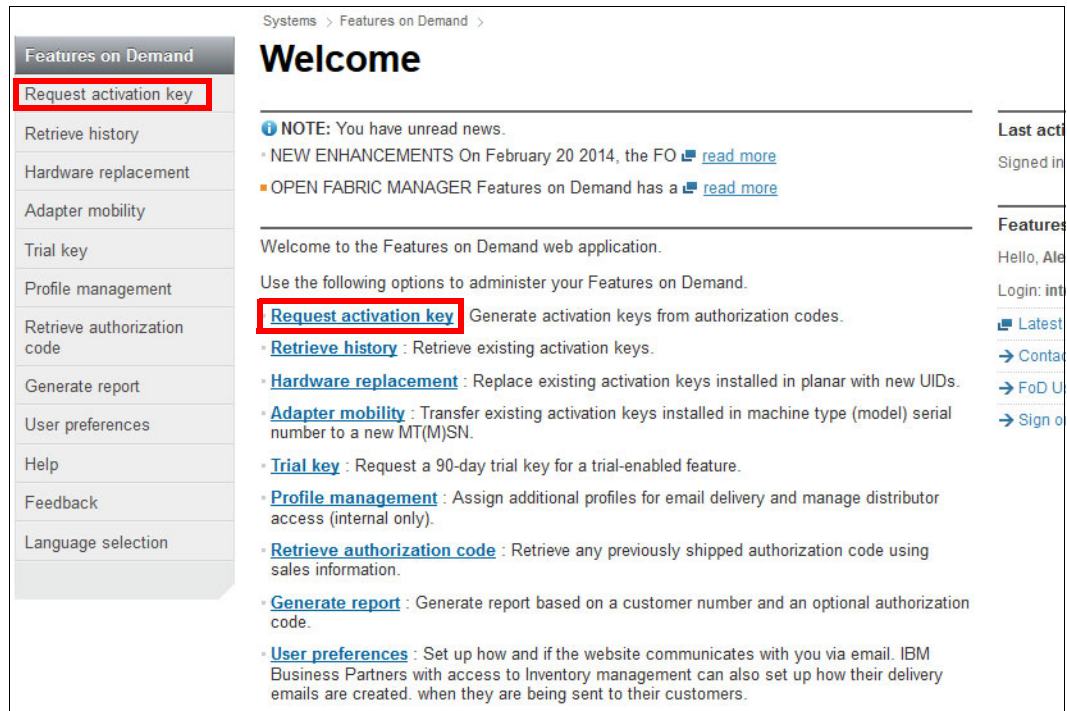


Figure 2-39 Request activation key option

5. Enter the authorization code that was provided to you on the Request activation key page (as shown in Figure 2-40) and click **Continue**.

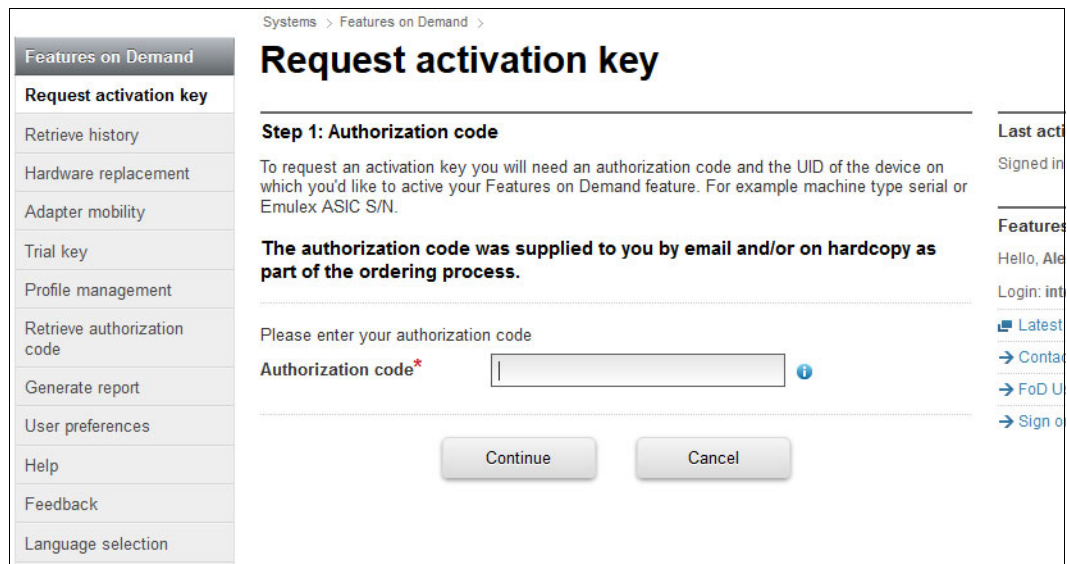


Figure 2-40 Entering an authorization code

- Enter the MTSN that was specified for feature activation in the appropriate fields, as shown in Figure 2-41. In our example, we are applying the IMM Advanced Upgrade key to a 7914 x3550 M4 server.

Features on Demand	
<b>Request activation key</b>	<h2>Request activation key</h2>
Retrieve history	<b>Step 2: Machine details</b>
Hardware replacement	Your authorization code is displayed below.
Adapter mobility	Select your machine type and model if available and enter your 7 character machine serial number. (Your machine serial number can be found on the back panel or in one of the system administration tools).
Trial key	<b>Feature code</b> <input type="text" value="A1ML"/>
Profile management	<b>Feature description</b> <input type="text" value="IBM Integrated Management Module Advanced Upgrade"/>
Retrieve authorization code	<b>Part number / PID</b> <input type="text" value="90Y3901"/>
Generate report	<b>Remaining keys</b> <input type="text" value="1"/>
User preferences	<b>Machine type*</b> <input type="text" value="7914 - IBM System x3550 M4"/> ⓘ
Help	<b>Model</b> <input type="text" value="Please select a model ..."/> ⓘ
Feedback	<b>Machine serial number*</b> <input type="text"/> ⓘ
Language selection	
	<input type="button" value="Generate key"/> <input type="button" value="Cancel"/>

Figure 2-41 Enter the MTSN

For server options, such as IMM Advanced Upgrade, you might see references to UID, which is synonymous with the server’s MTSN. For more information about what UID is required for each FoD upgrade type and where to find it, see Appendix A, “FoD Component reference” on page 155.

Emulex adapters and controllers use a different UID, as described in 2.3.4, “Emulex adapter UIDs” on page 22.

For features that include more constraints, such as the entitlement number of chassis, another prompt is displayed during the authorization code redemption process. The current entitlement is displayed and you are prompted for the new entitlement number. Enter the value when you are prompted. For more information about constraints, see your feature documentation.

- Click **Generate key** after all the necessary information is entered. A summary of what is created is displayed. Ensure that the information is correct and then, click **Confirm**, as shown in Figure 2-42.

Figure 2-42 Confirmation window

- Download and save the activation key. Choose the delivery methods **Download** or **Email**, as shown in Figure 2-43.

Figure 2-43 Key delivery options

We describe how to use the activation key to activate the feature in Chapter 3, “Installing Server FoD keys” on page 51.

## 2.4.3 Retrieve history

In the Retrieve history page, you can use the authorization code or the UID to search for the activation key history. By using the retrieve history page, you can also retrieve again an activation key that might be lost because of a hardware replacement.

The results from a search by using the authorization code list all activation keys that are generated for the authorization code. The results from a search by using the UID list all activation keys that are generated for the UID.

To retrieve the history, complete the following steps:

1. Select **Retrieve history** from the center of the page or from the left navigation pane, as shown in Figure 2-44.

The screenshot shows the 'Features on Demand' web application interface. On the left, a navigation menu lists various options, with 'Retrieve history' highlighted in red. The main content area features a 'Welcome' heading and a list of actions: 'Request activation key', 'Retrieve history' (highlighted in red), 'Hardware replacement', 'Adapter mobility', 'Trial key', 'Profile management', 'Retrieve authorization code', 'Generate report', and 'User preferences'. Each action is accompanied by a brief description of its function. The 'Retrieve history' description states: 'Retrieve existing activation keys.' The page also includes a 'NOTE' about unread news and a list of recent updates.

Figure 2-44 Retrieving history of activation keys



- As shown in Figure 2-45, select a search type. (The authorization code, UID, and machine type serial number search by types are available.) Enter the authorization code, UID, or the machine type serial number in the Search value field. Click **Continue**.

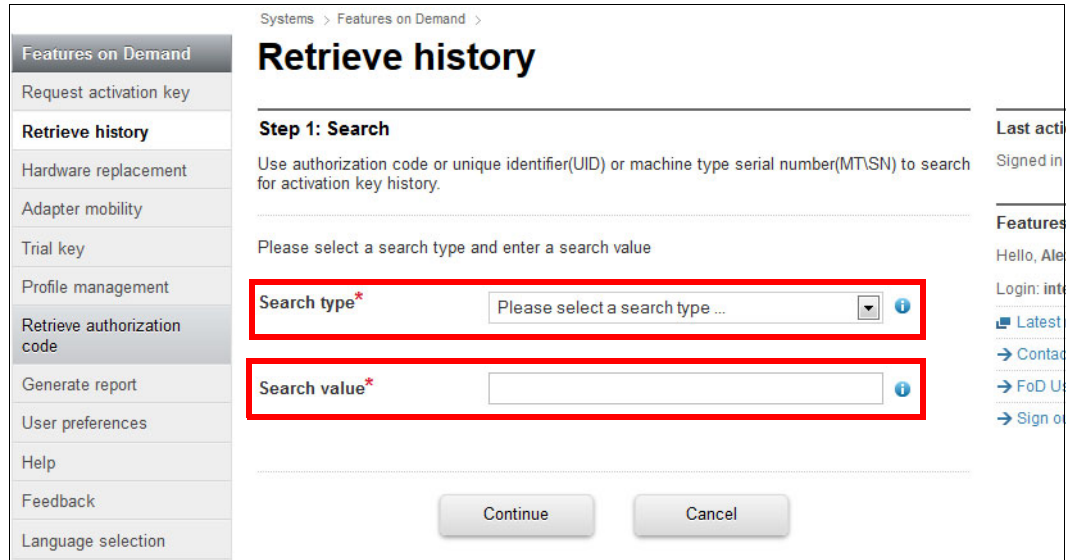


Figure 2-45 Retrieving activation key history

As shown in Figure 2-46, the results that are displayed provide the following information:

- ▶ The total number of activation keys that are associated with the authorization code.
- ▶ The total number of keys that are available for more UIDs that were not registered against the authorization code.
- ▶ A list of registered UIDs against an authorization code.

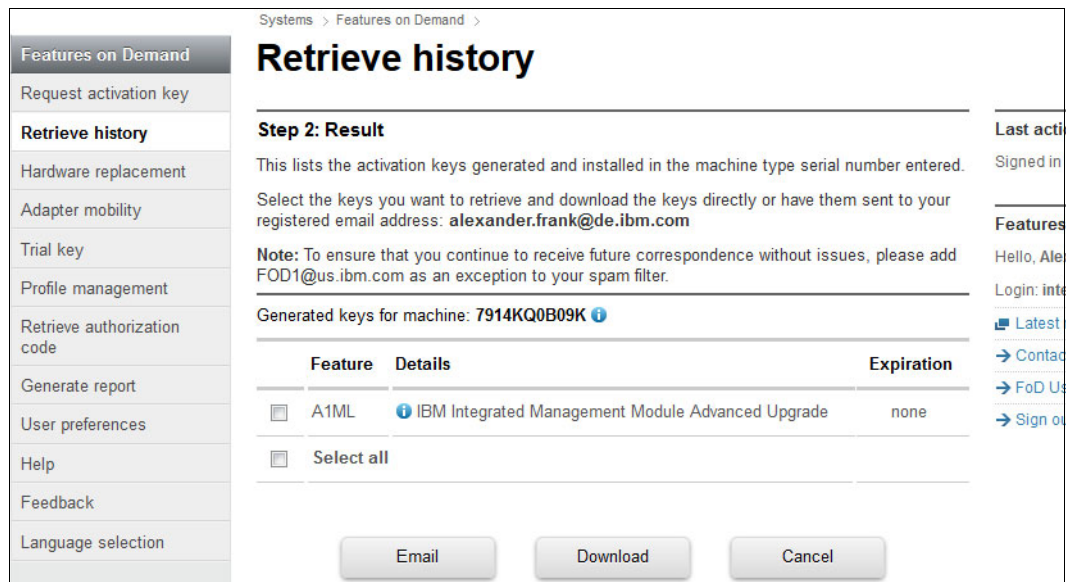


Figure 2-46 Example result for retrieving history via machine type serial number

### Retrieving an existing activation key by using Retrieve history

Complete the following steps to retrieve an activation key that was inadvertently deleted or lost because of a system or component failure:

1. Complete the steps that are described in 2.4.3, “Retrieve history” on page 43 and use the UID of the system or component as required. The authorization code or machine type serial number can also be used.
2. In the Retrieve History results page (as shown in Figure 2-46 on page 44), select the device for which you want to retrieve the key. To send the key information to the email address of the user who is logged in, click **Email**. To download the activation key directly to your computer, click **Download**.

## 2.4.4 Hardware Replacement

If there is a hardware failure on a server, such as a network adapter or network switch in a Flex chassis, we must update the unique identifier for the replacement part on the FoD website.

For more information about this website function, see 5.1, “Hardware replacement by using the FoD website” on page 136.

## 2.4.5 Adapter Mobility

If you move an adapter with FoD features enabled to a new server, those FoD features do not automatically transfer over because the FoD key is stored in the IMM2 of the server. Therefore, you must use the Adapter Mobility feature of the FoD website to transfer the FoD features to the new server.

For more information about moving an adapter, see 5.4, “Moving an adapter or a switch” on page 141.

**Tip:** The Adapter Mobility feature on the website also applies to Flex System switches.

## 2.4.6 Manage an IBM customer number

In the Manage IBM customer number page, you can see a list of the customer numbers for which you have administrative authority and any users who are registered for the customer number. You can add or remove users as administrators for a customer number.

**Tip:** If you cannot select a customer number in the Customer number field, click **Contacts** in the right navigation pane to contact customer support for your region.

To manage the IBM customer number, complete the following steps:

1. Select **Manage IBM customer number** from the left navigation pane, as shown in Figure 2-47.

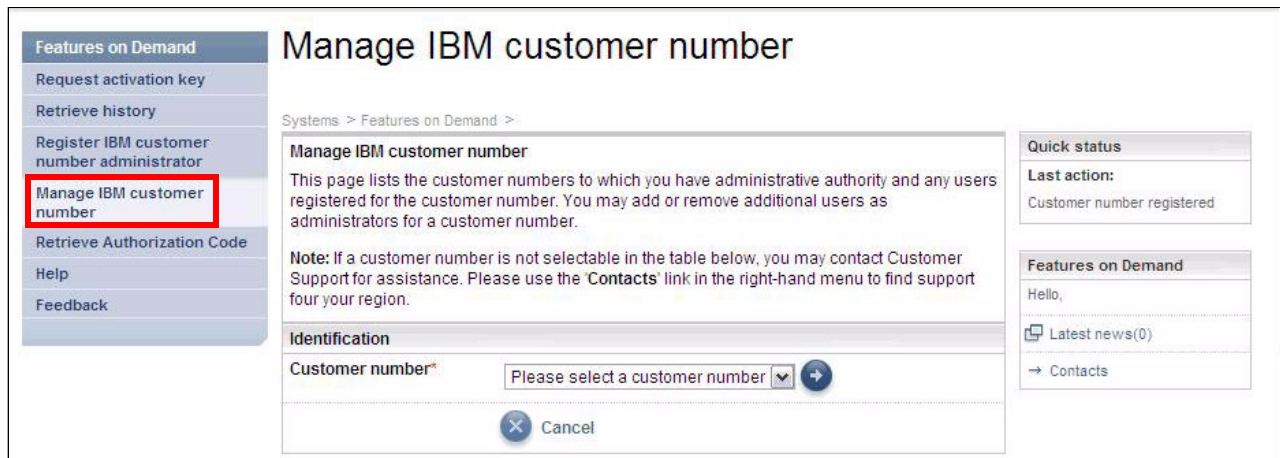


Figure 2-47 Manage IBM customer number main page

2. Select a customer number to which your IBM user ID is linked from the drop-down menu and click the arrow.
3. To link more users to your customer number, complete the following steps as shown in Figure 2-48 on page 47:

**IBM IDs:** Each user must have an IBM user ID and must sign on at least once on the IBM Features on-Demand website; otherwise, they cannot be linked to a customer number.

- a. In the Add IBM user ID field, enter the IBM user ID.
- b. Click **Add user**. The user ID, user name, and user email address are displayed.
- c. Click **Confirm**.



All users who are linked to a customer number receive authorization codes through email for future orders that are placed.

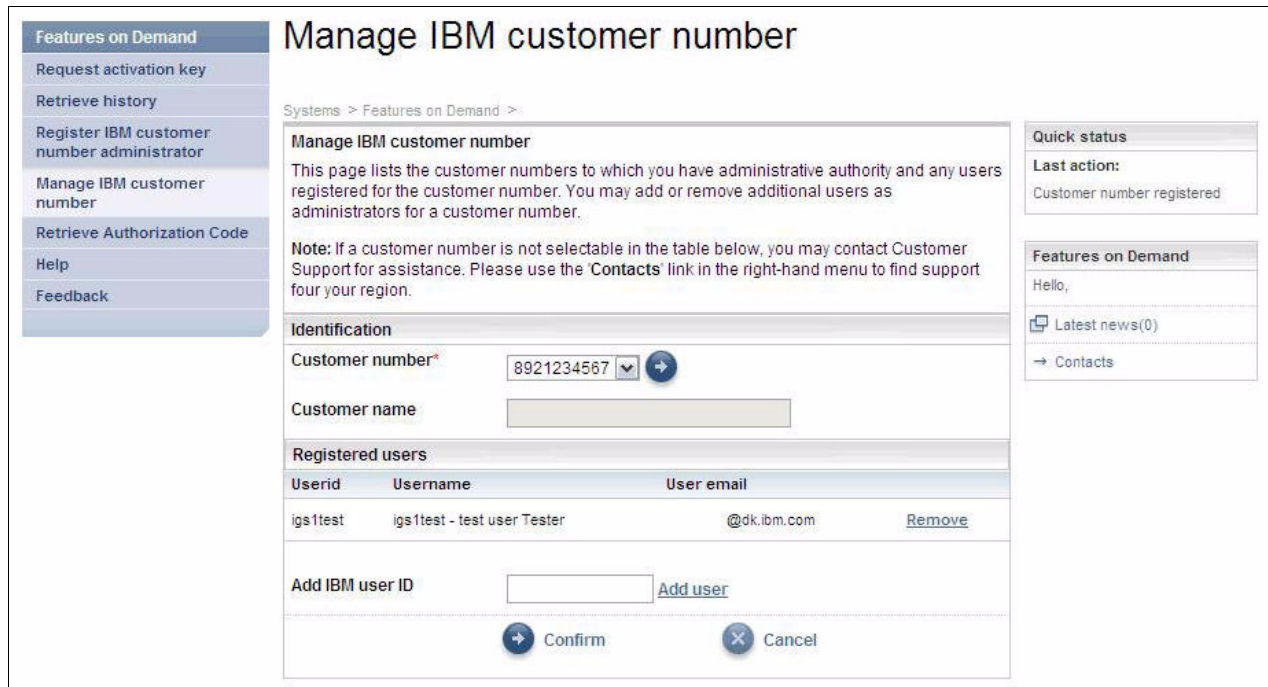


Figure 2-48 Linking more users to a customer number

## 2.4.7 Retrieve an authorization code

In the Retrieve Authorization Code page, you can request to have a PDF file with an authorization code emailed to you. This file can be handy if you inadvertently misplaced your authorization code.

To retrieve an authorization code, complete the following steps:

1. Select **Retrieve Authorization Code** from the left navigation pane, as shown in Figure 2-49 on page 48.
2. Select the order type, enter the customer number, order number, and option part number or product ID. These numbers are on the packing list that is included with your order.
3. Enter your email address, if necessary.
4. Click **Submit**. A confirmation window is displayed and the necessary information is emailed to you.

Systems > Features on Demand >

## Retrieve authorization code

**Retrieve authorization code**

For authorization code retrieval complete the below mandatory fields (\*) and submit the request.

The application will provide the authorization code by emailing a PDF file if a matching record is found.

The fields indicated with an asterisk (\*) are required to complete this transaction. If you do not want to provide the information use the Cancel button on your browser to return to the previous page, or close the window or browser session that is displaying this page.

**Note:** To ensure that you continue to receive future correspondence without issues, please add FOD1@us.ibm.com as an exception to your spam filter.

**Identification**

Order type \*

Customer number \*

Order number \*

Option P/N or Product ID \*

Your email address

Other recipients(cc:)

**Note:** By clicking **Submit** you agree that IBM may process and retain your data for the purposes listed above in accordance with IBM's data privacy policy.

Figure 2-49 Retrieving an authorization code

## 2.4.8 Generate a report

In the Generate report page, you can create several report types that are based on the following criteria:

- ▶ **Machine type and serial number**  
A report is generated that shows activation keys that were generated for a specific system. This report shows activations, such as Intel, IMM2, and ServeRAID features, but not activations, such as Emulex VFA III.
- ▶ **Other UID**  
You can use this option to generate a report that shows activation keys that are generated for an FoD identifier number other than machine type and serial number. An example is the FoD identifier for an Emulex VFA III adapter.
- ▶ **Authorization code**  
A report is generated that shows activation keys that were generated for a specific authorization code.

► Order number

A report is generated that shows the authorization code types that shipped under the entered order number. It also shows all the activation keys that are linked to the found authorization codes.

Reports are generated in a .csv format and are sent via email.

Complete the following steps to generate a report:

1. Select **Generate report** from the left navigation pane, as shown in Figure 2-50.

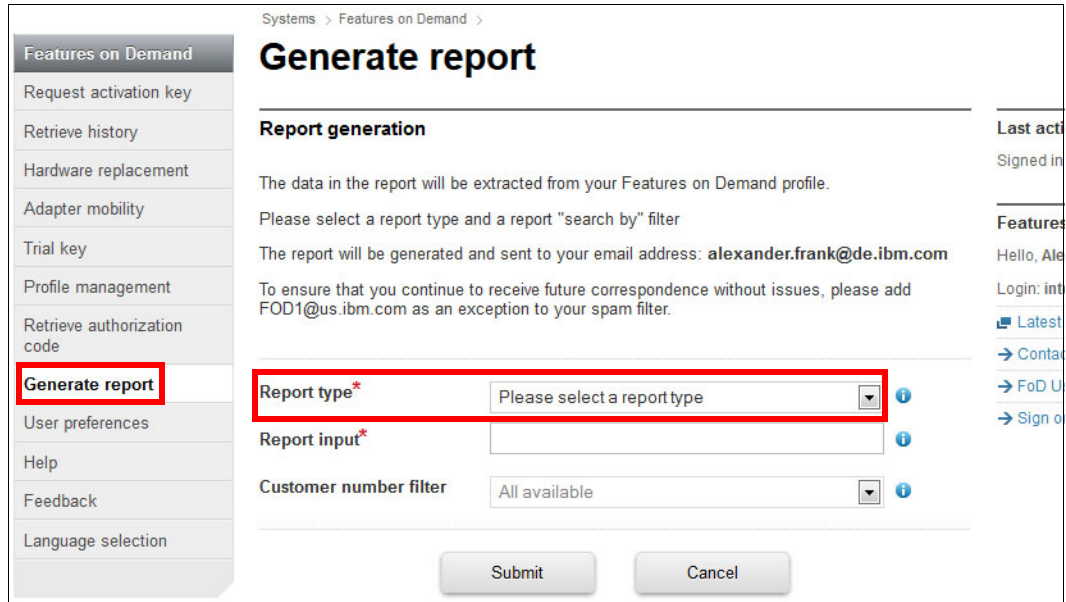


Figure 2-50 Selecting Generate report and a Report type

2. Select a report type from the Report type drop-down menu, as shown in Figure 2-50.
3. Based on the selected report type, enter an applicable value in the Report input field. The example that is shown in Figure 2-51 on page 50 shows a machine type and serial number that is entered to generate a report that is based on this information type.

**Tip:** Do not use a dash or space when you are entering the machine type and serial number in the Report Input field.

Systems > Features on Demand >

## Generate report

**Features on Demand**

- Request activation key
- Retrieve history
- Hardware replacement
- Adapter mobility
- Trial key
- Profile management
- Retrieve authorization code
- Generate report**
- User preferences
- Help
- Feedback
- Language selection

**Report generation**

The data in the report will be extracted from your Features on Demand profile.

Please select a report type and a report "search by" filter

The report will be generated and sent to your email address: **alexander.frank@de.ibm.com**

To ensure that you continue to receive future correspondence without issues, please add FOD1@us.ibm.com as an exception to your spam filter.

---

**Report type\***  ⓘ

**Report input\***  ⓘ

**Customer number filter**  ⓘ

---

**Last acti**  
Signed in

---

**Features**  
Hello, Ale

Login: int

→ Latest

→ Contac

→ FoD U

→ Sign o

Figure 2-51 Generating a reported based on machine type and serial number

4. You can refine the result by selecting a customer number for which you are an administrator. Select the customer number in the Customer number filter field.
5. Click **Submit**. A confirmation window opens and you receive an email with the report attached.

**Receiving FoD emails:** FoD reports are sent from the email address `fod1@us.ibm.com`. Ensure that this address is added as an exception to your email spam filters so that the report is not blocked.

# Installing Server FoD keys

In this chapter, we describe the various tools that are available to install and back up Features on Demand (FoD) activation keys on System x, Flex System, and BladeCenter servers. These keys are stored on the IMM2 service processor that is embedded on the server.

As described in 1.2, “Components that offer FoD upgrades” on page 3, some activation keys are applied per device and others are applied per system.

This chapter includes the following topics:

- ▶ 3.1, “Installing a key by using IMM2” on page 52
- ▶ 3.2, “Installing a key by using Preboot DSA” on page 59
- ▶ 3.3, “Installing a key by using Portable DSA” on page 69
- ▶ 3.4, “IBM Systems Director Feature Activation Manager” on page 76
- ▶ 3.5, “Installing a key by using ASU” on page 76
- ▶ 3.6, “ToolsCenter Suite FoD Mass Activation Tool” on page 85
- ▶ 3.7, “Viewing installed FoD keys with CMM” on page 94

**Note:** The use of the Flex System Manager (FSM) to install activation keys is out of scope for this paper.

## 3.1 Installing a key by using IMM2

In this section, we describe how to apply an FoD activation key by using the Integrated Management Module II (IMM2) web interface.

**Using x3100 M4 and x3250 M4 servers:** These instructions assume that the web interface of the IMM2 is enabled. For entry servers, such as the x3100 M4 and x3250 M4, the web interface is an FoD upgrade, which represents a *chicken-and-egg* situation. We are using the web interface to install an FoD upgrade, but an FoD upgrade is needed on these systems before the web interface can be used.

Therefore, on these servers, you must use another method to install an FoD key (including the one to enable the IMM2 web interface), such as using Preboot DSA, as described in 3.2, “Installing a key by using Preboot DSA” on page 59.

In this example, we apply the FoD upgrade for the Intel I350 Embedded Dual-port GbE adapter, which is used to enable Ethernet ports 3 and 4 on supported servers such as the x3530 M4.

Complete the following steps:

1. If you did not yet purchase the FoD upgrade and receive the authorization code, follow the instructions that are described in Chapter 2, “Acquiring FoD activation keys” on page 7. The Intel I350 upgrade for the x3530 M4 is part number 90Y9314.
2. Complete the steps that are described in 2.4.2, “Requesting an activation key” on page 38 to download the activation key. In our case, the following file was downloaded:

```
ibm_fod_8003_7160KQ5N05V_anyos_noarch.key
```

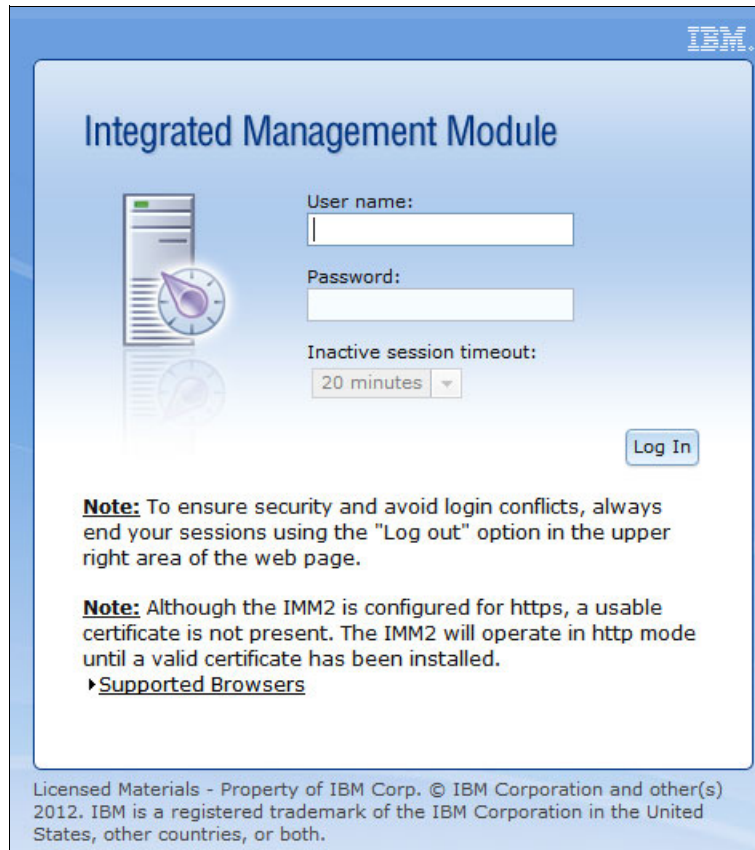
In our example, 8003 is the FoD type for the Intel I350 2-port upgrade. Also, 7160KQ5N05V is the unique ID, which in this case is a concatenation of the machine type and serial number of our lab system.

For more information about the various FoD type numbers, see Appendix A, “FoD Component reference” on page 155.

3. Log in to the IMM2 web interface by using your IMM credentials, as shown in Figure 3-1 on page 53.

If you do not know the IP address of the IMM2, reboot the server and enter System Setup (press F1 when prompted). Click **System Settings** → **Integrated Management Module** → **Network Configuration** and note the IP address that is listed there.

The default IMM credentials are USERID and PASSWORD (0 is zero).



IBM

## Integrated Management Module

User name:

Password:

Inactive session timeout: 20 minutes

**Note:** To ensure security and avoid login conflicts, always end your sessions using the "Log out" option in the upper right area of the web page.

**Note:** Although the IMM2 is configured for https, a usable certificate is not present. The IMM2 will operate in http mode until a valid certificate has been installed.

[Supported Browsers](#)

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Figure 3-1 IMM login page

- From the menu bar, click **IMM Management** → **Activation Key Management**, as shown in Figure 3-2.

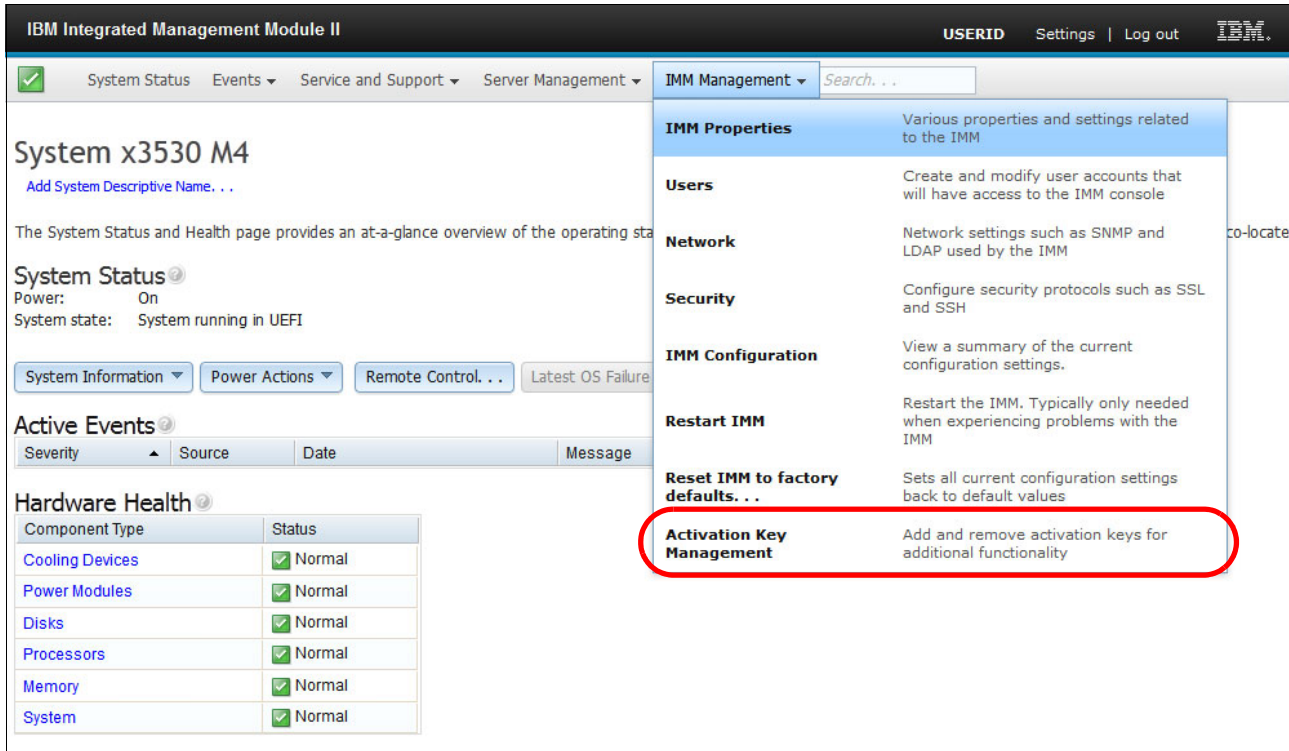


Figure 3-2 Activation Key Management menu

- The Activation Key Management panel, as shown in Figure 3-3, lists any activation keys that are installed. In our example, the IMM2 Advanced Upgrade (which enables remote control) is installed. Click **Add** to install a new key.

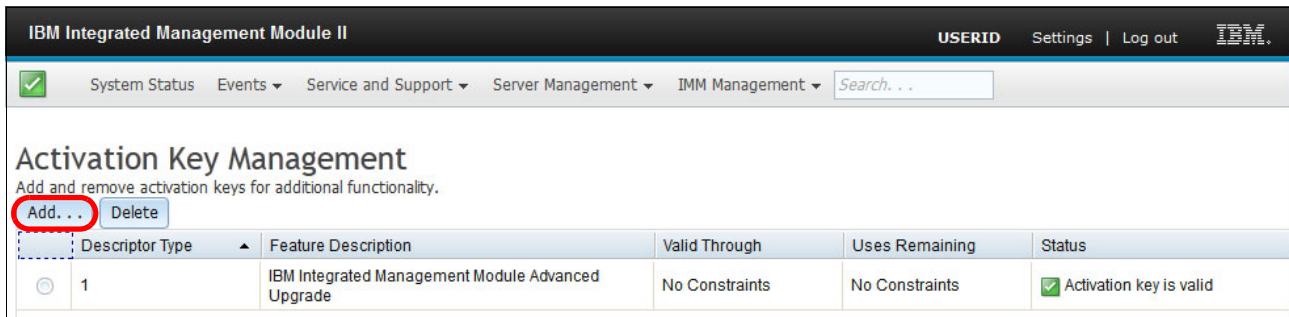


Figure 3-3 Add activation key



- The Add Activation Key window opens. Click **Select File**, browse to the location of the key file, and click **OK**. In our example, you can see the Intel I350 activation key file is ready to be installed, as shown in Figure 3-4.

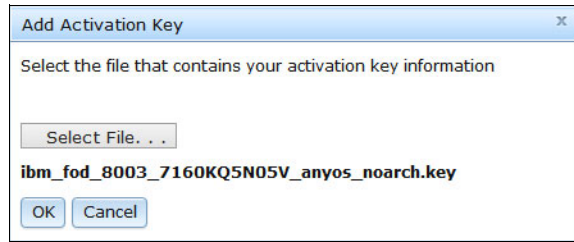


Figure 3-4 Intel I350 FoD key selection

- Click **OK** to upload the key file. If the key is valid for this system, a Success dialog is displayed, similar to the example that is shown in Figure 3-5. Click **Close**.

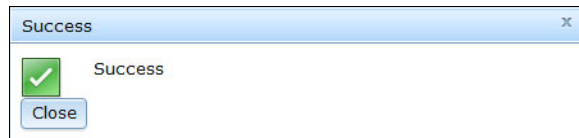


Figure 3-5 Key installed successfully

**Tip:** Success here means that the process of applying the key was successful. Some keys, such as those for Emulex controllers, are validated only via the Emulex firmware during UEFI system initialization. You can check the actual status of Emulex activation keys via the Emulex HbaCmd command or via IBM DSA.

A reboot might be required. For more information, see Appendix A, “FoD Component reference” on page 155. In our example, a reboot is required to activate the third and fourth Intel I350 Ethernet ports of the x3530 M4.

The Activation Key Management panel now shows that the process is complete, as shown in Figure 3-6.

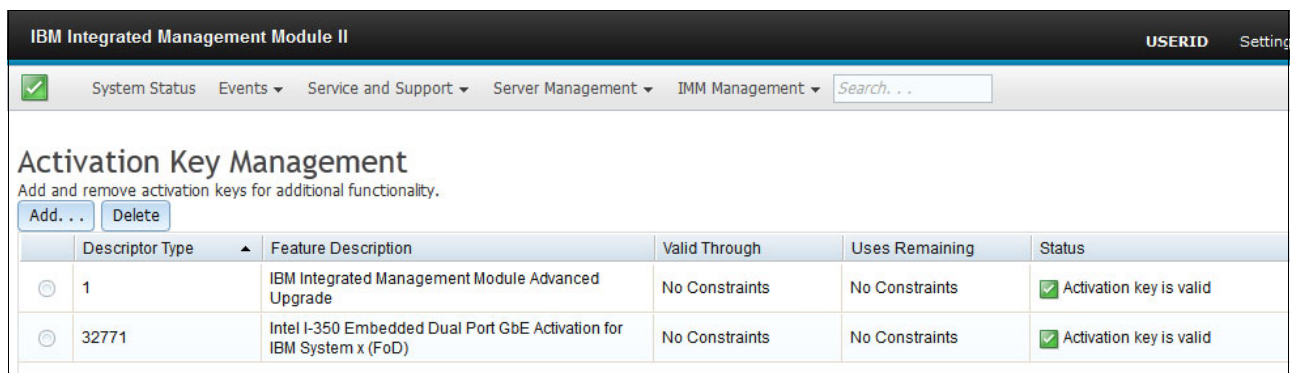


Figure 3-6 Key installation complete

## Other considerations for ServeRAID upgrades

All FoD upgrades for ServeRAID controllers are system-wide upgrades and not tied to any one controller or adapter. For example, if your server has a ServeRAID M5110e controller on the system planar and three ServeRAID M5110 adapters that are installed in the server, applying one RAID-6 activation key enables RAID-6 on all four ServeRAID controllers.

For more information about the ServeRAID FoD upgrades (current at the time of writing), see Appendix A, “FoD Component reference” on page 155.

## Other considerations for Emulex upgrades

The IMM2 cannot read the Emulex ASIC identifier, so it marks the keys as installed, but the keys must be validated by the Emulex firmware during UEFI system initialization process. The IMM2 status for these keys does not change if they are in use or not in use by the Emulex options that are installed in the system.

To determine whether an Emulex key activated the upgrade feature, use one of the following tools:

- ▶ The command `hbacmd getfodinfo` shows the FoD status as enabled, as shown in Figure 3-7.

```
C:\Program Files\Emulex\Util\OCManager>hbacmd getfodinfo 5c-f3-fc-36-17-c0
FoD Identifier:  FK3W8VCZNTAL73W1X5XDJ126T7R9WKW9
FoD Status:      enabled
FoD Type:        8005 (LOM)
```

Figure 3-7 Verifying that the FoD upgrade was successful: HbaCmd

- ▶ The Emulex OneCommand Manager GUI indirectly shows you that the FoD upgrade is active if you can change the personality of the card to FCoE or iSCSI, as shown in Figure 3-9 on page 57.
- ▶ In the Preboot DSA output, the State entry is a **1** for an activated ASIC (see Figure 3-8).

Emulex FoD Activation Information	
Instance ID	ELX:FoDID:11S95Y3764Y250HY22X0EX
FoD ID	CSU5NJK4U4NCWXJ437J9SVTJAU7S1LZ8
Type	800
State	1
Changeable Type	Not Changeable - Persistent

Figure 3-8 Verifying that the FoD upgrade was successful: Preboot DSA

**Note:** The FoD Type value that is shown in Figure 3-8 is incorrect. It should be a four-character value (in our case, 8005). You can check the FoD Type for Emulex by using F1 Setup, as described in “Using <F1> Setup to identify FoD ID” on page 31. The FoD Type value that is shown can be cross-referenced with the FoD type in the DSA column in Appendix A, “FoD Component reference” on page 155 to ensure that the correct upgrade part number is ordered for the Emulex adapter type.

After the Emulex is upgraded, you must enable the card’s personality to support FCoE or iSCSI. Complete the following steps:

1. If you have not done so already, reboot the system to allow UEFI to reinitialize and the operating system to load.

2. Start Emulex OneCommand Manager<sup>1</sup>.
3. Select the adapter. In the Adapter Information page, look for the Personality section (see Figure 3-9). From here, you can change the card to iSCSI or FCoE.

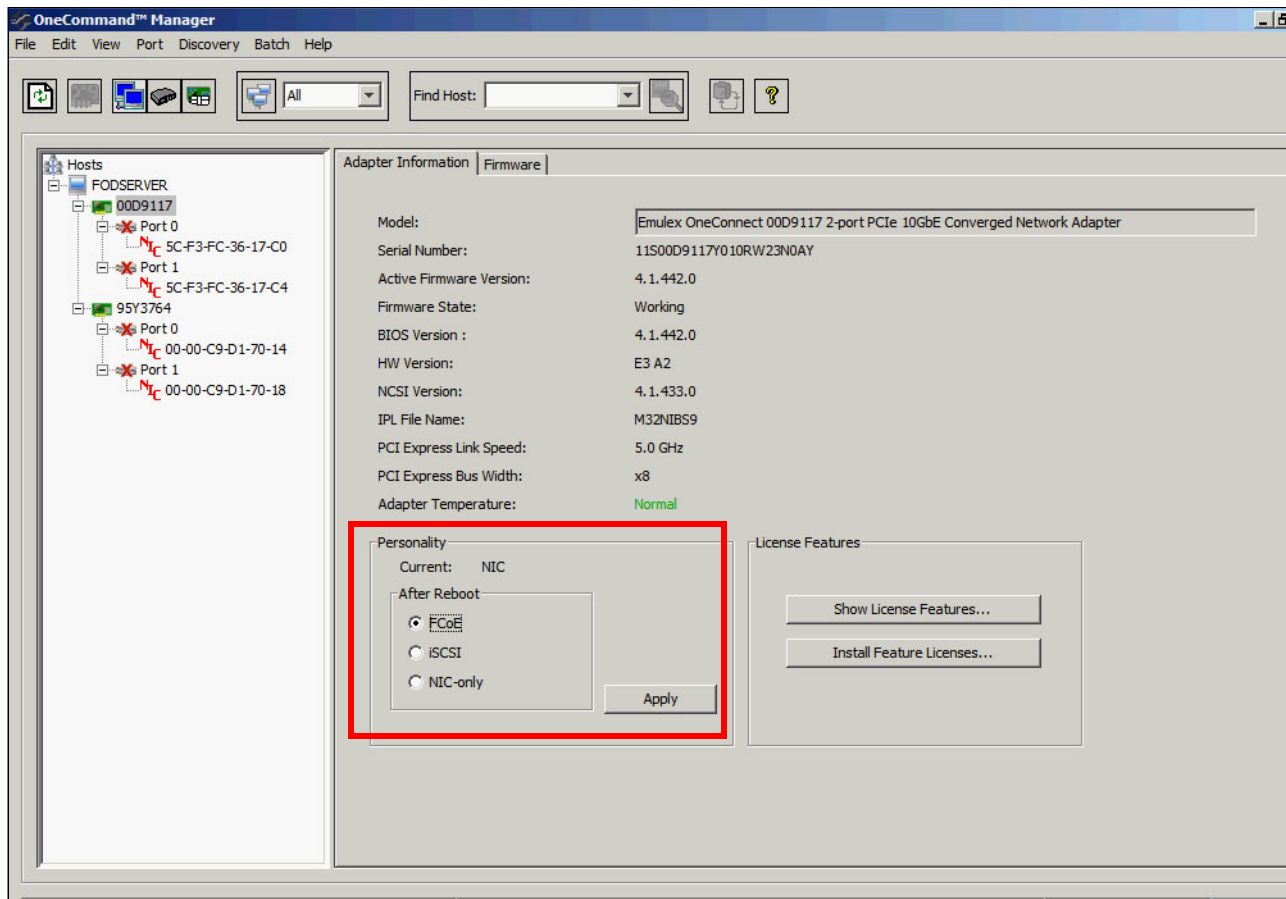


Figure 3-9 Emulex OneCommand Manage card personality selection

**Tips:** Consider the following points:

- ▶ If the FCoE and iSCSI options are grayed out, this means that the FoD key was not properly activated or you have not rebooted since the key was activated.
- ▶ The Show License Features and Install License Features options that are shown in Figure 3-9 are not used with IBM FoD and can be ignored.

<sup>1</sup> Download Emulex OneCommand Manager from this website:  
<http://www.emulex.com/downloads/ibm.html>

### 3.1.1 Backing up activation keys by using IMM2

Complete the following steps to use the IMM2 web interface to export FoD keys:

1. Log in to the IMM, click **IMM Management** → **Activation Key Management**, as shown in Figure 3-10.

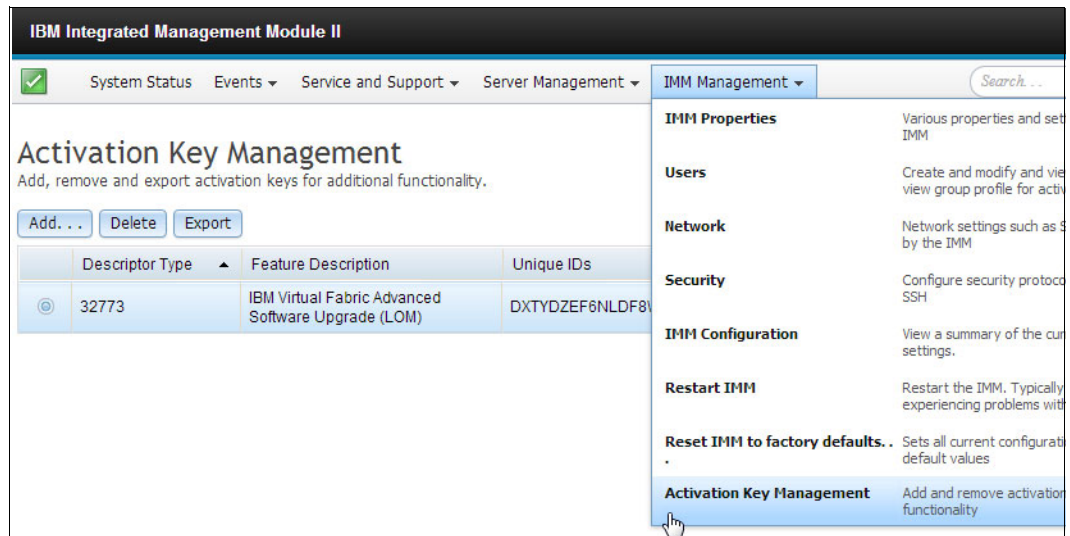


Figure 3-10 IMM2 Activation Key Management menu

2. In the Activation Key Management window, click **Export**, as shown in Figure 3-11.

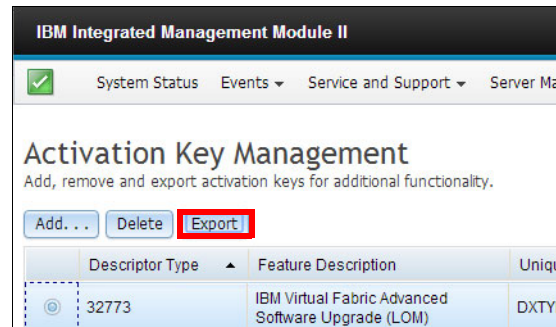


Figure 3-11 Export activation key

3. Click **OK** to confirm key selection. In our example, we are exporting the IBM Virtual Fabric Advanced Software Upgrade (LOM) key for the Flex System x240 compute node, as shown in Figure 3-12.



Figure 3-12 Confirm key selection

The key is downloaded to your web browser's Downloads folder and is saved in a .key format.

## 3.2 Installing a key by using Preboot DSA

By using Preboot DSA, you can install an FoD activation key by using one of the following methods:

- ▶ Preboot DSA can download the activation key directly from the IBM website and install it.
- ▶ Preboot DSA can install a key that you downloaded and placed on a USB memory key or other removable media.

Both processes begin by starting Preboot DSA. Complete the following steps:

1. Power on the system and press F2 when the UEFI window opens, as shown in Figure 3-13.

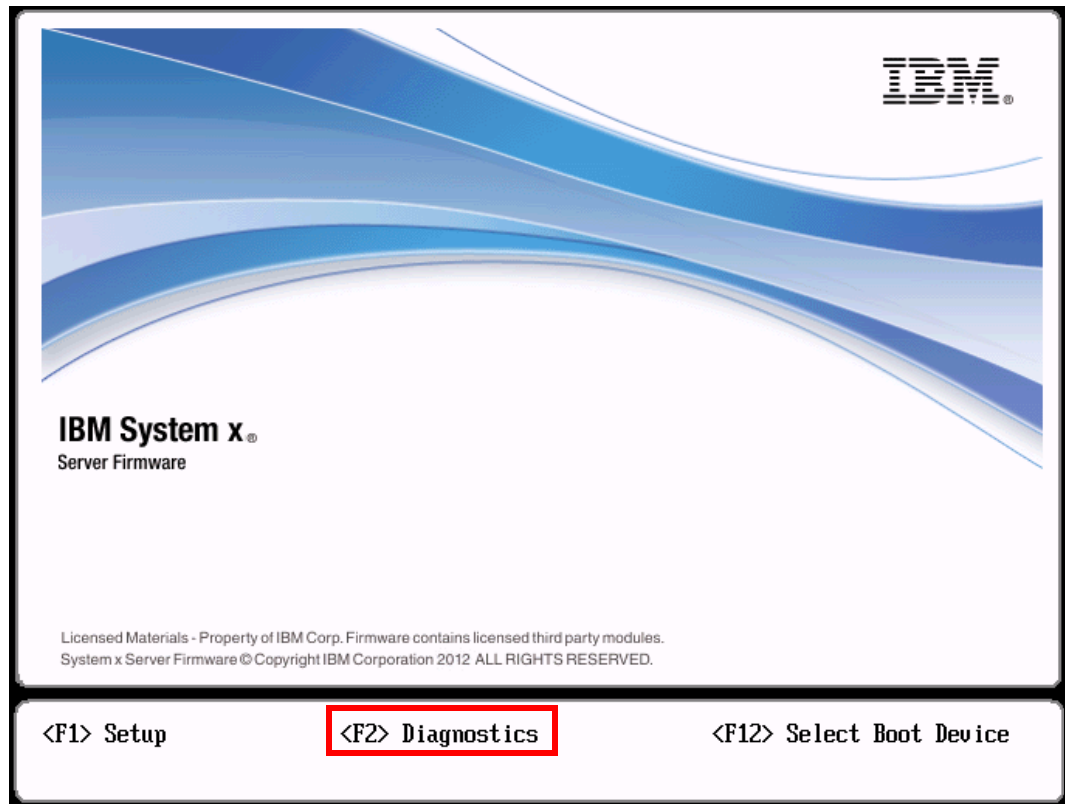


Figure 3-13 F2 option to enter Diagnostics option

- The IBM Memory Test page opens. Use the arrow keys to select **Quit** and press Enter to exit the memory test, as shown in Figure 3-14.

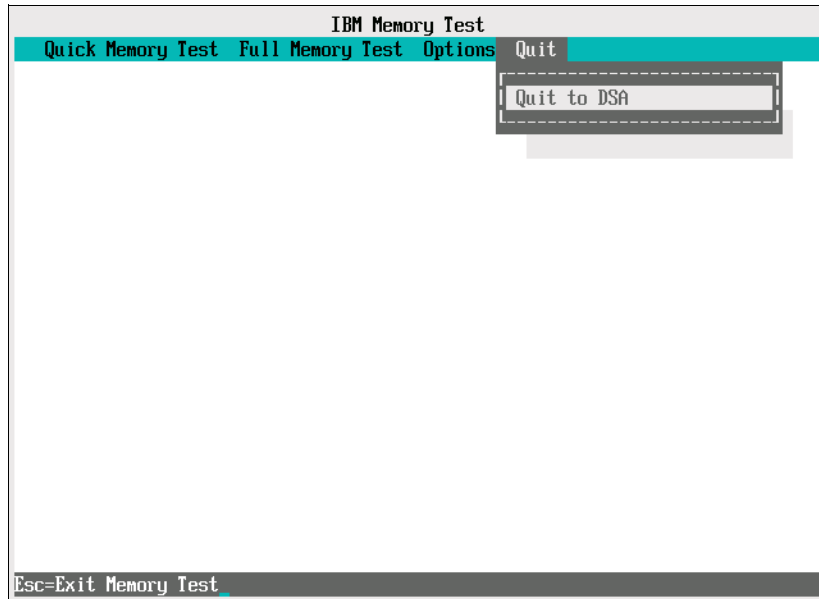


Figure 3-14 System memory test page

- Wait while a Linux kernel loads and many text messages scroll past.
- The user interface selection menu appears, as shown in Figure 3-15. Enter `gui` and press Enter to proceed to the DSA GUI.

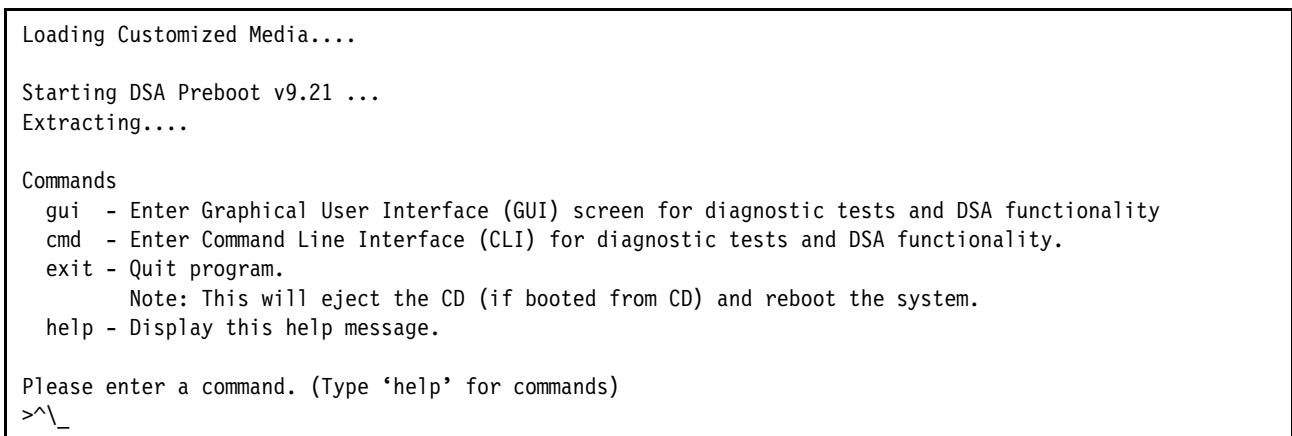


Figure 3-15 Preboot DSA user interface selection menu

- Click **I accept the terms in the license agreement** when prompted to do so. You see the following message for up to 3 minutes:  
Copying Schema, please wait a moment

6. The Preboot DSA Welcome page opens, as shown in Figure 3-16. Select **Activation Key Management**.

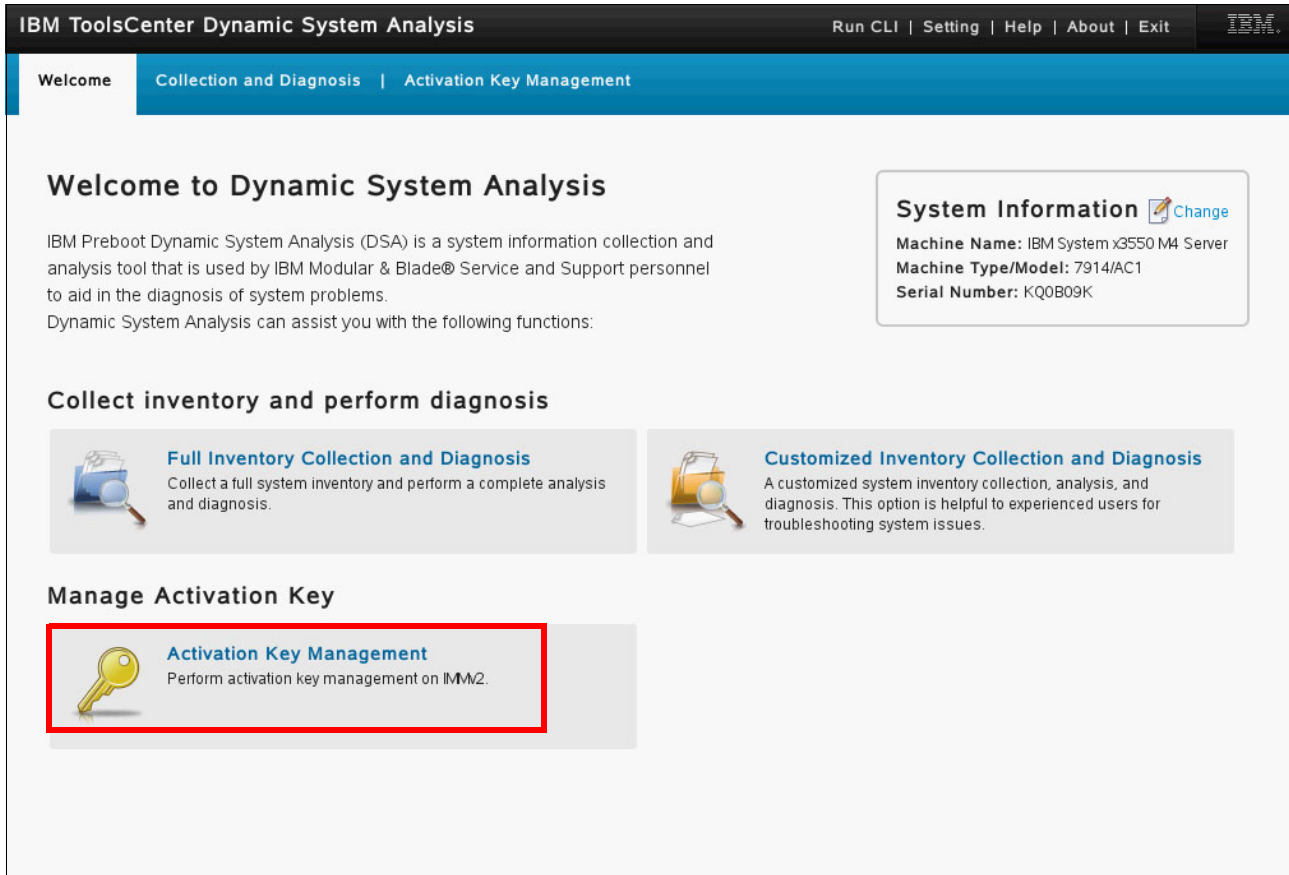


Figure 3-16 Preboot DSA Welcome page

**Note:** Depending on your version of Preboot DSA, the graphics that are shown in the following figures might vary.

7. Select **Manage Activation Key**, as shown in Figure 3-17.

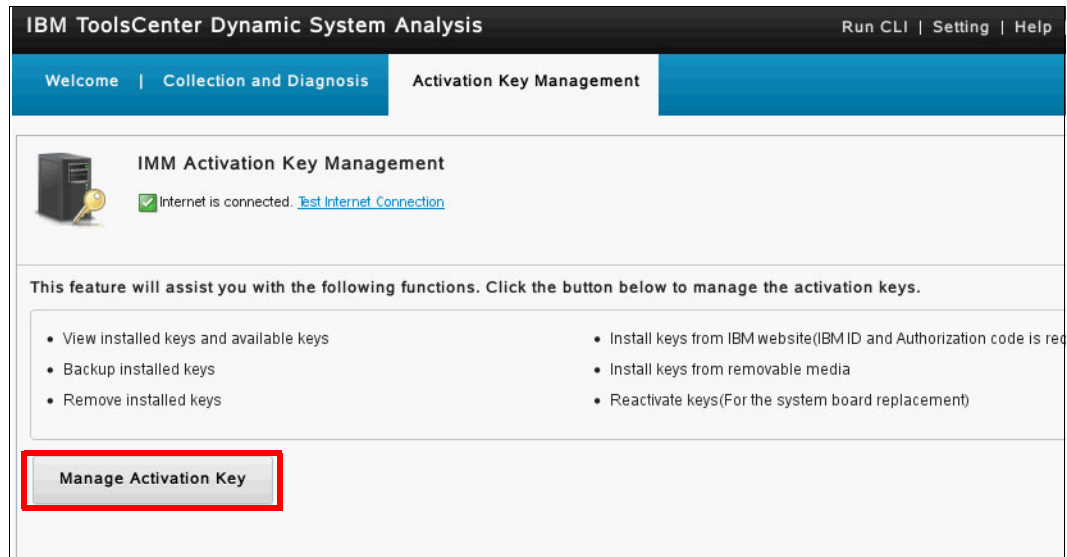


Figure 3-17 IMM Activation Key Management

8. Preboot DSA provides the following main choices to install the activation key, as shown in Figure 3-18 on page 63:

- Supply the FoD key file on a USB memory key or other portable media (for example, optical disc or USB drive). Select **Install from removable media**, as shown in Figure 3-18 on page 63.

For more information, see 3.2.1, “Install from USB memory key” on page 63.

- Have Preboot DSA download the FoD key directly from the Internet and install it. Select **Install from IBM Website**, as shown in Figure 3-18 on page 63.

**Note:** To select **Install from IBM Website**, you must have an Internet connection. Also, you must first select a feature to install from the list. Otherwise, the Install from IBM Website menu item is unavailable.

For more information, see 3.2.2, “Download and install from the Internet” on page 65.



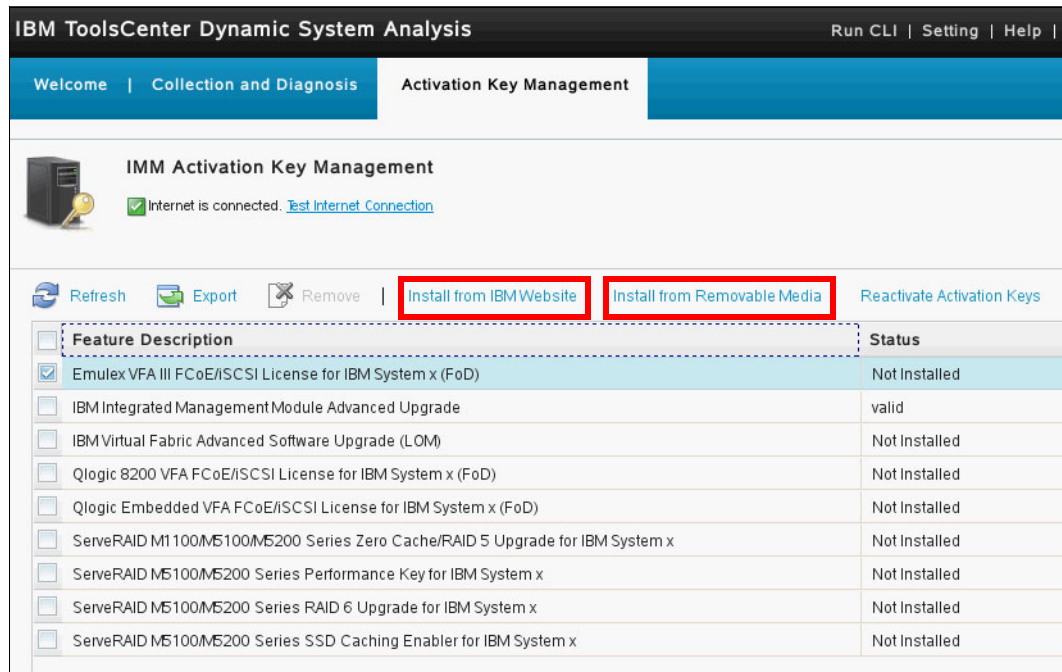


Figure 3-18 Activation key management window example with working Internet connection

### 3.2.1 Install from USB memory key

In this section, we continue the process of using Preboot DSA to install an FoD activation key that you downloaded and placed on a USB memory key. This process is useful if you do not have any network connectivity and downloaded the FoD keys that you want to apply onto a USB memory key. The key file can be stored in any directory on the USB key.

For this example, an FoD upgrade is applied for an Emulex card that is installed in a System x3550 M4. We used Preboot DSA version 9.60.

**Note:** In older versions of Preboot DSA, the FoD keys must be in the subfolder /FodKeys/<FoD UID>/. The folder names were case-sensitive; for example, “FodKeys”, not “fodkeys”. Also, the file extension must be .key (lowercase) and not .KEY (uppercase).

Complete the following steps to install the FoD keys as follows (continuing from step 8 on page 62):

1. If you select **Install from removable media**, the system detects available removable media. Select the removable media that contains your FoD keyfile, as shown in Figure 3-19.

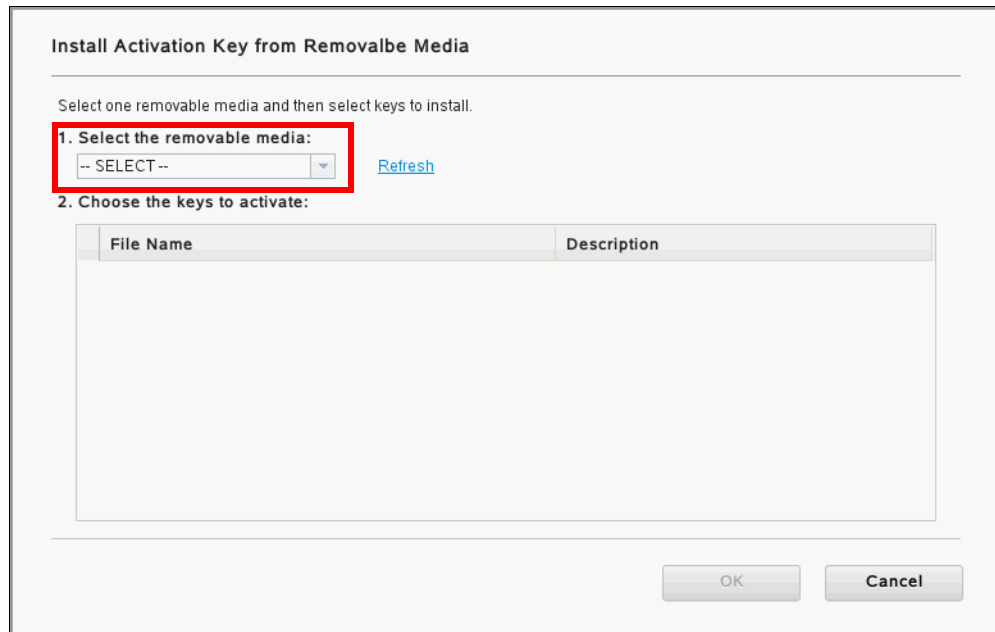


Figure 3-19 Removable media selection

2. As shown in Figure 3-20, select the activation key and click **OK** to install. The installer checks all directories on the USB key for valid key files and shows them all in this list.

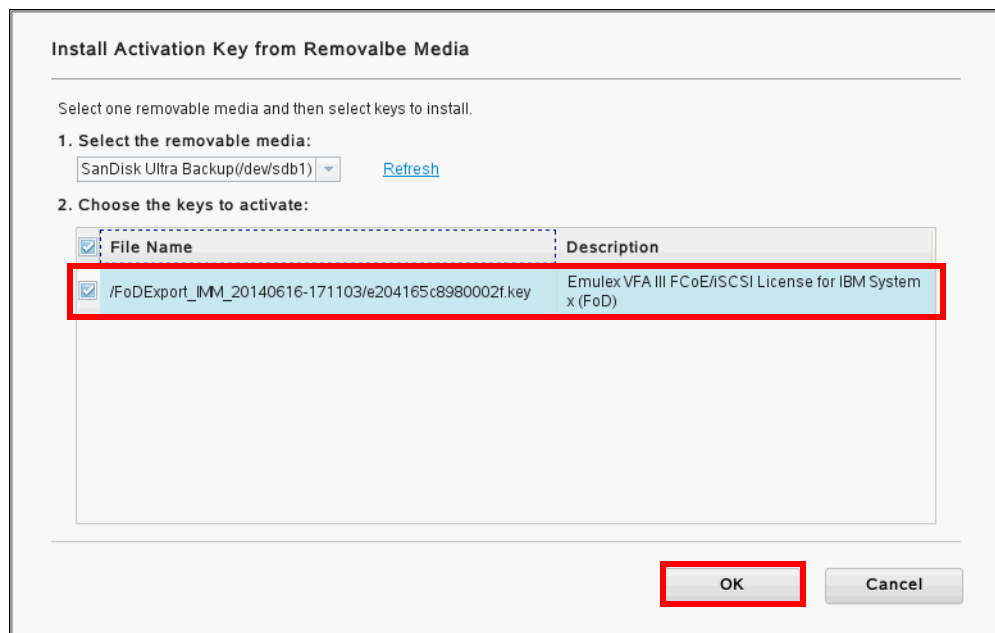


Figure 3-20 Existing FoD key on removable media

3. Upon completion of the installation process, a success message is displayed and the status changes to Installed, as shown in Figure 3-21.

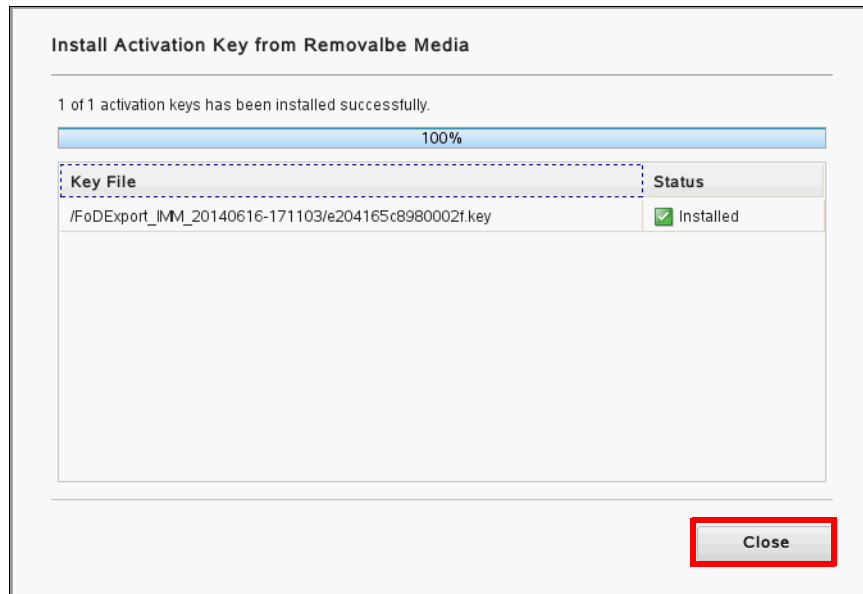


Figure 3-21 FoD key installation results

4. Click **Close** to return to the Activation Key Management window.

### 3.2.2 Download and install from the Internet

In this section, we continue the process of using Preboot DSA to download the key from the IBM FoD website and install all in one procedure. You do not need to download the keys before you begin. This option requires that you have a working connection to the Internet.

For this example, the IMM Advanced Upgrade FoD is installed on a System x 3550 M4. We used Preboot DSA version 9.60.

Complete the following steps (continuing on from step 8 on page 62):

1. Select **Install from IBM Website**, as shown in Figure 3-18 on page 63.

**Tip:** If the Install from IBM Website menu item is unavailable, this means that you did not select a feature to install or the server does not have an active Ethernet link.

2. Enter your user credentials, as shown in Figure 3-22.

**Install Activation Key from IBM Site**

Please provide the following information for activation key:

**1. User credential**

IBM ID:

User Password:

**2. Details for each key** (Auth code is required when the activation key file was not created yet)

<input type="checkbox"/>	Feature Description	Unique ID	Auth Code(Optional)
<input type="checkbox"/>	IBM Integrated Management Module Advanced Upgrade	7914KQ0B09K	<input type="text"/>

Figure 3-22 Installing activation key from IBM Website option

3. Click to select the items that you want to install from the list that is provided, as shown in Figure 3-23. Click **Install Now**.

**Install Activation Key from IBM Site**

Please provide the following information for activation key:

**1. User credential**

IBM ID: alexander.frank@de.ibm.com

User Password: ●●●●●●

**2. Details for each key** (Auth code is required when the activation key file was not created yet)

<input checked="" type="checkbox"/>	Feature Description	Unique ID	Auth Code(Optional)
<input checked="" type="checkbox"/>	IBM Integrated Management Module Advanced Upgrade	7914KQ0B09K	<input type="text"/>

Figure 3-23 Example showing selection for IMM Advanced Upgrade installation from IBM Site

**Authorization code:** An authorization code is needed only if you did not create the activation key from your authorization code by using the IBM FoD website.

- At completion, the installation results of each feature are displayed, similar to what is shown in Figure 3-21 on page 65.

### 3.2.3 Backing up activation keys by using Preboot DSA

In this section, we describe how to back up FoD Activation keys to a removable media, such as a USB memory key, by using the Preboot DSA GUI. We recommend that you back up your activation keys immediately after the installation because you are booted into Preboot DSA.

In the following example, we are using Preboot DSA version 9.60 to back up the IMM Advanced Upgrade FoD key and the Emulex card FoD key on a System x 3550 M4.

**Note:** The figures in this section show Preboot DSA version 9.60. If you are using an older version of Preboot DSA, the windows might look different.

Complete the following steps to back up keys for the local machine:

- Boot the server to Preboot DSA by pressing F2 and select the Manage Activation Key menu. Click **Manage Activation Key**, as described in steps 1 - 8 in 3.2, “Installing a key by using Preboot DSA” on page 59.
- The Activation Key Management window opens. Select the items from the list that you want to back up and click **Export**, as shown in Figure 3-24.

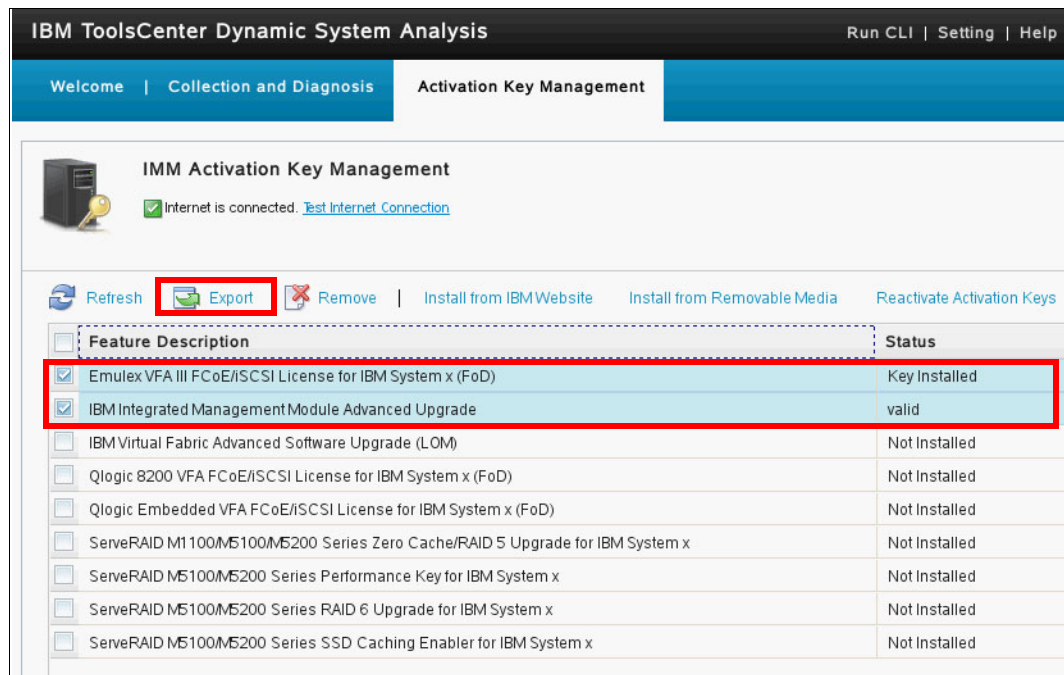


Figure 3-24 Activation key management selection example for backup

3. Select the removable media and click **OK**, as shown in Figure 3-25.

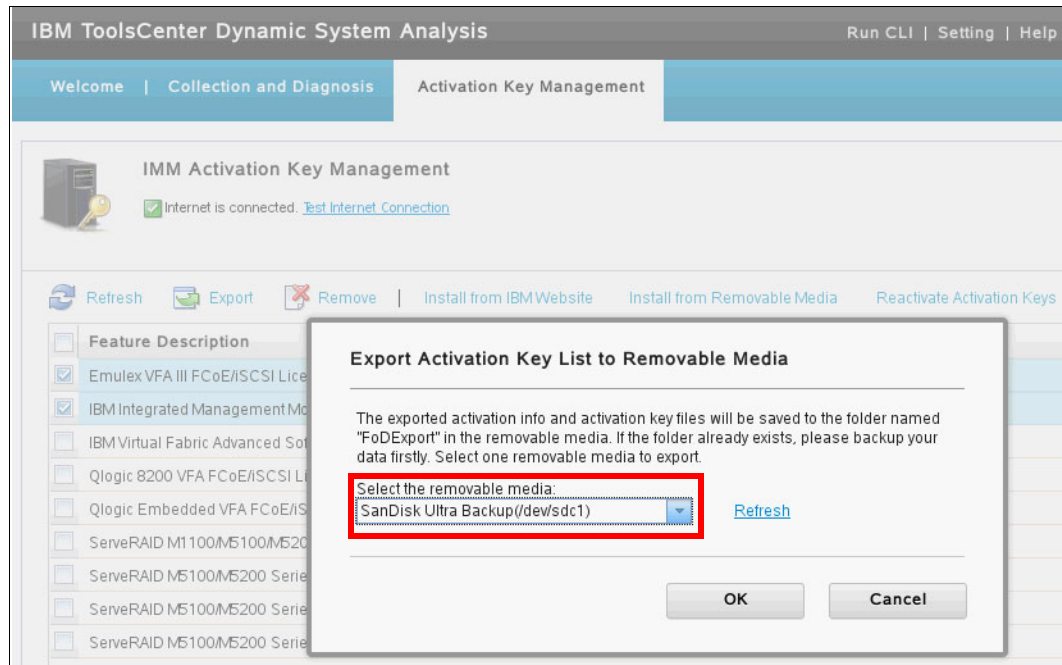


Figure 3-25 Export activation key screen.

4. Upon completion, a success message is displayed, as shown in Figure 3-26. Click **Close** to return to the activation key management window.

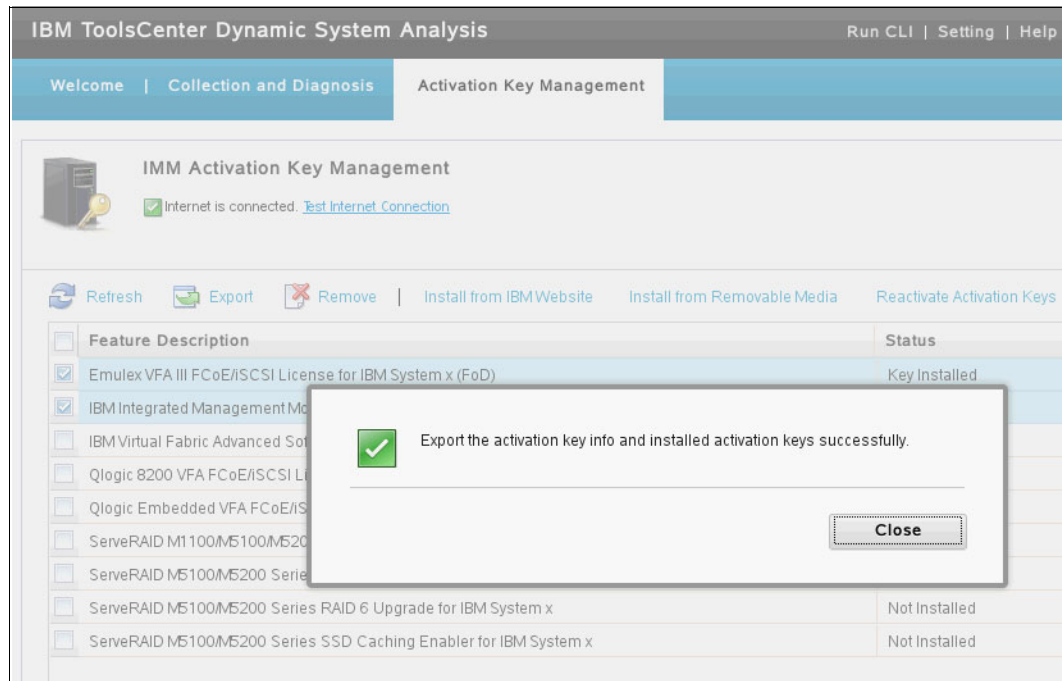


Figure 3-26 Export activation key success message

The FoD keys are stored on the root of the Removable Media and in the FoDExport\_IMM\_date/timestamp folder.

**Tip:** Unlike previous versions of Preboot DSA, exporting information to removable media requires no active Internet connection to export FoD keys to removable media.

## 3.3 Installing a key by using Portable DSA

**Note:** We recommend the use of the IBM Advanced Settings Utility (ASU) instead of Portable DSA if you want to use a command line-based tool because ASU is faster and more versatile. For more information, see 3.5, “Installing a key by using ASU” on page 76. The instructions in this section for the use of Portable DSA are shown for completeness of this paper only.

We can use IBM Dynamic System Analysis (DSA) to download and install FoD Activation keys. In this section, we describe the use of Portable DSA in an operating system. Portable DSA can be downloaded from this website:

<http://ibm.com/support/entry/portal/docdisplay?lnocid=SERV-DSA>

At the time of this writing, only a command-line interface (CLI) is available for managing FoD upgrades by using Portable DSA. The commands in this section require that the system be connected to the Internet.

These commands download specific FoD activation keys from the IBM FoD website, which is (also known as the Key Management System (KMS)), and installs them on the target system (the local server or a remote server).

The following Portable DSA functions are described in this section:

- ▶ 3.3.1, “Downloading an FoD key from the Internet (download\_fod\_key)” on page 69
- ▶ 3.3.2, “Installing a previously downloaded FoD key (install\_fod\_key)” on page 70
- ▶ 3.3.3, “Downloading and installing an FoD key (install\_imm\_fod)” on page 73
- ▶ 3.3.4, “Portable DSA command summary” on page 74

### 3.3.1 Downloading an FoD key from the Internet (download\_fod\_key)

In this section, we describe how to download an authorization key file by using Portable DSA in an operating system environment.

Our example uses the following configuration:

- ▶ 32-bit DSA that is running from CLI in Windows Server 2008 R2 that is connected to the Internet.
- ▶ The DSA file is in the C:\Users\Administrator\Desktop directory.
- ▶ The server machine type is 7915 and the serial number is 06CLAE6.
- ▶ The keys are downloaded to the \IBM\_Support\FoDKeys directory.
- ▶ The downloaded key in this example is `ibm_fod_0001_791506CLAE6_anyos_noarch.key`, which corresponds to the IMM Advanced Upgrade feature, as shown in Appendix A, “FoD Component reference” on page 155.
- ▶ IBM ID: `userid@us.ibm.com` (this ID is the IBM ID that is used on the FoD website).
- ▶ IBM ID password: `mypassword`

Use the following command and parameters to download an authorization key file:

```
dsaexe fod download_fod_key --ibmid userid:password> |  
--uid <unique_id> | --authcode <code> | --mt <machinetype>
```

The **ibmid** and **uid** parameters are required. **Authcode** and **machinetype** parameters are optional.

Figure 3-27 shows the output of the successful command.

```
C:\Users\Administrator\Desktop>ibm_utl_dsa_dsytaln-9.21_portable_windows_i386.exe fod download_fod_key  
--ibmid userid@us.ibm.com:mypassword --uid 791506CLAE6  
Downloading activation key from IBM website...  
The downloaded FoD key file is in the folder:C:\IBM_Support\FoDKeys\791506CLAE6  
Please press ANY key to Continue ...
```

Figure 3-27 Downloading FoD key

Figure 3-28 shows the output you see whether you do not have a connection to the Internet.

```
Downloading activation key from IBM website...  
Download the FoD key file failed.  
Failed message:  
Fail to get key, fail to perform curl.Couldn't connect to server  
Please press ANY key to Continue ...
```

Figure 3-28 FoD key download error

### 3.3.2 Installing a previously downloaded FoD key (install\_fod\_key)

In this section, we describe how to install a feature activation key by using local and remote Portable DSA installation methods. The key was downloaded as described in 3.3.1, “Downloading an FoD key from the Internet (download\_fod\_key)” on page 69.

#### Installing a feature activation key via the local operating system

The following steps show how to install a feature activation key that was copied to the local server that requires a feature activation.

**Reboot required:** A system reboot might be required, depending on the feature activation key that is installed. Although the activation key shows as installed in the IMM web console or CLI, it does not become effective until the UEFI is restarted. For more information about how to determine whether a reboot is required, see Appendix A, “FoD Component reference” on page 155.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the DSA for the server operating system on which you are running.

In this example, we have the following setup:

- ▶ The x64 version of DSA is installed on Windows Server x64.
- ▶ The DSA is in the C:\DSAut11 directory.
- ▶ The FoD key is in the C:\fodkey directory.
- ▶ The activation key file name to be installed is  
ibm\_fod\_8009\_791506CLAE6\_anyos\_noarch.key



Use the following command and parameters to install an activation key to the local server:

```
dsaexe fod install_fod_key --keyfile directory\keyfile --device
```

Consider the following points regarding this example:

- ▶ *directory\keyfile* is the directory and activation key file name.
- ▶ *device* is the device where the keys are stored. For the activation keys for System x servers, the device is IMM.

Figure 3-29 shows the command that we used.

```
C:\dsa>ibm_utl_dsa_dsytaln-9.21_portable_windows_i386.exe fod install_fod_key --keyfile  
C:\fodkey\ibm_fod_8009_791506CLAE6_anyos_noarch.key --user USERID --password iloveitso
```

Figure 3-29 Example DSA command that is run locally to install an activation key

Figure 3-30 shows the output if the command is successful.

```
IBM Dynamic System Analysis Version 9.21.A1N  
(C) Copyright IBM Corp. 2004-2012. All Rights Reserved  
Installing activation key to key repository(IMM)...  
Install FoD Key to IMM successfully.  
Please press ANY key to Continue
```

Figure 3-30 A successful installation of an activation key run locally

Restart the system (if required) to fully activate the feature.

### Installing a feature activation key to a remote system

In this section, we show how to install a feature activation key that was downloaded to your local workstation for deployment to a remote server. For the purposes of this demonstration, we deploy the ServerRAID M5100 Series SSD Caching Enabler for IBM System x activation key. This activation key is deployed to an IMM2 that is connected directly to a LAN. Portable DSA can connect to the IMM remotely when the server is connected to power or is using standby power.

**Reboot:** A system reboot might be required depending on the feature activation key that is installed. Although the activation key shows as installed in the IMM web console or CLI, it is not active until the UEFI is restarted. For more information about how to determine whether a reboot is required, see Appendix A, “FoD Component reference” on page 155.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the Portable DSA for the workstation on which you are running it.

In this example, we have the following setup:

- ▶ A Portable DSA 32-bit version is installed on a 32-bit Windows based workstation.
- ▶ The Portable DSA is in the C:\dsa directory.
- ▶ The FoD key is in the C:\fodkey directory.
- ▶ The activation key file name to be installed is:  
ibm\_fod\_8009\_791506CLAE6\_anyos\_noarch.key
- ▶ IMM IP address: 9.42.171.49

- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following command and parameters to install an activation key to a remote server:

```
dsaexe fod install_fod_key --keyfile directory\keyfile --device devicetype --host
username:password@ipaddress
```

Consider the following points regarding this example:

- ▶ *dsaexe* is the name of the DSA utility that changes in every version; for example: `ibm_utl_dsa_dsyta1n-9.21_portable_windows_i386.exe`
- ▶ *directory\keyfile* is the directory and file name of the activation key file
- ▶ *devicetype* is the type of device you are deploying the activation key to, which is IMM
- ▶ *username* is an IMM2 administrative account on the remote server
- ▶ *password* is the password of the chosen IMM2 administrative account
- ▶ *ipaddress* is the IP address of the IMM2 of the remote server

Figure 3-31 shows the command that we used.

```
C:\dsa>ibm_utl_dsa_dsyta1n-9.21_portable_windows_i386.exe fod install_fod_key --keyfile
C:\fodkey\ibm_fod_8009_791506CLAE6_anyos_noarch.key --device IMM --host USERID:iloveitso@9.42.171.39
```

Figure 3-31 Example Portable DSA command to remotely install an activation key

If you are running the DSA command on a PC or notebook, you might see the prompt that is shown in Figure 3-32. Because we are performing a remote operation rather than a local operation, we can safely ignore the message, enter Y, and press Enter to continue.

```
You might need to download an update for DSA to support this system.
Use the -? or -h parameter for more information about downloading updates.
Do you want to proceed anyway (function may be limited)? (Y/N)
```

Figure 3-32 DSA update prompt

Figure 3-33 shows the output if the command is successful.

```
Logging level set to Status
Copying Schema...
Dynamic System Analysis Version 9.21.A1N
(C) Copyright IBM Corp. 2004-2012. All Rights Reserved.
Installing activation key to key repository(IMM)...
Install FoD Key to IMM successfully.
Please press ANY key to Continue ...
```

Figure 3-33 A successful installation of an activation key run remotely

Restart the system (if required) to fully activate the feature.

### 3.3.3 Downloading and installing an FoD key (install\_imm\_fod)

As an alternative to using two separate DSA commands to download and then install the activation keys, you can use one command to do both. In this section, we describe how to use the IMM and Portable DSA to download and install an FoD authorization key.

Our example uses the following setup:

- ▶ A 32-bit DSA that is running from a CLI in Windows Server 2008 R2 that is connected to the Internet
- ▶ The DSA file that is in the C:\Users\Administrator\Desktop directory
- ▶ Server machine type and serial number are 7915 and 06CLAE6
- ▶ IBM ID: userid@us.ibm.com (this is the IBM ID that is used on the FoD website)
- ▶ IBM ID password: mypassword
- ▶ IMM IP address: 9.42.171.49
- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following command and parameters to download and install every available FoD activation key that is linked to a specified UID:

```
dsaexe fod install_imm_fod --ibmid <userid:password>, --uid <unique_id>,  
--authcode <code>, --mt <machinetype>, --host <userid:password@hostip:[port]>
```

If **host** is not specified, the repository defaults to the IMM on the local system. **Authcode** and **machinetype** parameters are optional.

Consider the following points regarding this example:

- ▶ *<userid:password>* is IBM ID website credentials.
- ▶ *<unique\_id>* is the FoD feature unique identifier information.
- ▶ *<code>* is the authentication code for FoD features.
- ▶ *<machinetype>* is the target system machine type (IMM).
- ▶ *<[http(s)://userid:password@hostip:[port]]>* is the remote key repository (IMM), default value is the local IMM device. Default IMM port is 5989.

The command that we used and the output that shows success are shown in Figure 3-34.

```
C:\Users\Administrator\Desktop>dsa.exe fod install_imm_fod --ibmid  
userid@us.ibm.com:mypassword --uid 791506CLAE6 --host USERID:iloveitso@9.42.171.39  
  
Installing activation key to key repository(IMM) ..  
Install FoD Key to IMM successfully.  
Please press ANY key to Continue ...
```

Figure 3-34 Downloading and installing an FoD key to a remote IMM

Figure 3-35 shows the output if there is no valid internet connection.

```
Installing activation key to key repository(IMM) ..  
  
Fail to install the FoD key to IMM.  
Failed message:  
Fail to get key, fail to perform curl.Couldn't connect to server  
Please press ANY key to Continue ...
```

Figure 3-35 No Internet connection error

### 3.3.4 Portable DSA command summary

Portable DSA also can run reporting and exporting commands. Table 3-1 lists all of the Portable DSA commands that are related to FoD. Keys are grouped by the key repository; that is, the component that is used to store the activation keys after they are installed.

The following syntax is used:

*dsaexe fod command*

Table 3-1 DSA commands

DSA FoD command	Description
help	Display a list of available commands.
export_imm_uid	Export FoD inventory information to removable media by using unique identifier (UID). The file that is generated is exported to <i>dsa_fod_id.txt</i> in the DSA output folder.
display_available_fod	Display the available FoD keys for a key repository.
download_fod_key	Acquire and download activation key from IBM website.
install_fod_key	Install activation keys from user-specified location to key repository.
export_imm_fod	Export the local FoD unique IDs to a file that is saved in DSA output path.
report_imm_active_fod	Report inventory information of IMM repository.
install_imm_fod	Download and install activation keys to IMM repository.
uninstall_imm_fod	Uninstall activation keys from IMM repository.

For example, the `report_imm_active_fod` command displays the output that is shown in Figure 3-36.

```
c:\dsaexe fod report_imm_active_fod
Reporting inventory information from key repository(IMM)...

Current active FoD feature(s):
-----

Number of keys installed is 2
No  Key ID          status      Description
1   ea6f0962f921c0b9 valid      IBM Integrated Management Module Advanced Upgrade
2   3c08174de28098bb valid      ServeRAID M5100 Series RAID 6 Upgrade for IBM System x
-----

Please press ANY key to Continue ...
```

Figure 3-36 Active FoD keys

### 3.3.5 Backing up activation keys by using Portable DSA

In this section, we describe how to run portable DSA to export UIDs.

The command is issued from a command line on the server and it assumes that an operating system is installed. The following command exports all FoD UIDs on the local system and stores them in file `dsa_fod_id.txt` locally in the DSA output folder:

```
dsaexe fod export_imm_fod
```

**Tip:** At the time of this writing, DSA can export only the FoD UIDs on the local system to the `C:\IBM_Support` directory.

The output of the command is shown in Figure 3-37.

```
Querying FoD unique ID... Done!

Exporting the local FoD unique id(s)...

FoD unique IDs are exported as file: C:\IBM_Support\dsa_fod_id.txt

Please press ANY key to Continue ...
```

Figure 3-37 Export UID by using Portable DSA

## 3.4 IBM Systems Director Feature Activation Manager

IBM Systems Director can be used to perform centralized FoD-related tasks. You can use the Feature Activation Manager configuration settings within IBM Systems Director to manage FoD activation keys.

By using the Feature Activation Manager configuration settings, you can perform the following tasks:

- ▶ Obtain activation keys by using the IBM FoD website (key management system, KMS)
- ▶ Upload activation keys from a local directory
- ▶ Choose whether you want to reboot a device automatically after an activation key is installed to complete the activation
- ▶ Install activation keys on the target device
- ▶ Retrieve activation keys from the target device and show the detailed license information
- ▶ Remove and deactivate existing keys from the target device

You can also create a Feature Activation Manager template through the IBM Systems Director configuration manager and use the template for the entire configuration across a group of similar devices.

The use of Feature Activation Manager within IBM Systems Director is documented in the *IBM Features on Demand User's Guide*; therefore, it is not covered in this paper. The *IBM Features on Demand User's Guide* is available at this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5089568>

## 3.5 Installing a key by using ASU

The ASU is a command-line utility that is used to modify firmware settings and manage FoD activation keys. It is supported on Windows and Linux and you can use it to manage feature activation keys (locally or remotely) for the following components:

- ▶ IMM2-based systems
- ▶ I/O modules

The IBM Advanced Settings Utility is available at this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=TOOL-ASU>

**Tip:** Whenever possible, have FoD features installed by IBM manufacturing at the time of product order.

For the purposes of this chapter, we focus on feature activation key management on IMM2-based server systems. It is assumed that the reader is already familiar with the use of the ASU command. For more information about the tool, see *IBM Advanced Settings Utility User Guide*, which is available at this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5085890>

In this section, we demonstrate how to install a feature activation key by using local and remote installation methods. The ASU **fodcfg** command is the main command that is used to manage FoD activation keys. It supports the FoD activation key tasks that are shown in summarized in Table 3-2.

Table 3-2 *fodcfg* commands

Command	Description
acquirekey	Acquire and download the activation key from the IBM web site.
installkey	Install activation keys from the user-specified location to the key repository.
uninstallkey	Uninstall activation keys from the device.
reportkey	Inventory information of a specified key repository (for example, IMM).
exportkey	Inventory information about a specified key repository. For more information about this command, see 3.5.5, "Backing up keys by using ASU" on page 82.

### 3.5.1 Installing an activation key locally

In this section, we demonstrate how to install a feature activation key that was copied locally to the system that requires the feature activation.

**Reboot required:** A system reboot might be required, depending on the feature activation key that is installed. Although the activation key shows as installed in the IMM web console or CLI, it is not effective until the UEFI is restarted.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the ASU for the server operating system on which you are running it. LAN over USB should not be disabled on the IMM because ASU uses this feature to communicate with it to apply the activation key.

In this example, we have the following setup:

- ▶ An ASU 64-bit version installed on a 64-bit Windows server-based operating system
- ▶ The C:\ASUutil directory contains the ASU
- ▶ The C:\fodkey directory contains the FoD key
- ▶ The activation key file name to be installed is:  
ibm\_fod\_8009\_791506CLAE6\_anyos\_noarch.key
- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following command and parameters to install an activation key locally by using ASU:

```
asu64.exe fodcfg installkey -f <directory\keyfile> --user <username> --password <password>
```

In the sample syntax, we make the following substitutions:

- ▶ *<directory\keyfile>* with the location of the directory and activation key file name
- ▶ *<username>* with an IMM2 administrative account
- ▶ *<password>* with the password of the chosen IMM2 administrative account

Using our lab example, the command that is used is shown in Figure 3-38.

```
C:\ASUtil>asu64.exe fodcfg installkey -f
C:\fodkey\ibm_fod_8009_791506CLAE6_anyos_noarch.key --user USERID --password iloveitso
```

Figure 3-38 Example ASU command run locally to install an activation key

The command completes successfully if you see the message Succeeded installing key, as shown in the last line of Figure 3-39.

```
IBM Advanced Settings Utility version 9.21.78C
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2012 All Rights Reserved
No host specified, attempting to discover the IMM(s) via SLP.
Successfully discovered the IMM via SLP.
Pegasus Exception: Cannot connect to 169.254.95.118:5989. Connection failed.
Executing the command through CIM interface failed, trying IPMI interface.
Connected to IMM at IP address 169.254.95.118
Succeeded installing key C:\fodkey\ibm_fod_8009_791506CLAE6_anyos_noarch.key.
```

Figure 3-39 A successful installation of an activation key run locally

Restart the system (if required) to fully activate the feature.

## 3.5.2 Installing an activation key remotely

In this section, we show how to install an activation key that was downloaded to your local workstation for deployment to a remote server.

For the purposes of this demonstration, we deploy the ServeRAID M5100 Series SSD Caching Enabler for IBM System x activation key. This activation key is deployed to an IMM2 that is connected directly to a LAN. The ASU can connect to the IMM remotely when the server is connected to power or is using standby power. IPv4 and IPv6 are supported remotely by ASU.

**IMPORTANT:** A system reboot might be required, depending on the feature activation key that is installed. Although the activation key shows as installed in the IMM web console or CLI, it does not become effective until the UEFI is restarted.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the ASU for the workstation on which you are running it.

In this example, we have the following setup:

- ▶ An ASU 32-bit version installed on a 32-bit Windows based workstation
- ▶ The C:\ASUtil directory contains the ASU
- ▶ The C:\fodkey directory contains the FoD key
- ▶ The activation key file name to be installed is:  
ibm\_fod\_8009\_791506CLAE6\_anyos\_noarch.key
- ▶ IMM IP address: 9.42.171.49
- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso



Use the following command and parameters to install an activation key remotely by using ASU:

```
asu.exe fodcfg installkey -f <directory\keyfile> --host <ipaddress> --user <username> --password <password>
```

In the sample syntax, we make the following substitutions:

- ▶ *<directory\keyfile>* with the location of the directory and activation key file name
- ▶ *<ipaddress>* with the IP address of the IMM2 on the remote server
- ▶ *<username>* with an IMM2 administrative account
- ▶ *<password>* with the password of the chosen IMM2 administrative account

For our example, the command that is used is shown in Figure 3-40.

```
C:\ASUtil>asu.exe fodcfg installkey -f C:\fodkey\ibm_fod_8009_791506CLAE6_anyos_noarch.key --host 9.42.171.39 --user USERID --password iloveitso
```

Figure 3-40 Example ASU command to remotely install an activation key

The command completes successfully if you see the message Succeeded installing key, as shown in the last line of Figure 3-41.

```
IBM Advanced Settings Utility version 9.21.78C
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2012 All Rights Reserved
Pegasus Exception: Cannot connect to 9.42.171.39:5989. Connection failed.
Executing the command through CIM interface failed, trying IPMI interface.
Connected to IMM at IP address 9.42.171.39
Succeeded installing key C:\fodkey\ibm_fod_8009_791506CLAE6_anyos_noarch.key.
```

Figure 3-41 A successful installation of an activation key run remotely

Restart the system to fully activate the feature.

### 3.5.3 Downloading and installing an activation key to a local system

In this section, we show how to download an FoD key from the IBM FoD website and then install that key to the local server.

In our example, we deploy the IMM Advanced Upgrade for IBM System x activation key.

**Reboot:** A system reboot might be required, depending on the feature activation key that is installed. Although the activation key shows as installed in the IMM web console or CLI, it does not become effective until the UEFI is restarted.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the ASU for the server operating system on which you are running it. LAN over USB should not be disabled on the IMM because ASU uses this feature to communicate with it to apply the activation key.

In this example, we have the following setup:

- ▶ An ASU 64-bit version installed on a 64-bit Windows server-based operating system
- ▶ The C:\ASUtil directory contains the ASU

- ▶ The C:\fodkey directory receives the FoD key

**Download Directory:** If no directory is specified, the feature key is downloaded into the directory from which the ASU is run. The feature key downloaded is placed into a directory that contains the naming convention of machine type and serial number (with no spaces or dashes).

- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following command and parameters to download and install an activation key locally by using ASU:

```
asu64.exe fodcfg acquirekey -r -d <directory> --ibmid <userid:password> -m <machinetype> -u <machinetypeserialnumber>
```

In the sample syntax, we make the following substitutions:

- ▶ *<directory>* with the location of the directory that receives the feature key
- ▶ *<userid:password>* with the IBM FoD ID website credentials
- ▶ *<machinetype>* with the machine type of the system
- ▶ *<machinetypeserialnumber>* with the machine type and serial number of the system with no spaces or dashes

For our example, the command that is used is shown in Figure 3-42.

```
C:\ASUtil>asu64.exe fodcfg acquirekey -r -d C:\fodkey --ibmid mikeh@za.ibm.com:xxxxxxx  
-m 7915 -u 791506CLAE6
```

Figure 3-42 Sample command for downloading and installing a feature key locally

The command completes successfully if you see the message Succeeded installing key, as shown in the last line of Figure 3-41 on page 79.

```
IBM Advanced Settings Utility version 9.21.78C  
Licensed Materials - Property of IBM  
(C) Copyright IBM Corp. 2007-2012 All Rights Reserved  
Succeed to get key for userid:mikeh@za.ibm.com uid:791506CLAE6.  
No host specified, attempting to discover the IMM(s) via SLP.  
Successfully discovered the IMM via SLP.  
Pegasus Exception: Cannot connect to 169.254.95.118:5989. Connection failed.  
Executing the command through CIM interface failed, trying IPMI interface.  
Failed to connect to IMM at IP address 169.254.95.118  
Connecting via IPMI device driver (KCS interface)....  
Success connecting to IMM via KCS interface  
Succeeded installing key  
C:\fodkey\791506CLAE6\ibm_fod_0001_791506CLAE6_ayos_noarch.KEY.
```

Figure 3-43 Successful download and installation of a feature activation key to a local system

Restart the system to fully activate the feature.

### 3.5.4 Downloading and installing an activation key to a remote system

In this section, we show how to download and install a feature activation key to a remote server via a workstation with Internet access. For the purposes of this demonstration, we deploy the IMM Advanced Upgrade for IBM System x activation key.

**Reboot:** A system reboot might be required, depending on the feature activation key that is installed. Although the activation key shows as installed in the IMM web console or CLI, it does not become effective until the UEFI is restarted.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the ASU for the workstation on which you are running it. This activation key is deployed to an IMM2 that is connected directly to a LAN. The ASU can connect to the IMM remotely when the server is connected to power or is using standby power. IPv4 and IPv6 are supported remotely by ASU.

In this example, we have the following setup:

- ▶ An ASU 32-bit version installed on a 32-bit Windows based workstation that has Internet access
- ▶ The C:\ASUti1 directory contains the ASU
- ▶ The C:\fodkey directory receives the FoD key
- ▶ IMM IP address: 9.42.171.49

**Download directory:** If no directory is specified, the feature key is downloaded into the directory from which the ASU is run. The feature key that is downloaded is placed into a directory that contains the naming convention of Machine Type and Serial Number (with no spaces or dashes).

- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following command and parameters to download and install an activation key remotely by using ASU:

```
asu64.exe fodcfg acquirekey -r -d <directory> --ibmid <userid:password> -m  
<machinetype> -u <machinetypeserialnumber> --host <ipaddress> --user <username>  
--password <password>
```

In the sample syntax, we make the following substitutions:

- ▶ *<directory>* with the location of the directory that receives the feature key
- ▶ *<userid:password>* with the IBM FoD ID website credentials
- ▶ *<machinetype>* with the machine type of the system
- ▶ *<machinetypeserialnumber>* with the machine type and serial number of the system with no spaces or dashes
- ▶ *<ipaddress>* with the IP address of the IMM2 on the remote server
- ▶ *<username>* with an IMM2 administrative account
- ▶ *<password>* with the password of the chosen IMM2 administrative account

For our example, the command that is used is shown in Figure 3-44.

```
C:\ASUutil>asu.exe fodcfg acquirekey -r -d C:\fodkey --ibmid mikeh@za.ibm.com:xxxxxxx -m 7915 -u 791506CLAE6 --host 9.42.171.39 --user USERID --password iloveitso
```

Figure 3-44 Sample command for downloading and installing a feature key remotely

The command completes successfully if you see the message Succeeded installing key, as shown in the last line of Figure 3-45.

```
IBM Advanced Settings Utility version 9.21.78C
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2012 All Rights Reserved
Succeed to get key for userid:mikeh@za.ibm.com uid:791506CLAE6.
Pegasus Exception: Cannot connect to 9.42.171.39:5989. Connection failed.
Executing the command through CIM interface failed, trying IPMI interface.
Connected to IMM at IP address 9.42.171.39
Succeeded installing key
C:\fodkey\791506CLAE6\ibm_fod_0001_791506CLAE6_aynos_noarch.KEY.
```

Figure 3-45 Successful download and installation of a feature activation key to a local system

Restart the system to fully activate the feature.

### 3.5.5 Backing up keys by using ASU

The ASU can be used to export feature activation keys from the IMM2 for backup purposes. The activation keys can be exported to the following locations:

- ▶ The local operating system that runs on the IMM2-based server. The system must have the ASU installed locally.
- ▶ A remote system with ASU installed locally.

It is assumed that you are familiar with the use of the ASU. For more information, see the *IBM Advanced Settings Utility User's Guide*, which is available from this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5085890>

The IBM Advanced Settings Utility can be downloaded from this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=T00L-ASU>

#### Exporting from the local IMM key repository

Before you begin, verify that you downloaded the correct version (32-bit or 64-bit) of the ASU for the server operating system on which you are running it. LAN over USB should not be disabled on the IMM because ASU uses this feature to communicate with it to apply or export the activation key.

In our example, we use the following setup:

- ▶ An ASU 64-bit version installed on a 64-bit Windows server-based operating system
- ▶ The C:\ASUutil directory contains the ASU
- ▶ The C:\fodkey directory exports the FoD keys
- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following ASU command and parameters to export all activation keys from the local IMM key repository and then save them locally:

```
asu64.exe fodcfg exportkey -d directory --keyid all --user username --password password
```

In the sample syntax, we made the following substitutions:

- ▶ *<directory>* with the location of the directory to which the FoD keys are exported
- ▶ *<username>* with an IMM2 administrative account
- ▶ *<password>* - with the password of the chosen IMM2 administrative account

**Note:** If an export directory is not specified, the ASU exports the keys to the directory from which it is run.

For our example, the command that is used is listed in Figure 3-46.

```
C:\ASUtil>asu64.exe fodcfg exportkey -d c:\fodkey --keyid all --user USERID --password iloveitso
```

Figure 3-46 Command to export all activation keys from the local IMM

The command completes successfully if you receive a Succeeded exporting key message followed by an activation key name. As shown in Figure 3-47, two activation keys were exported successfully to the directory that is specified in the command.

```
IBM Advanced Settings Utility version 9.21.78C
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2012 All Rights Reserved
No host specified, attempting to discover the IMM(s) via SLP.
Successfully discovered the IMM via SLP.
Pegasus Exception: Cannot connect to 169.254.95.118:5989. Connection failed.
Executing the command through CIM interface failed, trying IPMI interface.
Connected to IMM at IP address 169.254.95.118
Succeeded exporting key ea6f0962f921c0b9.
Succeeded exporting key 3c08174de28098bb.
```

Figure 3-47 Successful export

## Exporting from a remote IMM key repository

Before you begin, verify that you downloaded the correct version (32-bit or 64-bit) of the ASU for the workstation on which you are running it.

In our example, we use the following setup:

- ▶ An ASU 32-bit version that is installed on a 32-bit Windows based workstation
- ▶ The C:\ASUtil directory contains the ASU
- ▶ The FoD keys are exported to the C:\fodkey directory
- ▶ IMM user name: USERID
- ▶ IMM password: iloveitso

Use the following ASU command and parameters to export all activation keys from the local IMM key repository and then save them locally:

```
asu.exe fodcfg exportkey -d <directory> --keyid all --host <ipaddress> --user <username> --password <password>
```

In the sample syntax, we make the following substitutions:

- ▶ *<directory>* with the location of the local directory to where the FoD keys are exported
- ▶ *<ipaddress>* with the IP address of the IMM2 on the remote server
- ▶ *<username>* with an IMM2 administrative account
- ▶ *<password>* with the password of the chosen IMM2 administrative account

**Tip:** You do not need to specify a user name and password in the command if the IMM2 is using default credentials. The ASU attempts to use the default IMM2 authentication credentials when none is specified in the command. Also, if an export directory is not specified, the ASU exports the keys to the directory from which it is run.

For our example, the command that is used is shown in Figure 3-48.

```
C:\ASUtil>asu.exe fodcfg exportkey -d C:\fodkey --keyid all --host 9.42.171.39 --user  
USERID --password iloveitso
```

Figure 3-48 Command to export all keys from a remote IMM key repository

The command completes successfully if you receive a Succeeded exporting key message followed by an activation key name. As shown in Figure 3-49, two activation keys were exported successfully to the remote workstation in the directory that is specified in the command.

```
IBM Advanced Settings Utility version 9.21.78C  
Licensed Materials - Property of IBM  
(C) Copyright IBM Corp. 2007-2012 All Rights Reserved  
Pegasus Exception: Cannot connect to 9.42.171.39:5989. Connection failed.  
Executing the command through CIM interface failed, trying IPMI interface.  
Connected to IMM at IP address 9.42.171.39  
Succeeded exporting key ea6f0962f921c0b9.  
Succeeded exporting key 3c08174de28098bb.
```

Figure 3-49 Sample output

**Tip:** The activation keys that are exported are given file names that are associated with a key ID that is used in ASU. You can use the `asu fodcfg reportkey` command to see the key ID information.

Store these key files in a safe location. If you replace the system board of the server, you can use the ASU command to reapply them.

## 3.6 ToolsCenter Suite FoD Mass Activation Tool

IBM ToolsCenter Suite (TCS) is a consolidation of server management tools that helps simplify the management of IBM System x, BladeCenter servers, and Flex servers. ToolsCenter Suite provides functionality to allow FoD mass activation key management. Among TCS features, FoD mass activation key management is the inventory, acquisition, and installation FoD keys for multiple end points. All tasks can be done in a simple, unified, web-based single-user GUI. It is suitable for basic users with little knowledge and for advanced IT professional users.

The ToolsCenter Suite is available at this website:

<http://ibm.com/support/entry/portal/docdisplay?ln docid=tool-tcsuite>

In this section, we describe *endpoints* and *targets*, which, for scope of this paper, refer to individual servers, RAID cards, network cards, network modules, and Chassis Management Modules (CMM).

### 3.6.1 Acquiring machine vital product data

TCS can import multiple machines for Mass key activation. TCS requires the following machine information:

- ▶ IP address
- ▶ IMM user name
- ▶ IMM Password

Optionally, target system inventory can be imported from a comma-separated value file (CSV.)

Complete the following steps to acquire the vital product data (VPD) of target machines:

1. Under the Configuration tab, click **Features on Demand Mass Activation**, as shown in Figure 3-50.

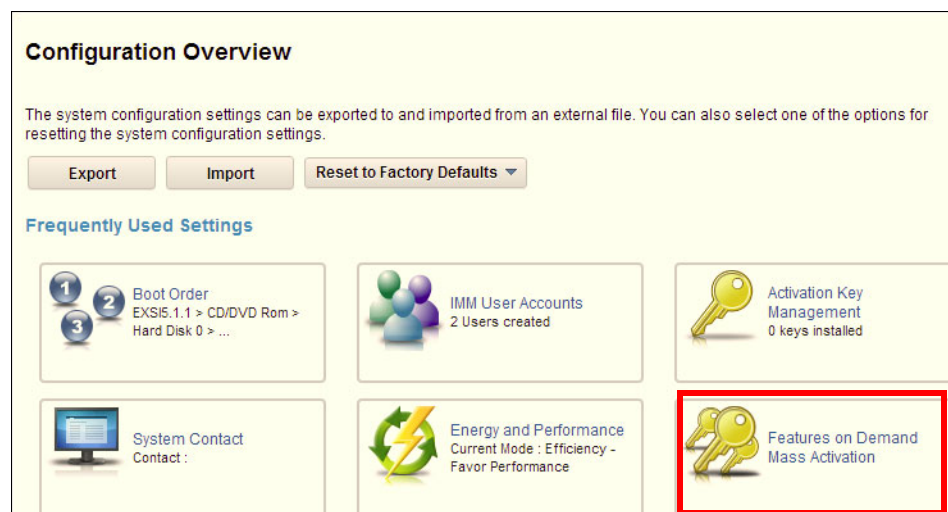


Figure 3-50 Features on Demand Mass Activation menu

In Figure 3-51, we see the main FoD Mass Activation window. We can see that Machine VPD was added because the View/Modify option can be selected. If the wanted machine VPD was added already, proceed to 3.6.2, “Key Retrieval” on page 88 to proceed with Key retrieval.

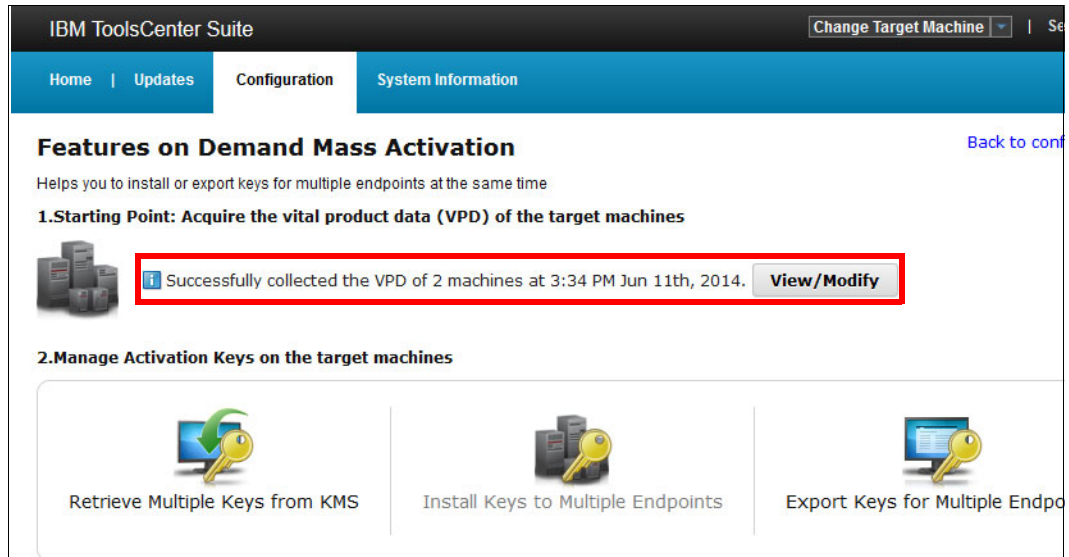


Figure 3-51 FoD Mass Activation with VPD already added

2. Click **View/Modify** to show which machines were added, as shown in Figure 3-52. From this window, we can Import more machine IP addresses through a .csv file or manually add IP addresses. We can also remove specific machines.

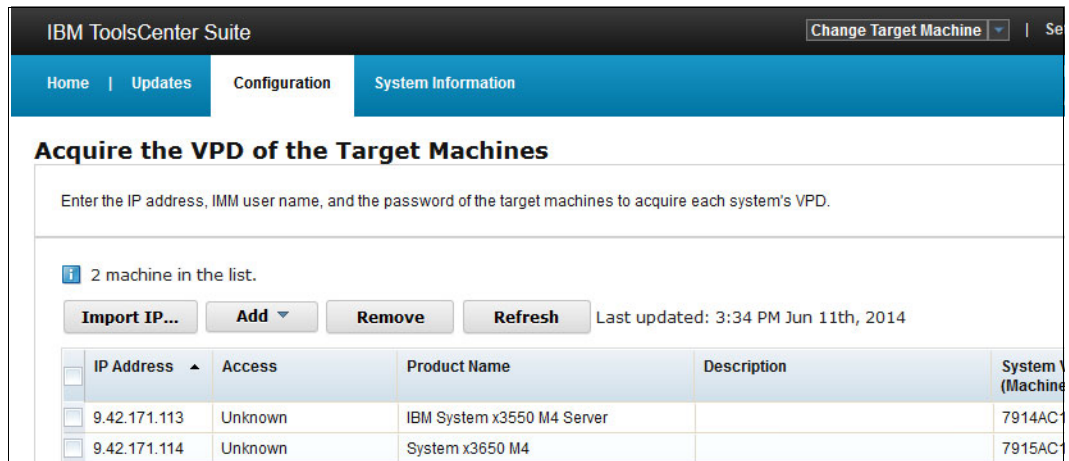


Figure 3-52 Acquire VPD with multiple machines

3. If the wanted machines are added, proceed to the key retrieval steps that are described in 3.6.2, “Key Retrieval” on page 88.



- From the Features on Demand Mass Activation page, click **Start** to add machine VPD, as shown in Figure 3-53.

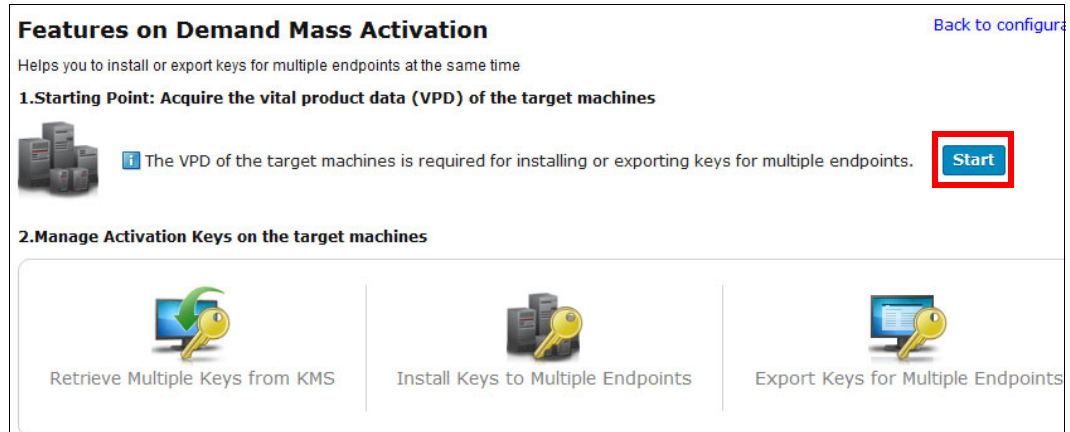


Figure 3-53 Add VPD

- Click **Add** to manually add values (as shown in Figure 3-54) or click **Import File**, as shown in Figure 3-55.

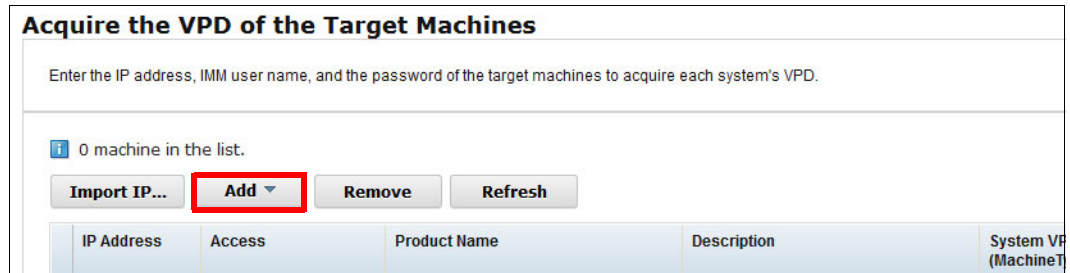


Figure 3-54 Acquire VPD menu

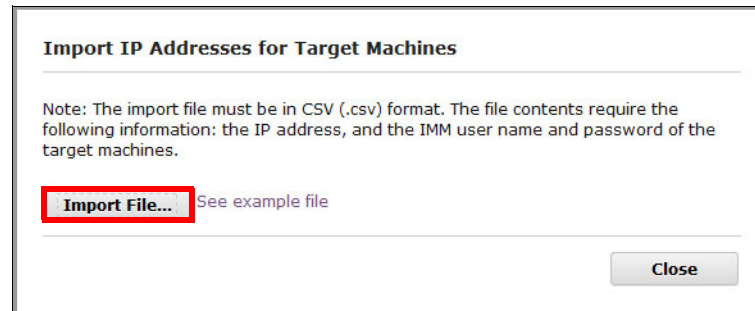


Figure 3-55 Import CSV dialog box

- Click **Return** to return to main page. Then, click **Retrieve Multiple Keys from KMS** to begin key retrieval process, shown in Figure 3-56.

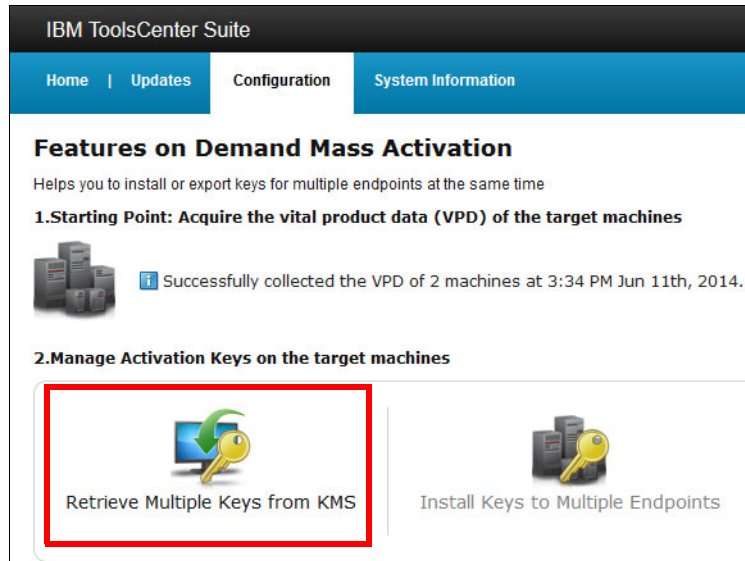


Figure 3-56 Retrieve Multiple Keys

### 3.6.2 Key Retrieval

Complete the following steps to retrieve a key or multiple keys with a single Authorization Code:

- As shown in Figure 3-57, we see an example of retrieving keys from Key Management System (KMS) by using one Authorization code. Enter the IBM ID, User Password, and Authorization Code. Click **Next**.

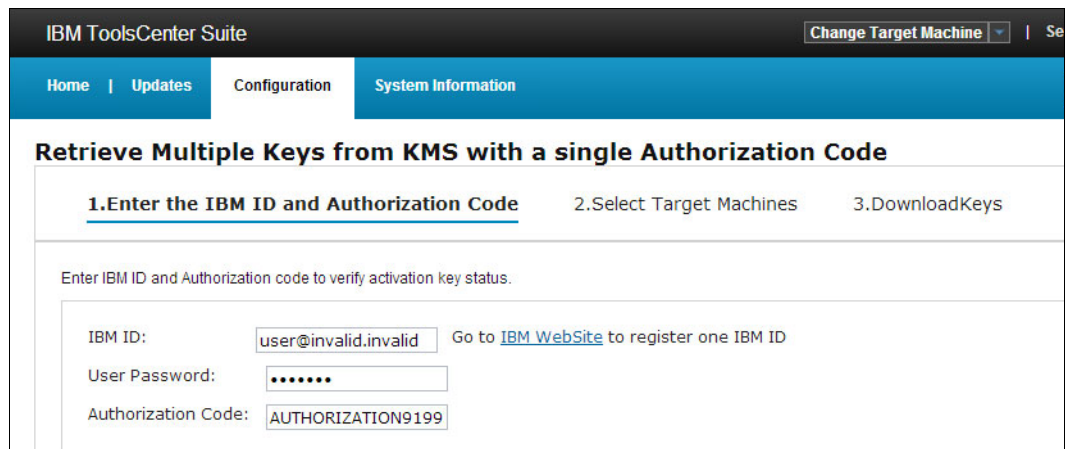


Figure 3-57 Retrieve multiple keys with one Authorization Code

- Select the target machine (or machines) to which we want to apply the FoD key. The machine's IP address and VPD are displayed, in addition to the FoD UID, as shown in Figure 3-58.

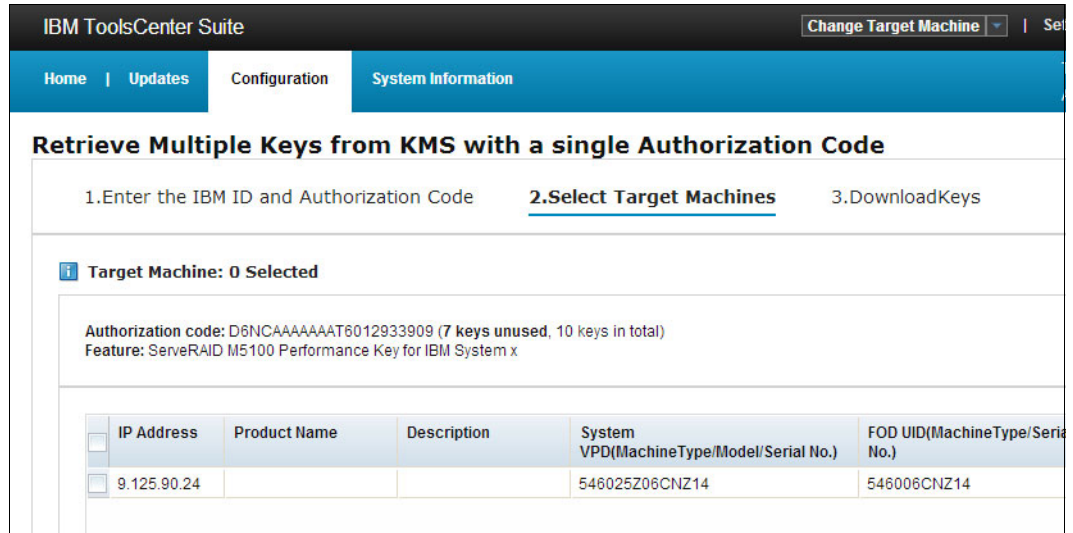


Figure 3-58 Select target machines

We then see the downloaded key (the ServeRAID M5100 Performance key for IBM System x in this example) for the target machine (or machines), as shown in Figure 3-59.

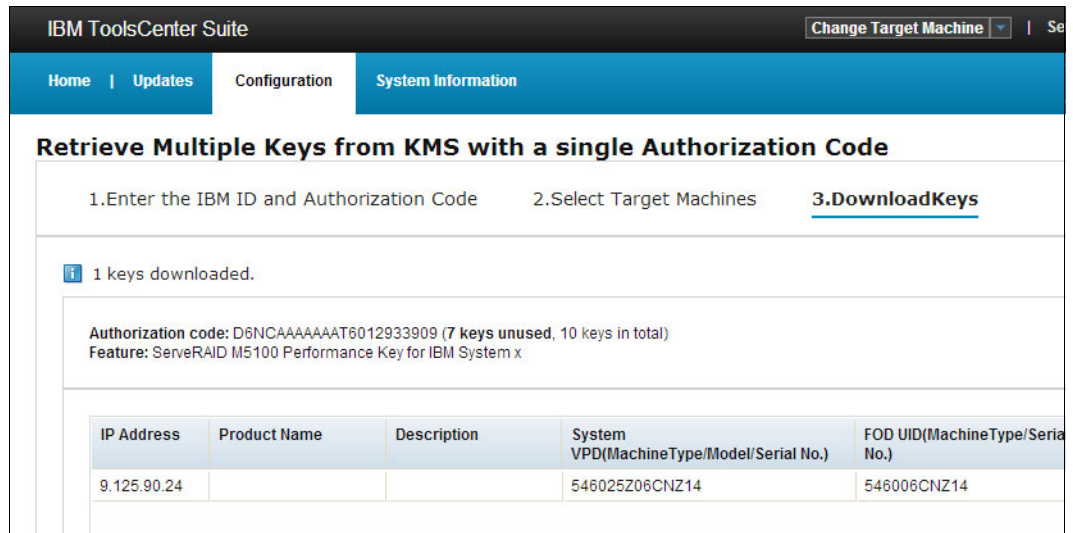


Figure 3-59 Downloaded key

### 3.6.3 Installing FoD keys by using TCS

To install multiple keys, click **Install Keys to Multiple Endpoints**, as shown in Figure 3-60.

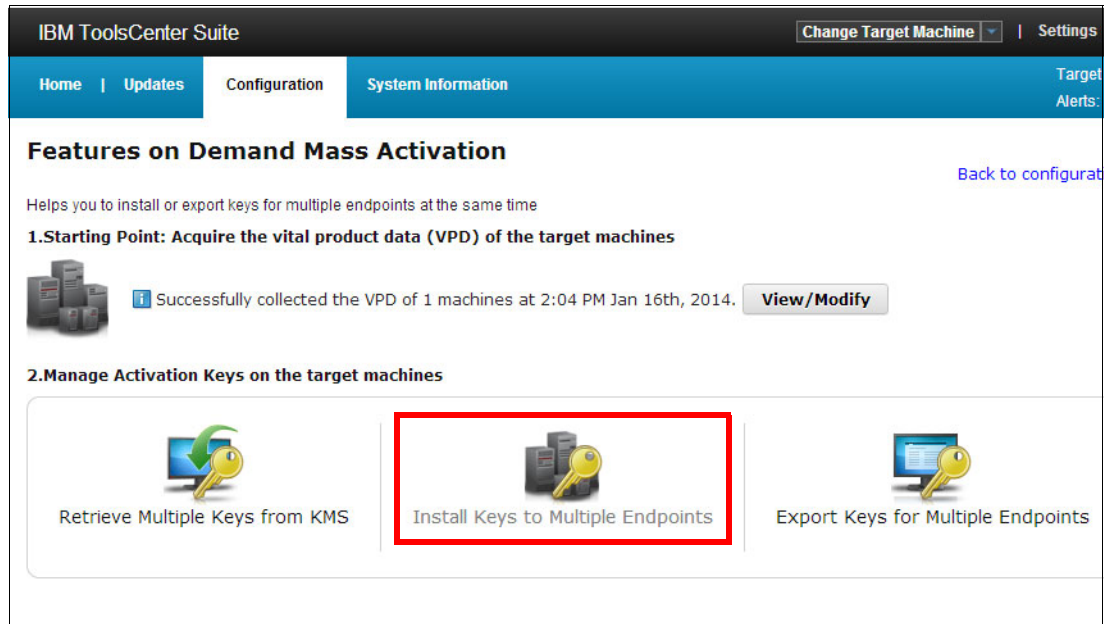


Figure 3-60 Install Keys to Multiple Endpoints

As shown in Figure 3-61, we see the key installing process. All of the previously downloaded keys are now installed. This process verifies the IP address and user credentials that were entered.

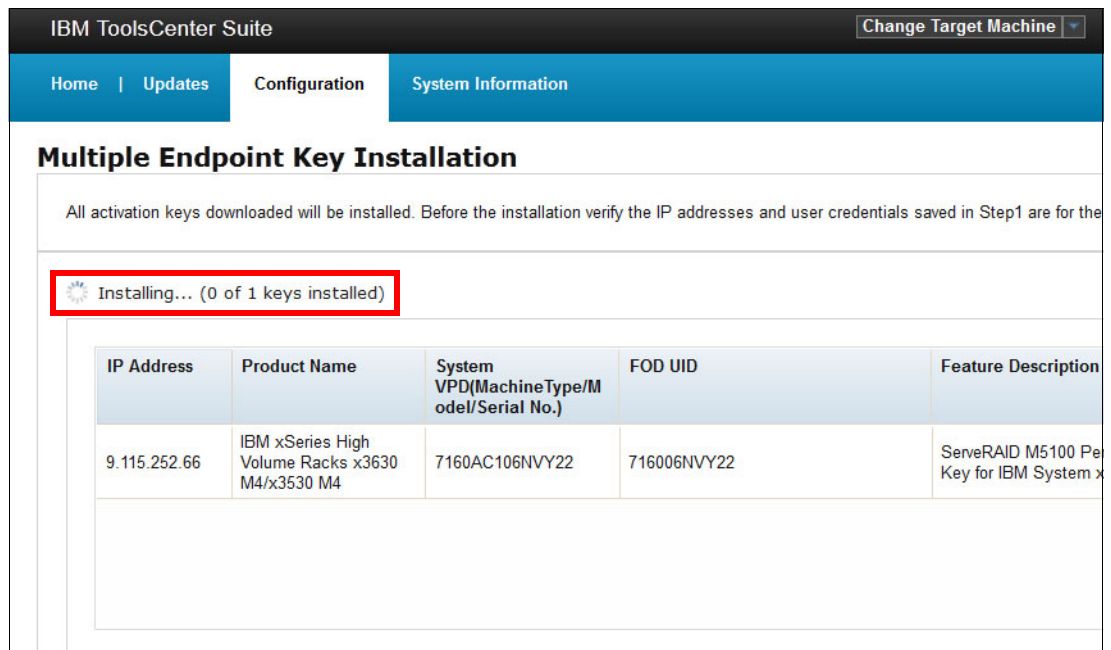


Figure 3-61 Multiple Endpoint Key Installation

We then see that the ServeRAID Key was installed successfully, as shown in Figure 3-62.

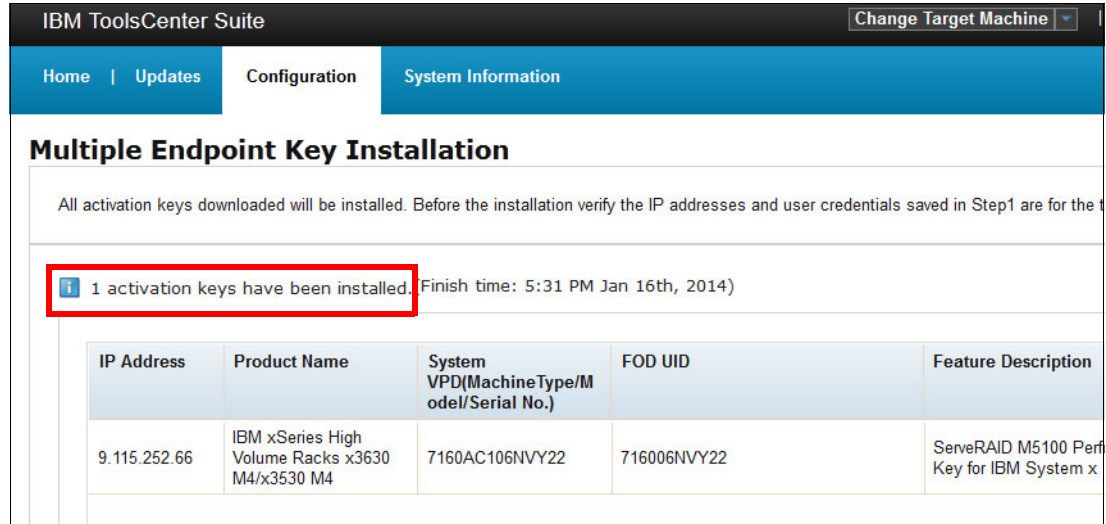


Figure 3-62 Successful key installation

### 3.6.4 Exporting FoD keys by using TCS

TCS can also export keys on multiple endpoints or target machines as a backup for reinstalling keys in the future. Complete the following steps:

1. From the main TCS window, click the **Configuration** tab. Then, click **Export Keys for Multiple Endpoints**, as shown in Figure 3-63.

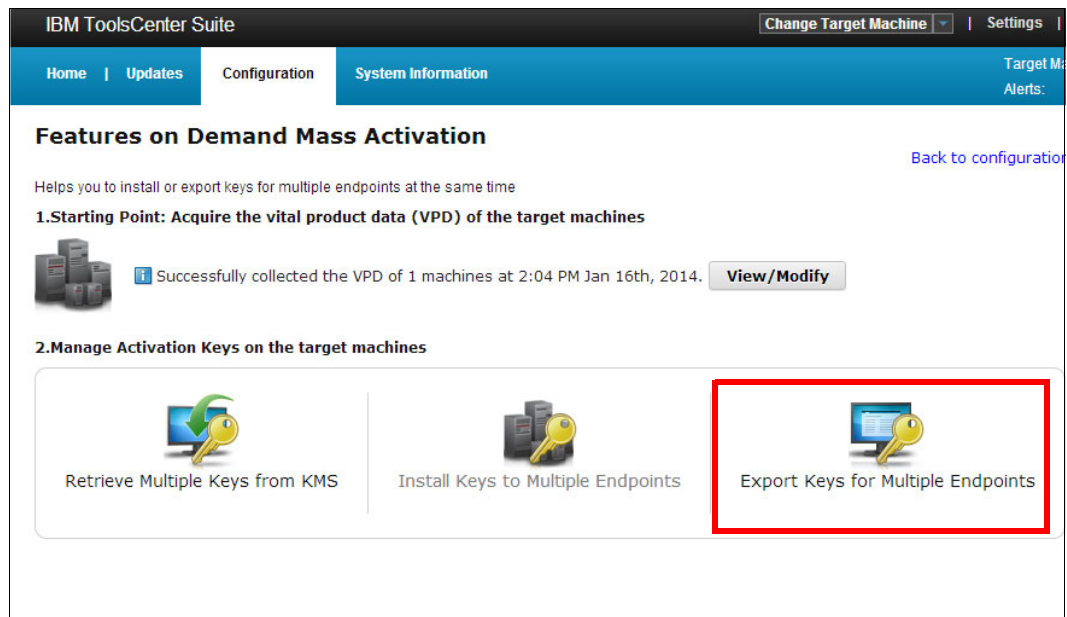


Figure 3-63 Export Keys for Multiple Endpoints menu selection

- In the Select local path to save activation keys field, enter the local directory to save the exported keys, as shown in Figure 3-64.

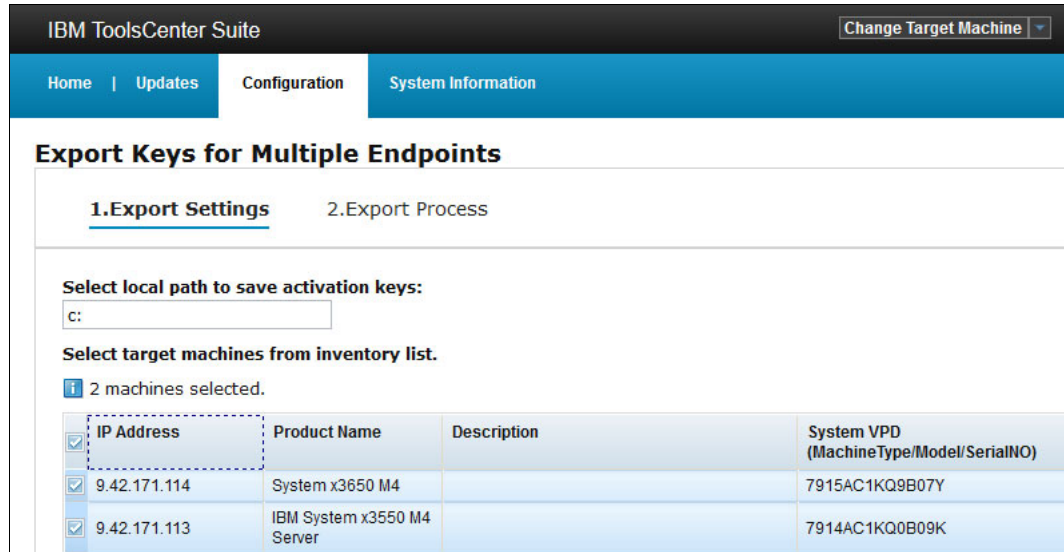


Figure 3-64 Export keys menu

- In the Select target machines from inventory list field, select the IP address of the target machine (or machines) for exporting keys. The export process begins and a status updates as each export completes.

As an activation key is exported, the status is shown as Exporting, shown in Figure 3-65.

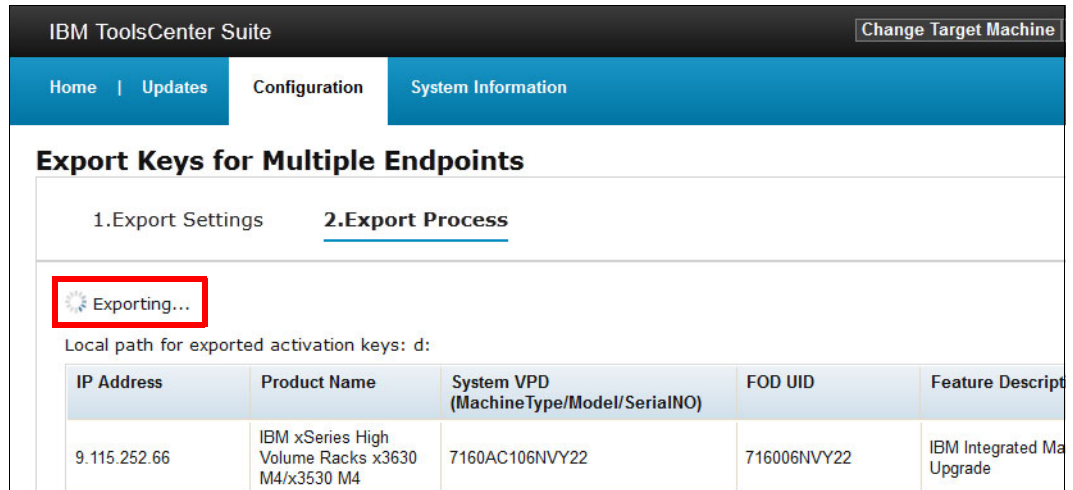


Figure 3-65 Exporting keys



When all of the activation keys are exported, the status displays as Exported, as shown in Figure 3-66.

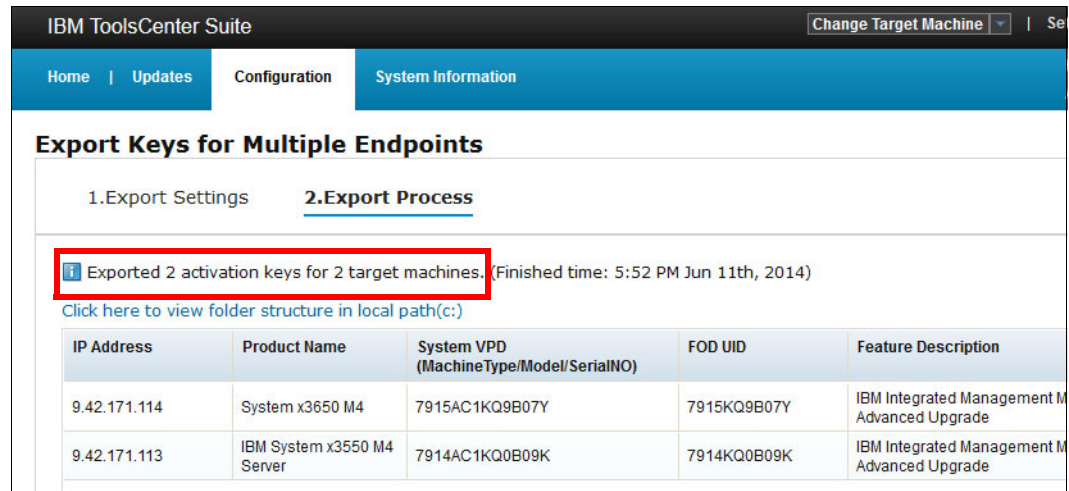


Figure 3-66 Exported keys

- When the export is complete, you can view the exported keys by clicking **Click here to view the folder structure in the local path** (as shown in Figure 3-67) or click **Finish** to exit the export process and return to Features on Demand Mass Activation primary page.

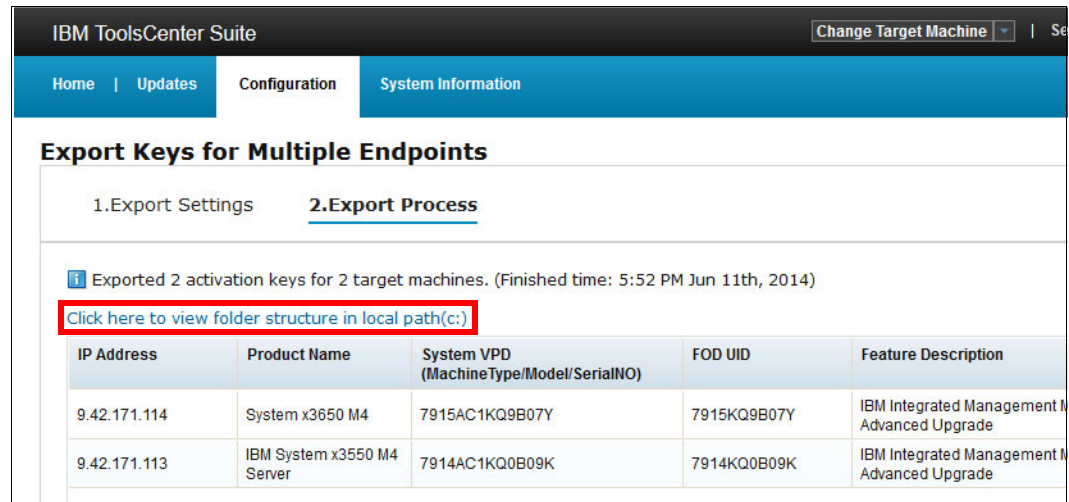


Figure 3-67 View FoD keys

- You can view the keys in the directory in which they were saved (in our example, the C: drive), as shown in Figure 3-68.

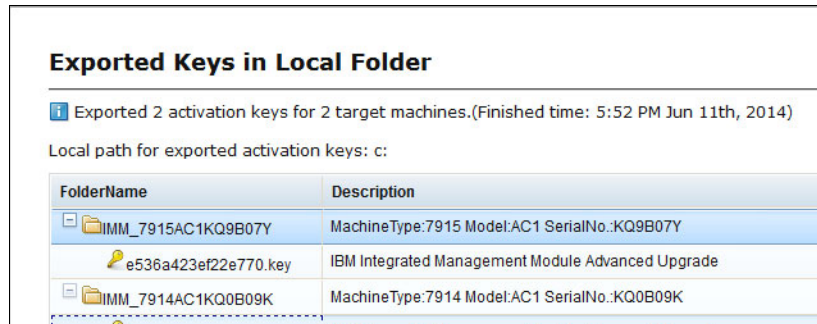


Figure 3-68 Exported keys in local folder

### 3.7 Viewing installed FoD keys with CMM

For IBM Flex System, use the CMM to view installed FoD keys. For example, we can view I/O Module keys, such as 24 - 46 Port Upgrade for the IBM Flex System Fabric EN4093 switch. The CMM is the keystore for chassis-based keys, such as IBM Fabric Manager (IFM). The IFM key is the only chassis-based key at time of this writing. The CMM provides no further key management because all IFM administers all IFM key management.

Complete the following steps to view FoD keys in the CMM:

- Log in to the CMM.
- Browse to the Mgt Module Management menu, as shown in Figure 3-69.

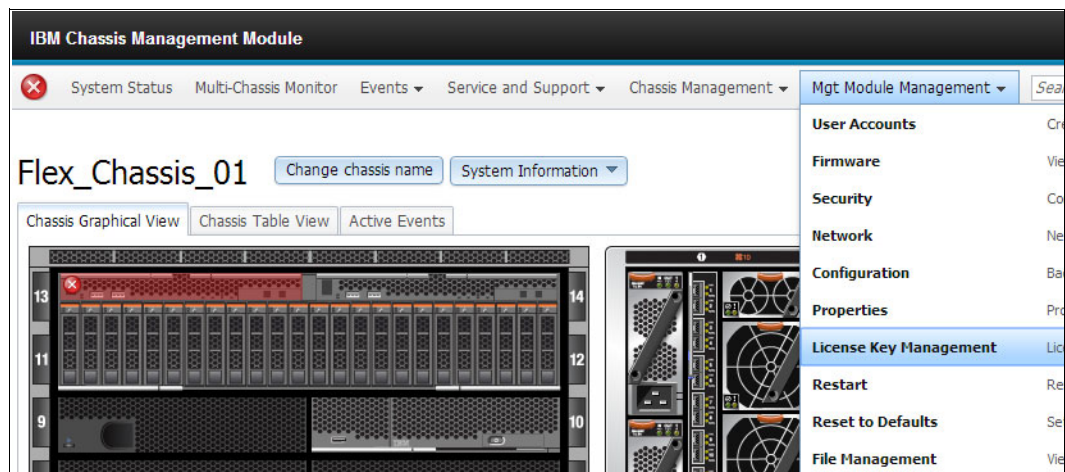


Figure 3-69 Mgt Module Management menu

- Click **License Key Management**.



- View the key status in the IOM License Keys Management and Chassis Keys Management tabs, as shown in Figure 3-70 and Figure 3-71.

License Key Management					
IOM License Keys Management			Chassis License Keys Management		
Cert	Index	Bay	Installed	Description	License ID
1	1	1	06/18/2013 - 23:03:31	IBM Flex System Fabric EN4093 10Gb ScSw 24-46 Port Upgrade	bfd2ca

Figure 3-70 IOM Keys Management tab

IOM License Keys Management		Chassis License Keys Management			
Index	Feature	Feature Type	Description	System	License ID
1	IBM Fabric Manager	0014	IBM SYSTEM X FEATURE ON DEMAND ACTIVATION KEY	IBM Flex System Chassis	MTSN 8721H

Figure 3-71 Chassis Keys Management tab



## Installing I/O Module FoD keys

In this chapter, we describe the various tools that are available to install and backup Features on Demand (FoD) activation keys for Flex System I/O modules. This chapter applies to the following I/O modules:

- ▶ IBM Flex System EN2092 1Gb Ethernet Scalable Switch
- ▶ IBM Flex System Fabric CN4093 10Gb Converged Scalable Switch
- ▶ IBM Flex System Fabric EN4093R 10Gb Scalable Switch
- ▶ IBM Flex System Fabric SI4093 System Interconnect Module

This chapter includes the following topics:

- ▶ 4.1, “Tools overview” on page 98
- ▶ 4.2, “Installing FoD keys by using ASU” on page 100
- ▶ 4.3, “Installing FoD keys by using the Industry Standard CLI” on page 106
- ▶ 4.4, “Installing FoD keys by using the Browser Based Interface” on page 112
- ▶ 4.5, “Installing FoD keys by using the Menu-Based CLI” on page 123
- ▶ 4.6, “Feature on Demand and flexible port mapping” on page 127

It is assumed that you purchased the FoD upgrades, received the authorization code, and downloaded the activation key. For more information about this process, see Chapter 2, “Acquiring FoD activation keys” on page 7.

**Order the FoD upgrade with the switch instead:** If you need the additional bandwidth that is provided by the upgrades when you are ordering your I/O module (or if you know that you need the additional bandwidth soon), it is easier to have the activation keys installed by IBM manufacturing by ordering the needed FoD upgrades *at the same time as* the I/O module.

## 4.1 Tools overview

The FoD upgrades can be applied by using the Advanced Settings Utility (ASU), a command-line tool that can be used across the complete range of IBM x86 servers, or by using one of the I/O module-specific tools.

If a single member (or group) of your staff is responsible for managing all FoD upgrade keys across *both* servers and Flex System I/O modules, ASU provides a simple command-line interface (CLI) that can be used. Alternatively, if networking personnel are responsible for managing FoD upgrade keys for the I/O modules, they might prefer to use one of the following I/O module interfaces:

- ▶ Industry Standard CLI (ISCLI)
- ▶ Browser Based Interface (BBI)
- ▶ Menu-Based CLI

In this chapter, we show examples of the key management tasks that are listed in Table 4-1 by using the ASU, ISCLI, BBI, and the Menu-Based CLI.

Table 4-1 Key Management tasks

Task	ASU	ISCLI	BBI	Menu-Based CLI
Verify no upgrades initially installed	For more information, see 4.2.1, "Verifying no upgrades were initially installed" on page 101	For more information, see 4.3.1, "Verifying that no upgrades were initially installed" on page 107	For more information, see 4.4.1, "Verifying that no upgrades were initially installed" on page 113	For more information, see 4.5.1, "Verifying that no upgrades were initially installed" on page 124
Apply Upgrade 1 and verify	For more information, see 4.2.2, "Applying Upgrade 1 and verifying" on page 102	For more information, see 4.3.2, "Applying Upgrade 1 and verifying" on page 107	For more information, see 4.4.2, "Applying Upgrade 1 and verifying" on page 114	For more information, see 4.5.2, "Apply upgrade 1 and verify" on page 124
Apply Upgrade 2 and verify	For more information, see 4.2.3, "Applying upgrade 2 and verifying" on page 103	For more information, see 4.3.3, "Applying Upgrade 2 and verifying" on page 108	For more information, see 4.4.3, "Applying Upgrade 2 and verifying" on page 117	For more information, see 4.5.3, "Applying Upgrade 2 and verifying" on page 125
Back up FoD keys	For more information, see 4.2.4, "Backing up FoD keys" on page 103	For more information, see 4.3.4, "Backing up FoD keys" on page 109	For more information, see 4.4.4, "Backing up FoD keys" on page 119	For more information, see 4.5.4, "Backing up FoD keys" on page 125
Remove Upgrade 2 and verify that Upgrade 1 remains	For more information, see 4.2.5, "Removing Upgrade 2 and verifying that Upgrade 1 remains" on page 104	For more information, see 4.3.5, "Removing Upgrade 2 and verifying that Upgrade 1 remains" on page 110	For more information, see 4.4.5, "Removing Upgrade 2 and verifying that Upgrade 1 remains" on page 120	For more information, see 4.5.5, "Removing upgrade 2 and verifying that Upgrade 1 remains" on page 126

Task	ASU	ISCLI	BBI	Menu-Based CLI
Remove Upgrade 1 and verify that no upgrades remain	For more information, see 4.2.6, “Removing Upgrade 1 and verifying that no upgrades remain” on page 105	For more information, see 4.3.6, “Removing Upgrade 1 and verifying that no upgrades remain” on page 111	For more information, see 4.4.6, “Removing Upgrade 1 and verifying that no upgrades remain” on page 122	For more information, see 4.5.6, “Removing Upgrade 1 and verifying that no upgrades remain” on page 127

**Note:** The Menu-Based CLI is an older interface for System Networking switches and most CLI enhancements are focused on the ISCLI (including support for Flexible Port Mapping, as described in 4.6, “Feature on Demand and flexible port mapping” on page 127).

However, until the recent release of IBM Networking OS 7.8, the Menu-Based CLI was the default CLI that was presented when you first powered up a new switch. Therefore, we show the use of both CLIs in this chapter where both can be used.

Consider the following important points about these tasks:

- ▶ Although all of the tools that are described in this chapter can back up or remove FoD keys, it is expected to be rare that you need to perform FoD backup or removal. After they are installed on a switch, FoD keys remain *even through a factory reset of the switch*. One reason for removing a FoD key from a switch might be to move that upgrade from one switch to another (perhaps from a test environment to a production environment). For completeness, however, those activities are shown in this chapter.
- ▶ Licenses are tied to the switch type and serial number. Therefore, if you must move an FoD license from one switch to another, you must get a new license key by using the Adapter Mobility feature of the FoD website, as described in 2.4.5, “Adapter Mobility” on page 45.
- ▶ Although an activation key shows as successfully installed (“enabled”) in the tool, it does not become effective (“active”) until the switch is restarted. This is the case with all tools that are described in this chapter.
- ▶ The other capabilities that you receive with the FoD upgrades and the dependencies between upgrades are different across the different IBM Flex System I/O modules that support FoD upgrades. Refer to the appropriate IBM Redbooks Product Guide for the specific I/O modules that you are using to understand what the available upgrades provide. For more information about Product Guides, see this website:  
<http://www.redbooks.ibm.com/portals/puresystems?Open&page=pg&cat=switches>
- ▶ The IBM Flex System EN4093, EN4093R, and SI4093 require Upgrade 1 and 2 to be applied (and removed) in order: Upgrade 1 must be installed before Upgrade 2 can be applied (and Upgrade 2 must be removed before Upgrade 1 can be removed).
- ▶ An FoD license key is delivered as a file that must be loaded onto the switch via a TFTP or SFTP server.
- ▶ FoD key files are a combination of ASCII (readable) and binary encrypted data. The following information can be seen by reviewing the key file with a text editor:
  - Switch type
  - Switch serial number
  - Key type

- ▶ New with IBM Networking OS version 7.8 or later, you have more flexibility in assigning the ports that you licensed on supported IBM Flex System I/O modules. Flexible port mapping provides you with the capability of reassigning ports as needed by moving internal and external ports or trading off lower-bandwidth ports for the use of higher-bandwidth ports, as shown in the following examples:

- Trading off 10 1-Gb ports for the use of a 10-Gb port
- Trading off the use of four 10-Gb ports for the use of a 40-Gb port

For more information about Flexible Port Mapping, see 4.6, “Feature on Demand and flexible port mapping” on page 127.

### 4.1.1 Lab environment

In our examples in this section, we apply FoD upgrades 1 and 2 to an IBM Flex System Fabric EN4093R 10Gb Scalable Switch module. The EN4093R IP address was 9.42.171.9.

In our lab environment, we used the TFTP server capabilities of the CMM module in our Flex System chassis. Our TFTP server address is 9.42.170.215, port 69. (You can set up your own TFTP server on your workstation or on a common server.) For our examples, the FoD keys are in the root directory of our TFTP server.

**Tip:** If you have a firewall in between the switch and the TFTP server, and the firewall allows TFTP traffic but blocks ICMP traffic, the switch might report the following error after attempting to start the TFTP download of the FoD key:

```
ERROR: Communication failure!
```

If you see this issue, make sure that TFTP and ICMP are allowed through the firewall for the IP address of the switch.

In our examples, our activation key file names were 7.key (for Upgrade 1), and 8.key (for Upgrade 2). You can name your key files anything that you want when you download them. We used 7.key and 8.key (consistent with the FoD type numbers that are shown in Table A-1 in Appendix A, “FoD Component reference” on page 155) to keep our examples simple.

The management protocol that was set up for our EN4093 is SNMP V3 (the default); therefore, our interactions with the EN4093 needed to specify the following information:

- ▶ SNMP authentication protocol to be used: HMAC-SHA (authproto SHA)
- ▶ SNMP privacy protocol to be used: DES (privproto DES)
- ▶ SNMP privacy password: adminsha (privpasswd adminsha)
- ▶ Key Repository UserID: adminsha (user adminsha)
- ▶ Key Repository password: adminsha (password adminsha)

## 4.2 Installing FoD keys by using ASU

The Advanced Settings Utility (ASU) is a command-line utility that is used to modify firmware settings and manage FoD activation keys. ASU is supported on Windows and Linux and you can manage feature activation keys locally and remotely.

The IBM Advanced Settings Utility can be downloaded at this website:

<http://ibm.com/support/entry/portal/docdisplay?lnocid=T00L-ASU>

In 3.5, “Installing a key by using ASU” on page 76, we describe the use of the ASU for feature activation key management on IMM2-based server systems. In this chapter, we use the ASU to manage feature activation keys for Flex System I/O modules.

For more information about the ASU tool, see *IBM Advanced Settings Utility User Guide*, which is available at this website:

<http://ibm.com/support/entry/portal/docdisplay?lnocid=MIGR-5085890>

The ASU **fodcfg** is the main command that is used to manage FoD activation keys. It supports the FoD activation key tasks that are summarized in Table 4-2.

Table 4-2 *fodcfg* commands

Command	Description
acquirekey	Acquire and download the activation key from the IBM website.
installkey	Install activation keys from the user-specified location to the key repository.
uninstallkey	Uninstall activation keys from the device.
reportkey	Report information of a specified key repository.
exportkey	Export information about a specified key repository. For more information about the use of this command, see 4.2.4, “Backing up FoD keys” on page 103.

Before you begin, ensure that you downloaded the correct version (32-bit or 64-bit) of the ASU for the workstation on which you are running it. In the examples in the next section, we have a 64-bit version of ASU (asu64.exe) installed at the root (C:\) on a 64-bit Windows based workstation.

## 4.2.1 Verifying no upgrades were initially installed

The ASU command and response that shows that our IBM Flex System EN4093 has no FoD upgrades is shown in Example 4-1.

**Note:** Most of the parameters on the ASU commands in the following examples are *identical* because we are always working with the same switch. Therefore, the parameters that are different in our examples are highlighted with **red text**.

*Example 4-1 ASU command to verify no upgrades initially*

```
C:\>asu64.exe fodcfg reportkey --keyid all --device switch --interface snmp --host
9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd
adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
Number of keys installed is 0
```

The **reportkey** ASU command is used to see which, if any, FoD upgrades are applied to a switch. We specify **--keyid all** because we want to see whether any keys were applied. As the response shows, no keys are installed.

**Note:** Although you might expect that the TFTP server address is not required for a reportkey command, it is required because a file with a copy of the reported information is also placed into the TFTP server.

## 4.2.2 Applying Upgrade 1 and verifying

The ASU command and response to apply the FoD key for upgrade 1 (7.key) is shown in Example 4-2.

*Example 4-2 ASU command to install the FoD key for upgrade 1*

```
C:\>asu64.exe fodcfg installkey -f 7.key --device switch --interface snmp --host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N  
Licensed Materials - Property of IBM  
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved  
Succeeded uploading key file to ftp server.  
Succeeded installing key: 7.key. Reboot Required
```

The **installkey** ASU command is used to apply an FoD upgrade key. We specify **-f 7.key** to specify the file name of our FoD key for Upgrade 1.

**Reboot the switch:** Although the activation key shows as successfully installed, it does not become effective until the switch is restarted. The ASU cannot reboot I/O modules directly; therefore, you must reboot another way. The easiest way to reboot the switch is to log in to the CMM, power off the switch, and then power it back on again.

To verify that Upgrade 1 was successfully applied, we reboot the switch and then reissue the reportkey command. The results are shown in Example 4-3.

*Example 4-3 Confirming upgrade 1 applied*

```
C:\>asu64.exe fodcfg reportkey --keyid all --device switch --interface snmp --host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N  
Licensed Materials - Property of IBM  
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
```

No	Key ID	status	Description
1	0007	Activated	IBM Flex System Fabric EN4093R
	10Gb Scalable Switch	(Upgrade 1)	

The command output confirms that Upgrade 1 was successfully applied.



### 4.2.3 Applying upgrade 2 and verifying

The ASU command and response to apply the FoD key for Upgrade 2 (8.key) is shown in Example 4-4.

*Example 4-4 ASU command to install the FoD key for Upgrade 2*

---

```
C:\>asu64.exe fodcfg installkey -f 8.key --device switch --interface snmp --host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
Succeeded uploading key file to ftp server.
Succeeded installing key: 8.key. Reboot Required
```

---

The `installkey` ASU command that is used to apply an FoD upgrade key. We specify `-f 8.key` to specify the file name of our FoD key for Upgrade 2. Remember that a reboot is required for the upgrade to take effect.

To verify that Upgrade 2 was successfully applied, we reboot the switch and then reissue the `reportkey` command. The results are shown in Example 4-5.

*Example 4-5 Confirming Upgrade 2 applied*

---

```
C:\>asu64.exe fodcfg reportkey --keyid all --device switch --interface snmp --host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
```

No	Key ID	status	Description
1	0007	Activated	IBM Flex System Fabric EN4093R
	10Gb Scalable Switch	(Upgrade 1)	
2	0008	Activated	IBM Flex System Fabric EN4093R
	10Gb Scalable Switch	(Upgrade 2)	

---

The command output confirms that Upgrade 2 was successfully applied.

### 4.2.4 Backing up FoD keys

The ASU command and response to back up FoD keys from the switch is shown in Example 4-6.

*Example 4-6 ASU command to back up FoD keys from the switch*

---

```
C:\>asu64.exe fodcfg exportkey --keyid all -d ./ --device switch --interface snmp --host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
```

Succeeded exporting key 7.  
Succeeded exporting key 8.

---

The **exportkey** ASU command is used to apply an FoD upgrade key. We specify **--keyid all** to export the Upgrade 1 and Upgrade 2 keys and we used **-d ./** to specify that the key files should be placed into the root directory of our TFTP server. This command results in two files (7.key and 8.key) being placed in the root directory of our TFTP server.

## 4.2.5 Removing Upgrade 2 and verifying that Upgrade 1 remains

The ASU command and response to remove Upgrade 2 is shown in Example 4-7.

*Example 4-7 ASU command to remove Upgrade 2*

---

```
C:\>asu64.exe fodcfg uninstallkey --keyid all --device switch --interface snmp
--host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES
--privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
Pre-Requisite Key Action Required
Fail to uninstall key 7.
Succeeded uninstalling key 8. Reboot Required
```

---

The **uninstallkey** ASU command is used to remove FoD upgrade keys. Although we specified **--keyid all** to remove all FoD keys, only Upgrade 2 (key 8) was successfully uninstalled. Only one key was removed because they must be removed one at a time.

**Tip:** If you are planning to remove both keys, a reboot is not required between the two **uninstallkey** commands. A switch reboot is required only after the second command to complete the removal process.

To verify that Upgrade 2 was indeed removed, we reboot the switch and then reissue the **reportkey** command. The results are shown in Example 4-8.

*Example 4-8 Confirming Upgrade 2 removed*

---

```
C:\>asu64.exe fodcfg reportkey --keyid all --device switch --interface snmp --host
9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd
adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
No Key ID status Description
1 0007 Activated IBM Flex System Fabric EN4093R
10Gb Scalable Switch (Upgrade 1)
```

---

The command output confirms that Upgrade 2 was successfully removed.

## 4.2.6 Removing Upgrade 1 and verifying that no upgrades remain

The ASU command and response to remove Upgrade 1 is shown in Example 4-9.

*Example 4-9 ASU command to remove Upgrade 1*

---

```
C:\>asu64.exe fodcfg uninstallkey --keyid all --device switch --interface snmp
--host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES
--privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
Pre-Requisite Key Action Required
Fail to uninstall key 7.
Succeeded uninstalling key 8. Reboot Required
```

```
C:\>asu64.exe fodcfg uninstallkey --keyid all --device switch --interface snmp
--host 9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES
--privpasswd adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
Succeeded uninstalling key 7. Reboot Required
```

---

The **uninstallkey** ASU command is used to remove FoD upgrade keys. We specified **--keyid all** again. This time, Upgrade 1 (key 7) was successfully uninstalled. As with upgrades, a reboot is required for the change to take effect.

To verify that Upgrade 1 was removed, we reboot the switch and then reissue the **reportkey** command. The results are shown in Example 4-10.

*Example 4-10 Confirming Upgrade 1 removed*

---

```
C:\>asu64.exe fodcfg reportkey --keyid all --device switch --interface snmp --host
9.42.171.9 --tftp 9.42.170.215:69 --authproto SHA --privproto DES --privpasswd
adminsha --user adminsha --password adminsha
```

```
IBM Advanced Settings Utility version 9.60.84N
Licensed Materials - Property of IBM
(C) Copyright IBM Corp. 2007-2014 All Rights Reserved
Number of keys installed is 0
```

---

The command output confirms that Upgrade 1 was successfully removed.

## 4.3 Installing FoD keys by using the Industry Standard CLI

The Industry Standard CLI (ISCLI) provides a direct method for collecting switch information and performing switch configuration. By using a basic terminal, you can use the ISCLI to view information and statistics about the switch and perform any necessary configuration.

For more information about the ISCLI, see the ISCLI Reference at this website:

<http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7943.pdf>

**Note:** Some of the FoD-related ISCLI commands changed with the Networking OS 7.8. Therefore, the following examples show the ISCLI pre-7.8 commands and ISCLI 7.8 and later commands when they are different.

The ISCLI has the following command modes listed in order of increasing privileges:

- ▶ User EXEC mode
- ▶ Privileged EXEC mode
- ▶ Global Configuration mode

**Note:** Although you might expect FoD-related commands to require Global Configuration Mode (**config t**), they do not. Before Networking OS 7.8, FoD commands required Privileged EXEC mode (**enable**) and with Networking OS 7.8 and later, ISCLI FoD commands can be issued in User EXEC mode.

The ISCLI pre-7.8 FoD commands require Privileged EXEC mode and are started with the **fod-key** command. Example 4-11 shows how to enter the appropriate command mode to issue FoD commands.

*Example 4-11 ISCLI pre-7.8: Entering the appropriate command mode to issue FoD commands*

---

```
Router>enable
```

```
Enable privilege granted.
```

```
Router#fod-key
```

```
Router(FoD)#
```

---

All ISCLI pre-7.8 examples in the following sections are issued from the Router (FoD)# prompt.

The ISCLI 7.8 and later commands do not require Privileged EXEC mode and are started with the **software-key** command. Example 4-12 shows how to enter the appropriate command mode to issue FoD commands for ISCLI 7.8 and later.

*Example 4-12 ISCLI 7.8 and later: Entering the appropriate command mode to issue FoD commands*

---

```
Router>software-key
```

```
Router(Software-Key)>
```

---

All ISCLI 7.8 and later examples in the following sections are issued from the Router (Software-Key)> prompt.

### 4.3.1 Verifying that no upgrades initially installed

The ISCLI command and response that shows that our IBM Flex System EN4093 has no FoD upgrades is shown in Example 4-13.

*Example 4-13 ISCLI command to verify no upgrades initially*

---

```
Router>show software-key
Enabled FoD Key(s):
  none
Active FoD Key(s):
  none
Non-Reusable Demo License(s):
  none
```

---

For IBM Networking OS versions earlier than 7.8, the **show software-key** command that is shown in Example 4-13 is issued at the Router(FoD)# prompt.

The **show software-key** ISCLI command is used to see which, if any, FoD upgrades are applied to a switch. As the response shows, no keys are installed.

### 4.3.2 Applying Upgrade 1 and verifying

The ISCLI pre-7.8 command and response to apply the FoD key for Upgrade 1 (7.key) is shown in Example 4-14.

*Example 4-14 ISCLI pre-7.8: Command to install the FoD key for Upgrade 1*

---

```
Router(FoD)#enakey address 9.42.170.215 keyfile 7.key protocol tftp

Starting download key file...
Key file download complete (494 bytes)
Software feature 'Upgrade1' will be Active upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The ISCLI 7.8 and later command and response to apply the FoD key for Upgrade 1 (7.key) is shown in Example 4-15.

*Example 4-15 ISCLI 7.8 and later: Command to install the FoD key for Upgrade 1*

---

```
Router(Software-Key)>enakey address 9.42.170.215 keyfile 7.key protocol tftp
mgt-port

Starting download key file...
Key file download complete (494 bytes)
Software feature 'Upgrade1' will be Active upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The **enakey** ISCLI command is used to apply an FoD upgrade key. We specify the IP address of our TFTP server and the key file name **7.key** to specify the file name of our FoD key for Upgrade 1. The ISCLI 7.8 and later requires another parameter, **mgt-port**, which specifies the type of port over which the switch communicates with the TFTP server. Because we use the CMM as our TFTP server, our switch must access it over the MGT port (instead of DATA or EXTM). If you are using your workstation as a TFTP server (or some other external TFTP server), you must specify **data-port** instead of **mgt-port** as we did.

**Reboot the switch:** Although the activation key was successfully downloaded, it does not become effective until the switch is restarted. To restart the switch, issue the **reload** command.

To verify that Upgrade 1 was successfully applied, we reboot the switch and then reissue the **show software-key** ISCLI command. The results are shown in Example 4-16.

*Example 4-16 ISCLI command confirming Upgrade 1 applied*

---

```
Router>show software-key
Enabled FoD Key(s):
  Upgrade1
Active FoD Key(s):
  Upgrade1
Non-Reusable Demo License(s):
  none
```

---

For IBM Networking OS versions earlier than 7.8, the **show software-key** command that is shown in Example 4-16 is issued at the Router(FoD)# prompt.

The command output confirms that Upgrade 1 was successfully applied.

**Note:** If you are planning to apply Upgrade 1 and Upgrade 2, there is no need to reboot the switch between the two **enakey** commands (as we did in our example). Instead, issue the two **enakey** commands and then reboot after both are enabled.

### 4.3.3 Applying Upgrade 2 and verifying

The ISCLI pre-7.8 command and response to apply the FoD key for Upgrade 2 (8.key) is shown in Example 4-17.

*Example 4-17 ISCLI pre-7.8: Command to install the FoD key for Upgrade 2*

---

```
Router(FoD)#enakey address 9.42.170.215 keyfile 8.key protocol tftp
```

```
Starting download key file...
Key file download complete (494 bytes)
Software feature 'Upgrade2' will be Active upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The ISCLI 7.8 and later command and response to apply the FoD key for Upgrade 2 (8.key) is shown in Example 4-18.

*Example 4-18 ISCLI 7.8 and later: Command to install the FoD key for Upgrade 2*

---

```
Router(Software-Key)>enakey address 9.42.170.215 keyfile 8.key protocol tftp
mgt-port
```

```
Starting download key file...
Key file download complete (494 bytes)
Software feature 'Upgrade2' will be Active upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The **enakey** ISCLI command is used to apply an FoD upgrade key. We specify the IP address of our TFTP server, the key file name 8.key to specify the file name of our FoD key for Upgrade 2 and **mgt-port** to indicate that the connection to the TFTP server is across the internal management port on the switch.

Because we use the CMM as our TFTP server, our switch must access it over the MGT port (instead of DATA or EXTM). If you are using your workstation as a TFTP server (or some other external TFTP server), you must specify data-port instead of mgt-port as we did.

**Reboot the switch:** Although the activation key was successfully downloaded, it does not become effective until the switch is restarted.

To verify that Upgrade 1 was successfully applied, we reboot the switch and then reissue the **show software-key** ISCLI command. The results are shown in Example 4-19.

*Example 4-19 ISCLI command confirming Upgrade 2 applied*

---

```
Router>show software-key
Enabled FoD Key(s):
  Upgrade1 + Upgrade2
Active FoD Key(s):
  Upgrade1 + Upgrade2
Non-Reusable Demo License(s):
  none
```

---

For IBM Networking OS versions earlier than 7.8, the **show software-key** command that is shown in Example 4-19 is issued at the Router(FoD)# prompt.

The command output confirms that Upgrade 2 was successfully applied.

### 4.3.4 Backing up FoD keys

The ISCLI command and response to back up FoD keys from the switch is shown in Example 4-20.

*Example 4-20 ISCLI command to back up FoD keys from the switch*

---

```
Router(Software-Key)>ptkey address 9.42.170.215 key Upgrade2 protocol tftp file
Upgrade2bk.key
Enter the port to use
["data"|"extm"|"mgt"]: mgt

Upload successfully tftp'd to 9.42.170.215:Upgrade2bk.key
Upload with success!
Router(Software-Key)>ptkey address 9.42.170.215 key Upgrade1 protocol tftp file
Upgrade1bk.key
Enter the port to use
["data"|"extm"|"mgt"]: mgt

Upload successfully tftp'd to 9.42.170.215:Upgrade1bk.key
Upload with success!
```

---

**Note:** We are not aware of any useful purpose for backing up FoD keys for I/O modules for the following reasons:

- ▶ After FoD keys are installed on a switch, the keys remain even after a factory reset of the switch.
- ▶ Licenses are tied to the switch type and serial number; therefore, if you must move a FoD license from one switch to another, you still need to get a new license key.

For IBM Networking OS versions earlier than 7.8, the **ptkey** command that is shown in Example 4-20 on page 109 is issued at the Router (FoD)# prompt.

**Note:** The specification of Upgrade1 or Upgrade2 in the commands that are shown in Example 4-20 on page 109 is case-sensitive.

The **ptkey** ISCLI command is used to back up an FoD upgrade key. We specify the IP address of our TFTP server, the particular feature (Upgrade1 or Upgrade2) that we want to back up, and the key file name to use for the backup.

With the ISCLI, each FoD activation key must be backed up individually. Therefore, we must issue the command twice: once for Upgrade1 and once for Upgrade2. Regardless of whether we specified **mgmt-port** on the command, we were still required to separately specify **mgmt** as the port to use.

### 4.3.5 Removing Upgrade 2 and verifying that Upgrade 1 remains

The ISCLI command and response to remove Upgrade 2 is shown in Example 4-21.

**Note:** We are not aware of any useful purpose for removing FoD keys from I/O modules, with the possible exception to move upgrades from one switch to another (for example, from a test environment to a production environment or from a failing switch to its replacement). These examples are included for completeness only.

If you must move a FoD license from one switch to another, you must acquire a new license key as described in 5.4, “Moving an adapter or a switch” on page 141.

*Example 4-21 ISCLI command to remove Upgrade 2*

---

```
Router(Software-Key)>rmkey key Upgrade2
Confirm removing Upgrade2 software feature [y/n]: y
Software feature 'Upgrade2' will be Inactive upon next reboot.
Jun 18 13:52:14 9.42.171.9 NOTICE mgmt: Software feature 'Upgrade2' will be
Inactive upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

For IBM Networking OS versions earlier than 7.8, the **rmkey** command that is shown in Example 4-21 is issued at the Router (FoD)# prompt.

**Note:** The specification of Upgrade2 in the command that is shown in Example 4-21 is case-sensitive.



The **rmkey** ISCLI command is used to remove FoD upgrade keys. We specified **key Upgrade2** to specifically remove Upgrade 2. As with upgrades, a reboot is required for the change to take effect.

To verify that Upgrade 2 was removed, we reboot the switch and then reissue the **show software-key** ISCLI command. The results are shown in Example 4-22.

*Example 4-22 ISCLI command confirming Upgrade 2 removed*

---

```
Router>show software-key
Enabled FoD Key(s):
  Upgrade1
Active FoD Key(s):
  Upgrade1
Non-Reusable Demo License(s):
  none
```

---

For IBM Networking OS versions earlier than 7.8, the **show software-key** command that is shown in Example 4-22 is issued at the Router(FoD)# prompt.

The command output confirms that Upgrade 2 was successfully removed.

### 4.3.6 Removing Upgrade 1 and verifying that no upgrades remain

The ISCLI command and response to remove Upgrade 1 is shown in Example 4-23.

*Example 4-23 ISCLI 7.8 and later: Command to remove Upgrade 1*

---

```
Router(Software-Key)>rmkey key Upgrade1
WARNING: First reboot will reset all mapped ports to default
Confirm removing Upgrade1 software feature [y/n]: y
Software feature 'Upgrade1' will be Inactive upon next reboot.

Jun 18 13:57:27 9.42.171.9 NOTICE mgmt: Software feature 'Upgrade1' will be
Inactive upon next reboot.
```

A Reboot is required for the new settings to take effect.

---

For IBM Networking OS versions earlier than 7.8, the **rmkey** command that is shown in Example 4-23 is issued at the Router(FoD)# prompt.

**Note:** The specification of Upgrade1 in the command that is shown in Example 4-23 is case-sensitive.

The **rmkey** ISCLI command is used to remove FoD upgrade keys. We specified **key Upgrade1** to specifically remove Upgrade 1. As with upgrades, a reboot is required for the change to take effect; however, if you are removing both upgrades, you do not need to reboot the switch in between the two **rmkey** commands.

**Note the WARNING in Example 4-23:** Networking OS 7.8 is the first version that supports the new Flexible Port Mapping capability (as described in 4.5, “Feature on Demand and Flexible Port Mapping”). Whenever you remove an upgrade, all mapped ports are reset to the default mapping. Therefore, if you are using port mapping and remove an upgrade, you must remap those ports.

To verify that Upgrade 1 was removed, we reboot the switch and then reissue the **show software-key** ISCLI command. The results are shown in Example 4-24.

*Example 4-24 ISCLI command confirming Upgrade 1 removed*

---

```
Router>show software-key
Enabled FoD Key(s):
  none
Active FoD Key(s):
  none
Non-Reusable Demo License(s):
  none
```

---

For IBM Networking OS versions earlier than 7.8, the **show software-key** command that is shown in Example 4-24 is issued at the Router(FoD)# prompt.

The command output confirms that Upgrade 1 was successfully removed.

## 4.4 Installing FoD keys by using the Browser Based Interface

By using the switch Browser Based Interface (BBI) software, you can use your web browser to access switch information and statistics and perform switch configuration.

For more information about the BBI, see the BBI Quick Guide, which is available at this website:

<http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7944.pdf>

#### 4.4.1 Verifying that no upgrades are initially installed

The BBI Switch Dashboard (as shown in Figure 4-1) is used to confirm that our IBM Flex System EN4093 has no FoD upgrades.

<b>Switch Dashboard</b>	
Switch Name	
Switch Location	
Switch Type	IBM Flex System Fabric EN4093R 10Gb Scalable Switch
Switch Up Time	0 days, 0 hours, 4 minutes and 26 seconds.
Last Boot Time	18:38:19 Thu Jun 12, 2014 (reset by WEB-UI)
Time and date	18:40:16 , 6/12/2014
Timezone Location	
Daylight Savings Time Status	disabled
MAC Address	74:99:75:6c:63:00
IP Address	9.42.171.9
PCBA Part Number	00D6166
Hardware Part Number	95Y3311
Serial Number	Y010CM2BV156
Manufacturing Date	49/12
Hardware Revision	2
Board Revision	2
PLD Firmware Version	1.7
Temperature Sensor 1 (Warning)	35 C (Warn at 60 C/Recover at 55 C)
Temperature Sensor 2 (Shutdown)	35 C (Shutdown at 65 C/Recover at 60 C)
Temperature Sensor 3 (Inlet)	28 C
Temperature Sensor 4 (Exhaust)	36 C
Power Consumption	41.750 W (12.444 V, 3.355 A)
Software Rev	7.5.1 (FLASH image1)
Flash Configuration	FLASH image1, active configuration.
Enabled Software features	none
Banner	
Login Notice	
Switch Module Bay	2
Service Required LED	Disabled
	Operational Status <input type="text" value="Normal"/> ▼

Figure 4-1 BBI Switch Dashboard showing no upgrades

## 4.4.2 Applying Upgrade 1 and verifying

To apply Upgrade 1 by using the BBI, we browse to the configure FoD activation window, as shown in Figure 4-2.

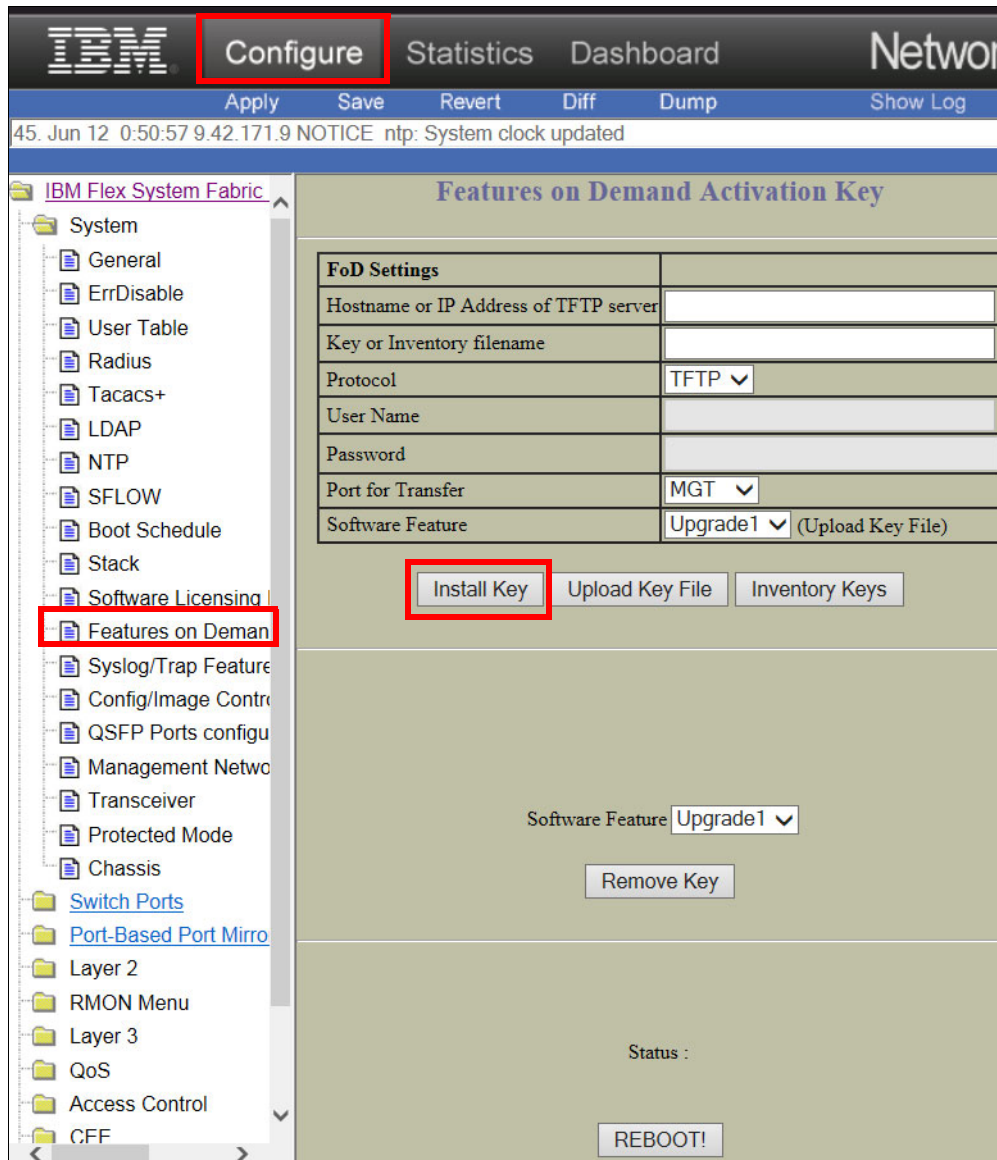


Figure 4-2 BBI configure FoD activation window for Upgrade 1

We enter the IP address of our TFTP server (9.42.170.215) and the key file name (7.key), as shown in Figure 4-3. Then, we click **Install Key**.

<b>FoD Settings</b>	
Hostname or IP Address of TFTP server	9.42.170.215
Key or Inventory filename	7.key
Protocol	TFTP ▾
User Name	
Password	
Port for Transfer	MGT ▾
Software Feature	Upgrade1 ▾ (Upload Key File)

Figure 4-3 BBI input for Upgrade 1

**Port for Transfer:** Because we used the CMM as our TFTP server, we specified the management (MGT) port as the path over which our switch communicates with the TFTP server. If you use your workstation or an external TFTP server, you must specify the use of a Data port for FoD key installation.

If the upgrade is installed successfully, you see the message that is shown in Figure 4-4.

Status : Upgrade1 installed with success! A Reboot is required for the new settings to take effect.

REBOOT!

Figure 4-4 BBI Upgrade 1 installation success

As noted in the message, a switch reboot is required to complete the upgrade. After rebooting and logging back in to the BBI, the dashboard confirms that Upgrade 1 is installed, as shown in Figure 4-5.

<b>Switch Dashboard</b>	
Switch Name	
Switch Location	
Switch Type	IBM Flex System Fabric EN4093R 10Gb Scalable Switch(Upgrade1)
Switch Up Time	0 days, 0 hours, 6 minutes and 27 seconds.
Last Boot Time	18:47:22 Thu Jun 12, 2014 (reset by WEB-UI)
Time and date	18:51:35 , 6/12/2014
Timezone Location	
Daylight Savings Time Status	disabled
MAC Address	74-99:75:6c:63:00
IP Address	9.42.171.9
PCBA Part Number	00D6166
Hardware Part Number	95Y3311
Serial Number	Y010CM2BV156
Manufacturing Date	49/12
Hardware Revision	2
Board Revision	2
PLD Firmware Version	1.7
Temperature Sensor 1 (Warning)	35 C (Warn at 60 C/Recover at 55 C)
Temperature Sensor 2 (Shutdown)	35 C (Shutdown at 65 C/Recover at 60 C)
Temperature Sensor 3 (Inlet)	28 C
Temperature Sensor 4 (Exhaust)	36 C
Power Consumption	43.190 W (12.444 V, 3.470 A)
Software Rev	7.5.1 (FLASH image1)
Flash Configuration	FLASH image1, active configuration.
Enabled Software features	Upgrade1
Banner	
Login Notice	
Switch Module Bay	2
Service Required LED	Disabled
	Operational Status <span>Normal</span> ▼

Figure 4-5 BBI Dashboard showing Upgrade 1

### 4.4.3 Applying Upgrade 2 and verifying

To apply Upgrade 2 by using the BBI, we browse to the configure FoD activation window, as shown in Figure 4-6.

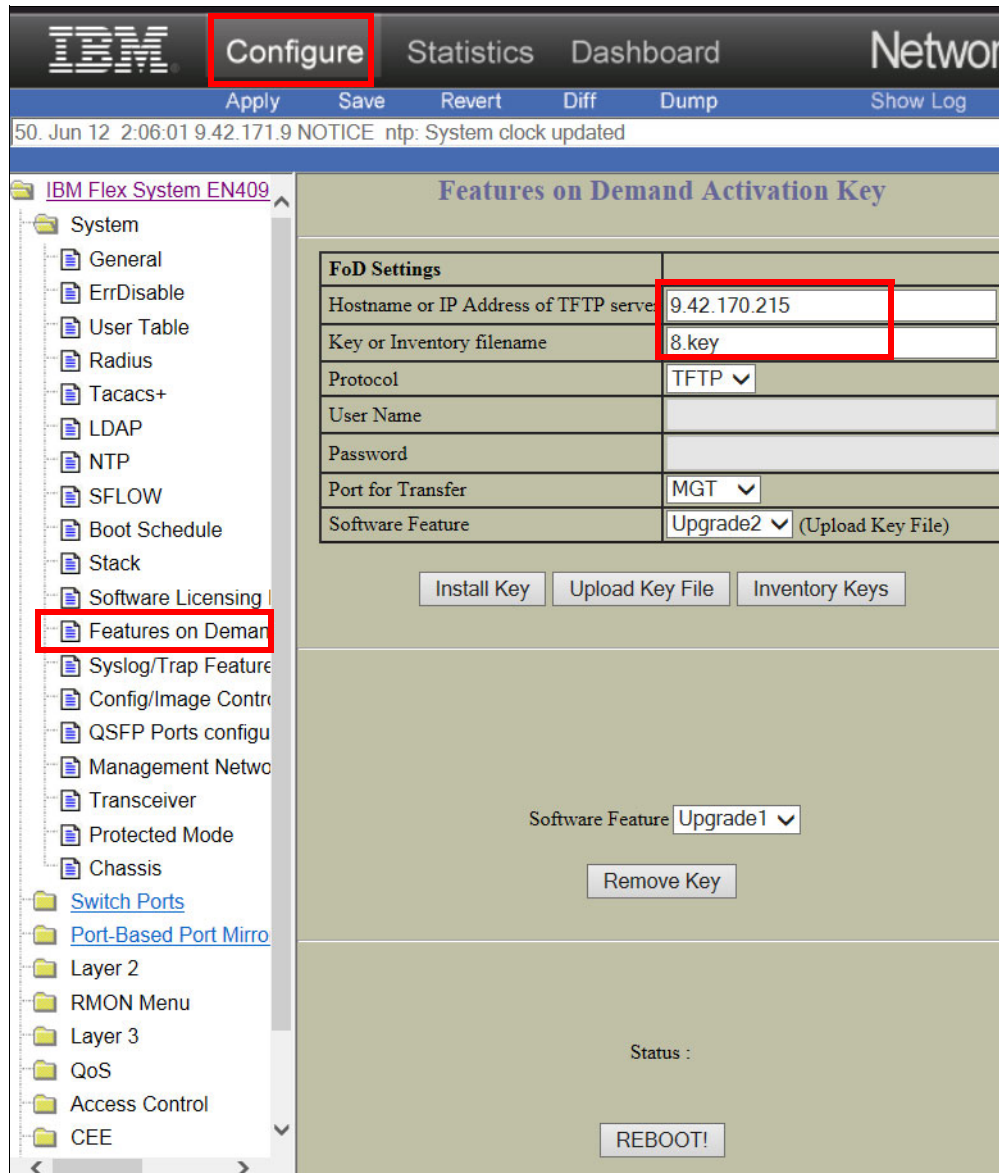


Figure 4-6 BBI configure FoD activation window for Upgrade 2

We enter the IP address of our TFTP server (9.42.170.215) and the key file name (8.key). Then, we click **Install Key**.

If the upgrade is installed successfully, you see the message that is shown in Figure 4-7.

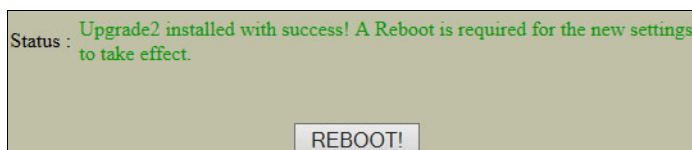


Figure 4-7 BBI Upgrade 2 installation success

As noted in the message, a switch reboot is required to complete the upgrade. After rebooting and logging back in to the BBI, the dashboard confirms that upgrades 1 and 2 are now installed, as shown in Figure 4-8.

<h2>Switch Dashboard</h2>	
Switch Name	
Switch Location	
Switch Type	IBM Flex System Fabric EN4093R 10Gb Scalable Switch(Upgrade2)
Switch Up Time	0 days, 0 hours, 6 minutes and 38 seconds.
Last Boot Time	19:16:37 Wed Jun 11, 2014 (power cycle)
Time and date	19:21:01 , 6/11/2014
Timezone Location	
Daylight Savings Time Status	disabled
MAC Address	74:99:75:6c:63:00
IP Address	9.42.171.9
PCBA Part Number	00D6166
Hardware Part Number	95Y3311
Serial Number	Y010CM2BV156
Manufacturing Date	49/12
Hardware Revision	2
Board Revision	2
PLD Firmware Version	1.7
Temperature Sensor 1 (Warning)	35 C (Warn at 60 C/Recover at 55 C)
Temperature Sensor 2 (Shutdown)	35 C (Shutdown at 65 C/Recover at 60 C)
Temperature Sensor 3 (Inlet)	27 C
Temperature Sensor 4 (Exhaust)	35 C
Power Consumption	44.910 W (12.508 V, 3.585 A)
Software Rev	7.5.1 (FLASH image1)
Flash Configuration	FLASH image1, factory default configuration.
Enabled Software features	Upgrade1 + Upgrade2
Banner	
Login Notice	
Switch Module Bay	2
Service Required LED	Disabled
	Operational Status <span>Normal</span> ▼

Figure 4-8 BBI Dashboard showing Upgrade 1 and Upgrade 2



#### 4.4.4 Backing up FoD keys

To back up FoD keys by using the BBI, we browse to the configure FoD activation window and enter the information, as shown in Figure 4-9.

FoD Settings	
Hostname or IP Address of TFTP/SFTP server	9.42.170.215
Key or Inventory filename	
Protocol	TFTP ▾
Port of TFTP/SFTP server	69
User Name	
Password	
Physical Port for Transfer	MGT ▾
Software Feature	Upgrade1 ▾ (Upload Key File)
<input type="button" value="Install Key"/> <input type="button" value="Upload Key File"/> <input type="button" value="Inventory Keys"/>	

Figure 4-9 BBI backing up FoD keys

We enter the IP address of our TFTP server (9.42.170.215), select the feature we want to back up (Upgrade 1 or Upgrade 2), and then click **Upload Key File**. As with the ISCLI, we must upload each key separately. Optionally, we can also specify the name that is given to the key file that is uploaded to the specified TFTP server.

Figure 4-10 shows the message that is shown after the key upload completes successfully.

```
Status : Key file: /ibm_fod_0007_Y010CM2BV156_anyos_noarch.key uploaded with success!
```

Figure 4-10 Successful upload of an FoD key file

## 4.4.5 Removing Upgrade 2 and verifying that Upgrade 1 remains

To remove Upgrade 2 by using the BBI, we browse to the configure FoD activation window, as shown in Figure 4-11.

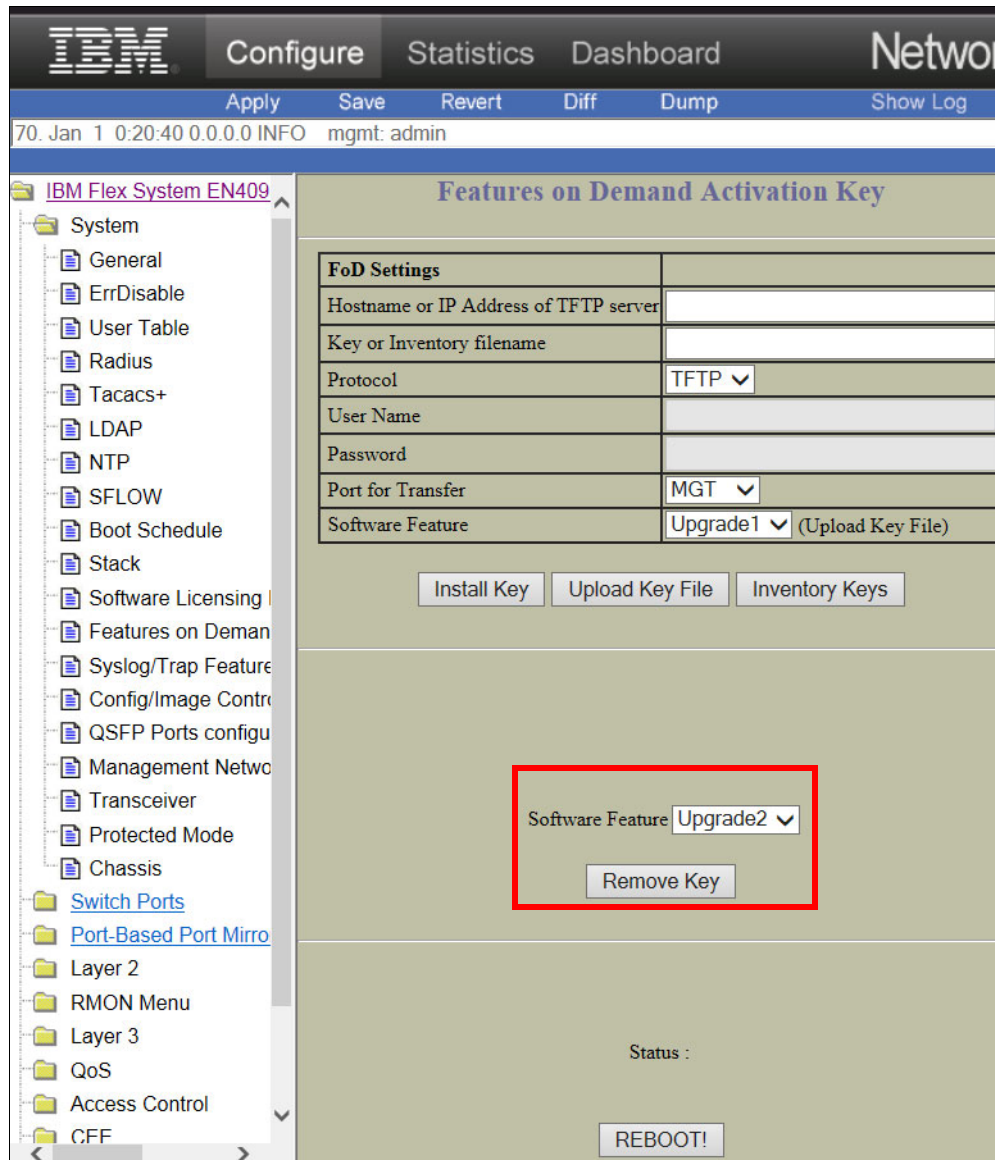


Figure 4-11 BBI remove FoD key window for Upgrade 2

We select Upgrade 2 as the feature that we want to remove and then click **Remove Key**.

If the upgrade is uninstalled successfully, you see the message that is shown in Figure 4-12.

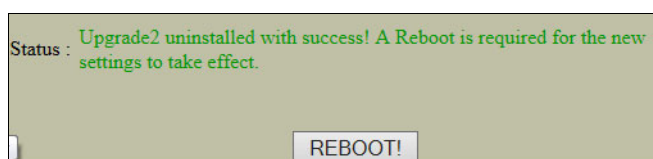


Figure 4-12 BBI Upgrade 2 uninstallation success

As noted in the message, a switch reboot is required to complete the uninstall. After rebooting and logging back in to the BBI, the dashboard confirms that only Upgrade 1 remains, as shown in Figure 4-13.

<b>Switch Dashboard</b>	
Switch Name	
Switch Location	
Switch Type	IBM Flex System Fabric EN4093R 10Gb Scalable Switch(Upgrade1)
Switch Up Time	0 days, 0 hours, 6 minutes and 27 seconds.
Last Boot Time	18:47:22 Thu Jun 12, 2014 (reset by WEB-UI)
Time and date	18:51:35 , 6/12/2014
Timezone Location	
Daylight Savings Time Status	disabled
MAC Address	74:99:75:6c:63:00
IP Address	9.42.171.9
PCBA Part Number	00D6166
Hardware Part Number	95Y3311
Serial Number	Y010CM2BV156
Manufacturing Date	49/12
Hardware Revision	2
Board Revision	2
PLD Firmware Version	1.7
Temperature Sensor 1 (Warning)	35 C (Warn at 60 C/Recover at 55 C)
Temperature Sensor 2 (Shutdown)	35 C (Shutdown at 65 C/Recover at 60 C)
Temperature Sensor 3 (Inlet)	28 C
Temperature Sensor 4 (Exhaust)	36 C
Power Consumption	43.190 W (12.444 V, 3.470 A)
Software Rev	7.5.1 (FLASH image1)
Flash Configuration	FLASH image1, active configuration.
Enabled Software features	Upgrade1
Banner	
Login Notice	
Switch Module Bay	2
Service Required LED	Disabled
	Operational Status Normal <input type="button" value="v"/>

Figure 4-13 BBI Dashboard showing that only Upgrade 1 remains

## 4.4.6 Removing Upgrade 1 and verifying that no upgrades remain

To remove Upgrade 1 by using the BBI, we browse to the configure FoD activation window, as shown in Figure 4-14.

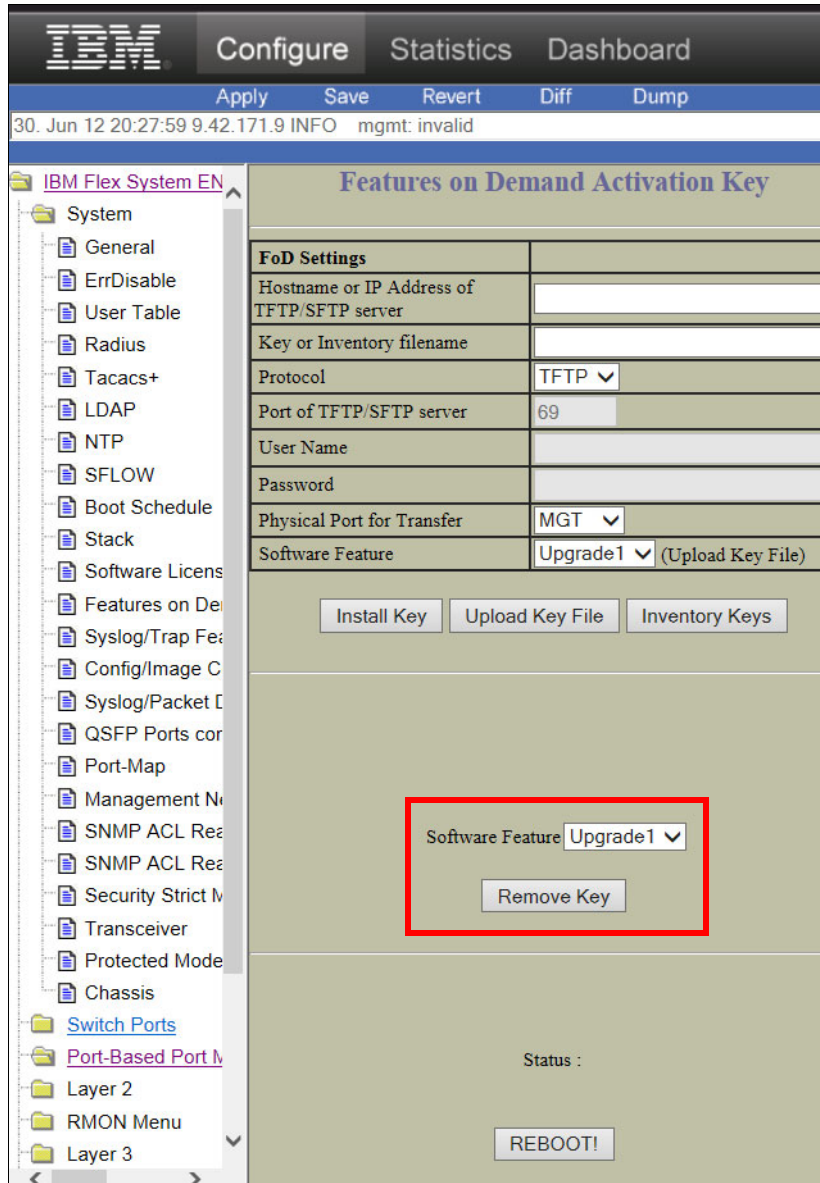


Figure 4-14 BBI remove FoD key for Upgrade 1

As with Upgrade 2, we select Upgrade 1 as the feature that we want to remove and then click **Remove Key**.

As noted in the resulting message, a switch reboot is required to complete the uninstall. After rebooting and logging back in to the BBI, the dashboard confirms that no upgrades remain, as shown in Figure 4-15.

<b>Switch Dashboard</b>	
Switch Name	
Switch Location	
Switch Type	IBM Flex System Fabric EN4093R 10Gb Scalable Switch
Switch Up Time	0 days, 0 hours, 4 minutes and 26 seconds.
Last Boot Time	18:38:19 Thu Jun 12, 2014 (reset by WEB-UI)
Time and date	18:40:16 , 6/12/2014
Timezone Location	
Daylight Savings Time Status	disabled
MAC Address	74:99:75:6c:63:00
IP Address	9.42.171.9
PCBA Part Number	00D6166
Hardware Part Number	95Y3311
Serial Number	Y010CM2BV156
Manufacturing Date	49/12
Hardware Revision	2
Board Revision	2
PLD Firmware Version	1.7
Temperature Sensor 1 (Warning)	35 C (Warn at 60 C/Recover at 55 C)
Temperature Sensor 2 (Shutdown)	35 C (Shutdown at 65 C/Recover at 60 C)
Temperature Sensor 3 (Inlet)	28 C
Temperature Sensor 4 (Exhaust)	36 C
Power Consumption	41.750 W (12.444 V, 3.355 A)
Software Rev	7.5.1 (FLASH image1)
Flash Configuration	FLASH image1, active configuration.
Enabled Software features	none
Banner	
Login Notice	
Switch Module Bay	2
Service Required LED	Disabled
Operational Status	Normal <input type="button" value="v"/>

Figure 4-15 BBI Dashboard showing no upgrades remains

## 4.5 Installing FoD keys by using the Menu-Based CLI

As with the ISCLI, the Menu-Based CLI provides a direct method for collecting switch information and performing switch configuration. By using a basic terminal, you can use the Menu-Based CLI to view information and statistics about the switch and perform any necessary configuration.

With the Menu-Based CLI, the various commands are logically grouped into a series of menus and submenus. Each menu displays a list of commands or submenus that are available, along with a summary of the function of each command. Below each menu is a prompt where you can enter any command that is appropriate to the current menu.

For more information about the Menu-Based CLI, see this website:

<http://www-01.ibm.com/support/knowledgecenter/api/redirect/flexsys/information/topic/com.ibm.acc.networkdevices.doc/88y7942.pdf>

## 4.5.1 Verifying that no upgrades were initially installed

The Menu-Based CLI command and response that shows that our IBM Flex System EN4093 currently has no FoD upgrades is shown in Example 4-25.

*Example 4-25 Menu-Based CLI command to verify no upgrades initially*

---

```
>> Main# /info/swkey
Enabled FoD Key(s):
  none
Active FoD Key(s):
  none
Non-Reusable Demo License(s): none
```

---

The `/info/swkey` Menu-Based CLI command is used to see which, if any, FoD upgrades are applied to a switch. As the response shows, no keys are installed.

## 4.5.2 Apply upgrade 1 and verify

The Menu-Based CLI command and response to apply the FoD key for upgrade 1 (7.key) is shown in Example 4-26.

*Example 4-26 Menu-Based CLI command to install the FoD key for Upgrade 1*

---

```
>> Software License# /oper/swkey/enakey 9.42.170.215 7.key
Enter username for SFTP server or hit return for TFTP server:
Enter the port to use for downloading the file
["data"|"extm"|"mgt"]: mgt

Starting download key file...
Key file download complete (494 bytes)
Software feature 'Upgrade1' will be Active upon next reboot.
Jun 18 17:51:28 9.42.171.9 NOTICE mgmt: Software feature 'Upgrade1' will be
Active upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The `/oper/swkey/enakey` Menu-Based CLI command is used to apply an FoD upgrade key. We specify the IP address of our TFTP server and the key file name `7.key` to specify the file name of our FoD key for upgrade 1. When prompted to enter SFTP server user name or press Enter for TFTP server, we press Enter because we are using a TFTP server.

**Reboot the switch:** Although the activation key was successfully downloaded, it does not become effective until the switch is restarted. To reboot, enter the `/boot/reset` command.

To verify that Upgrade 1 was successfully applied, we reboot the switch and then reissue the `/info/swkey` Menu-Based CLI command. The results are shown in Example 4-27.

*Example 4-27 Confirming upgrade 1 applied*

---

```
>> Main# /info/swkey
Enabled FoD Key(s):
  Upgrade1
Active FoD Key(s):
  Upgrade1
Non-Reusable Demo License(s): none
```

---

The command output confirms that Upgrade 1 was successfully applied.

**Hint:** If you are installing Upgrade1 and Upgrade2, it is not necessary to reboot in between (as we did in our example). Instead, issue both install commands and then reboot.

### 4.5.3 Applying Upgrade 2 and verifying

The Menu-Based CLI command and response to apply the FoD key for upgrade 2 (8.key) is shown in Example 4-28.

*Example 4-28 Menu-Based CLI command to install the FoD key for Upgrade 2*

---

```
>> Software License# /oper/swkey/enakey 9.42.170.215 8.key
Enter username for SFTP server or hit return for TFTP server:
Enter the port to use for downloading the file
["data"|"extm"|"mgt"]: mgt

Starting download key file...
Key file download complete (494 bytes)
Software feature 'Upgrade2' will be Active upon next reboot.
Jun 18 17:51:40 9.42.171.9 NOTICE mgmt: Software feature 'Upgrade2' will be
Active upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The **/oper/swkey/enakey** Menu-Based CLI command is used to apply an FoD upgrade key. We specify the IP address of our TFTP server and the key file name 8.key to specify the file name of our FoD key for Upgrade 2.

To verify that Upgrade 2 was successfully applied, we reboot the switch and then reissue the **/info/swkey** Menu-Based CLI command. The results are shown in Example 4-29.

*Example 4-29 Confirming upgrade 2 applied*

---

```
>> Main# /info/swkey
Enabled FoD Key(s):
  Upgrade1  Upgrade2
Active FoD Key(s):
  Upgrade1  Upgrade2
Non-Reusable Demo License(s): none
```

---

The command output confirms that Upgrade 2 was successfully applied.

### 4.5.4 Backing up FoD keys

The ISCLI command and response to back up FoD keys from the switch is shown in Example 4-30 on page 126.

*Example 4-30 Menu-Based CLI command to back up FoD keys from the switch*

---

```
>> Software License# /oper/swkey/ptkey 9.42.170.215 menubk.key
Enter username for SFTP server or hit return for TFTP server:
Enter the port to use for uploading the file
["data"|"extm"|"mgt"]: mgt
Enter software feature to be uploaded
[Upgrade1|Upgrade2] : Upgrade1
```

```
Upload successfully tftp'd to 9.42.170.215:menubk.key
Upload with success!
```

---

The `/oper/swkey/ptkey` Menu-Based CLI command is used to back up an FoD upgrade key. We specify the IP address of our TFTP server and the key file name to back up. With the Menu-Based CLI, the FoD activation keys must be backed up one at a time. Therefore, we must issue the command twice to back up both keys: once for Upgrade 1 and once for Upgrade 2.

## 4.5.5 Removing upgrade 2 and verifying that Upgrade 1 remains

The ISCLI command and response to remove Upgrade 2 is shown in Example 4-31.

*Example 4-31 Menu-Based CLI command to remove Upgrade 2*

---

```
>> Software License# /oper/swkey/rmkey Upgrade2
Confirm removing Upgrade2 software feature [y/n]: y
Software feature 'Upgrade2' will be Inactive upon next reboot.
Jun 18 17:44:34 9.42.171.9 NOTICE mgmt: Software feature 'Upgrade2' will be
Inactive upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The `/oper/swkey/rmkey` ISCLI command is used to remove FoD upgrade keys. We specified Upgrade2 to specifically remove Upgrade 2. As with upgrades, a reboot is required for the change to take effect.

To verify that Upgrade 2 was removed, we reboot the switch and then reissue the `/info/swkey` Menu-Based CLI command. The results are shown in Example 4-32.

*Example 4-32 Confirming that Upgrade 2 removed*

---

```
>> Main# /info/swkey
Enabled FoD Key(s):
  Upgrade1
Active FoD Key(s):
  Upgrade1
Non-Reusable Demo License(s): none
```

---

The command output confirms that Upgrade 2 was successfully removed.

**Hint:** As with installation, you can also issue the commands to remove Upgrade1 and Upgrade2 and reboot only once.



## 4.5.6 Removing Upgrade 1 and verifying that no upgrades remain

The Menu-Based CLI command and response to remove Upgrade 1 is shown in Example 4-33.

*Example 4-33 Menu-Based CLI command to remove Upgrade 1*

---

```
>> Software License# /oper/swkey/rmkey Upgrade1
Confirm removing Upgrade1 software feature [y/n]: y
Software feature 'Upgrade1' will be Inactive upon next reboot.

Jun 18 17:45:00 9.42.171.9 NOTICE mgmt: Software feature 'Upgrade1' will be
Inactive upon next reboot.
A Reboot is required for the new settings to take effect.
```

---

The `/oper/swkey/rmkey` Menu-Based CLI command is used to remove FoD upgrade keys. We specified `Upgrade1` to specifically remove upgrade 1. As with upgrades, a reboot is required for the change to take effect.

To verify that upgrade 1 was indeed removed, we reboot the switch and then reissue the `/info/swkey` Menu-Based CLI command. The results are shown in Example 4-34.

*Example 4-34 Confirming Upgrade 1 removed*

---

```
>> Main# /info/swkey
Enabled FoD Key(s):
    none
Active FoD Key(s):
    none
Non-Reusable Demo License(s): none
```

---

The command output confirms that upgrade 1 was successfully removed.

## 4.6 Feature on Demand and flexible port mapping

Flexible port mapping might save you the cost of switch upgrades by making better use of available ports. New with IBM Networking OS version 7.8 or later, you have more flexibility in assigning the ports that you licensed on IBM Flex System I/O modules.

Although the base model and upgrades might still activate specific ports, you can reassign ports as needed by moving internal and external ports or trading lower-bandwidth ports for the use of higher-bandwidth ports by using flexible port mapping, as shown in the following examples:

- ▶ Trading 10 1-Gb ports for the use of a 10 Gb port
- ▶ Trading the use of four 10 Gb ports for the use of a 40 Gb port

Consider the following points regarding flexible port mapping:

- ▶ Flexible port mapping does not change the amount of capacity that you get with each upgrade. For example, with the EN4093R 10Gb Scalable Switch, the base gives you 240 Gb of usable bandwidth. Upgrade 1 gives you another 220 Gb, for a total of 460 Gb. Upgrade 2 gives you all 640 Gb of port capacity the switch hardware can support.

- ▶ If you add a FoD upgrade without remapping any ports, the upgrade activates a set of default ports<sup>1</sup>. However, if you add a FoD upgrade after remapping any ports, the upgrade reflects the other available bandwidth but *you will be required to map the specific ports you want activated*; the upgrade does not activate any particular ports by default.
- ▶ Whenever you remove an upgrade, all mapped ports are reset to the default mapping (for example, see the Warning messages that are noted in Example 4-23 on page 111). Therefore, if you are using port mapping and remove an upgrade, you must go back in and remap those ports.
- ▶ For all current I/O modules, all ports on the I/O module are active after Upgrade 2 is applied. Therefore, the ISCLI commands and the BBI menu options for flexible port mapping no longer appear.

Flexible port mapping might be of value to your organization as shown in the following examples:

- ▶ Reassigning ports from unused compute node bays to bays with nodes that are using four or eight-port adapters.

**Note:** Available Flex System I/O modules can support only up to six of the eight ports on eight-port adapters. Support for all eight ports might be available with future I/O modules.

- ▶ Simplifying cabling (and potentially reducing costs) by using two 40 Gb uplinks instead of eight 10 Gb uplinks
- ▶ Supporting Flex System clustered solutions by using four Ethernet I/O modules.  
Two of the I/O modules are dedicated to cluster internal connectivity (for example, remapping EXTxx ports for more internal node-to-node bandwidth).  
The other two I/O modules are dedicated to external (uplink) connectivity and a pair of cluster front-end nodes.

<sup>1</sup> For more information, see the IBM Redbooks Product Guide for your specific I/O module, which is available at this website: <http://www.redbooks.ibm.com/portals/puresystems?Open&page=pg&cat=switches>

As an example for showing how to use flexible port mapping, consider the IBM Flex System solution that is shown in Figure 4-16.



Figure 4-16 Flexible Port Mapping Example Flex System

Consider the following points regarding this example:

- ▶ Compute node bays 1 - 4 have nodes with four-port 10 Gb Ethernet adapters (highlighted in Figure 4-16 by the four green boxes to the side of each those nodes).
- ▶ Compute node bays 5 - 10 have nodes with two-port LAN on Motherboard (highlighted in Figure 4-16 by the two green boxes to the side of each of those nodes).
- ▶ Compute node bays 11 - 14 are unused.
- ▶ We want to simplify uplink connectivity by using two 40 Gb Ethernet uplinks.

Figure 4-17 shows the default port assignments for each EN4093 switch (without upgrades) in the example Flex System solution.

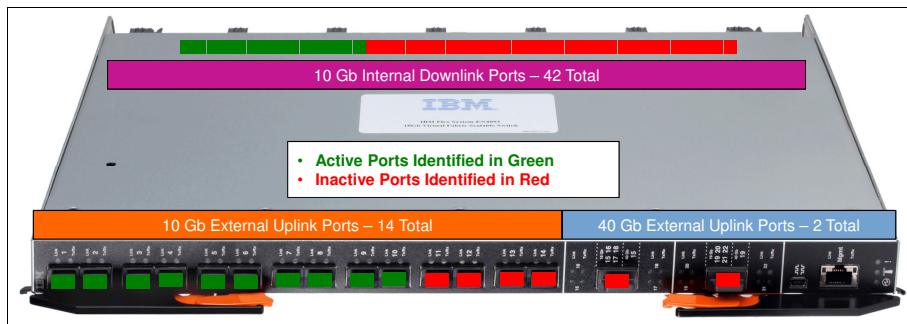


Figure 4-17 Default port assignments for each EN4093 switch (without upgrades)

In the default configuration (and before flexible port mapping), only one internal 10 Gb connection is available to each compute node bay (regardless of whether that bay was being used). Also, the two 40 Gb ports are not available without Upgrade 1.

Figure 4-18 shows the port assignments after the use of flexible port mapping to match those needed to support the configuration that shown in Figure 4-16 on page 129 without purchasing switch upgrades.

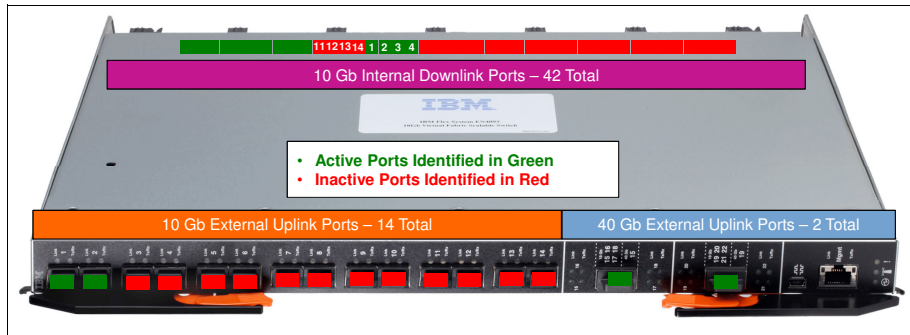


Figure 4-18 EN4093 port assignments after the use of flexible port mapping

In the following sections, we show the remapping internal ports INTA11 - INTA14 to INTB1 - INTB4 to support the four-port adapters in bays 1 - 4. Also, we remap ports EXT3 - EXT10 to the 40 Gb ports EXT15 and EXT19. We show those activities first, by using the ISCLI (as described in 4.6.1, “Flexible port mapping by using the ISCLI” on page 130) and then by using the BBI (as described in 4.6.2, “Flexible port mapping by using the BBI” on page 133).

**Note:** The Menu-Based CLI does not support flexible port mapping.

#### 4.6.1 Flexible port mapping by using the ISCLI

To see the current port mapping by using the ISCLI, run the **show boot port-map** command, as shown in Example 4-35.

*Example 4-35 Displaying current port mapping by using ISCLI*

```
Router>show boot port-map
```

```
Maximum bandwidth: 240G
Mapped ports booted configuration:
  Used bandwidth: 240G
  INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
  INTA11 INTA12 INTA13 INTA14
  EXT1 EXT2 EXT3 EXT4 EXT5 EXT6 EXT7 EXT8 EXT9 EXT10
Mapped ports saved configuration:
  Used bandwidth: 240G
  INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
  INTA11 INTA12 INTA13 INTA14
  EXT1 EXT2 EXT3 EXT4 EXT5 EXT6 EXT7 EXT8 EXT9 EXT10
```

NOTE: Reboot is required to enable the saved configuration (if different).

The command output shows the following information:

- ▶ Our switch has no upgrades; maximum bandwidth shows as 240 Gb.
- ▶ It is using the default port assignments INTA1-14 and EXT1-10.
- ▶ All available bandwidth was allocated to ports; maximum and used bandwidths show 240 Gb.
- ▶ No port mapping changes were yet made; booted configuration matches saved configuration.

Example 4-36 shows the ISCLI commands to free up ports INTA11 - INTA14 and then assign those ports to INTB1 - INTB4.

*Example 4-36 ISCLI remapping INTA11 - INTA14 to INTB1 - INTB4*

---

```
Router#config t
Enter configuration commands, one per line. End with Ctrl/Z.
Router(config)#no boot port-map inta11
Router(config)#no boot port-map inta12
Router(config)#no boot port-map inta13
Router(config)#no boot port-map inta14
Router(config)#boot port-map intb1
Router(config)#boot port-map intb2
Router(config)#boot port-map intb3
Router(config)#boot port-map intb4
Router(config)#show boot port-map

Maximum bandwidth: 240G
Mapped ports booted configuration:
    Used bandwidth: 240G
    INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
    INTA11 INTA12 INTA13 INTA14
    EXT1 EXT2 EXT3 EXT4 EXT5 EXT6 EXT7 EXT8 EXT9 EXT10
Mapped ports saved configuration:
    Used bandwidth: 240G
    INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
    INTB1 INTB2 INTB3 INTB4
    EXT1 EXT2 EXT3 EXT4 EXT5 EXT6 EXT7 EXT8 EXT9 EXT10
```

NOTE: Reboot is required to enable the saved configuration (if different).

---

After the commands are issued to remap INTA11 - INTA14 to INTB1 - INTB4 (and not yet rebooted), you can see from the show command that the saved configuration reflects what we needed for our internal ports.

In Example 4-37, we show the commands to remap eight of our 10 Gb external ports (EXT3 - EXT10) to our two 40 Gb ports (EXT15 and EXT19).

*Example 4-37 ISCLI remapping EXT3 - EXT10 to EXT15 and EXT19*

---

```
Router(config)#no boot port-map ext3
Router(config)#no boot port-map ext4
Router(config)#no boot port-map ext5
Router(config)#no boot port-map ext6
Router(config)#no boot port-map ext7
Router(config)#no boot port-map ext8
Router(config)#no boot port-map ext9
```

```
Router(config)#no boot port-map ext10
Router(config)#boot port-map ext15
Router(config)#boot port-map ext19
Router(config)#show boot port-map
```

```
Maximum bandwidth: 240G
Mapped ports booted configuration:
  Used bandwidth: 240G
  INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
  INTA11 INTA12 INTA13 INTA14
  EXT1 EXT2 EXT3 EXT4 EXT5 EXT6 EXT7 EXT8 EXT9 EXT10
Mapped ports saved configuration:
  Used bandwidth: 240G
  INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
  INTB1 INTB2 INTB3 INTB4
  EXT1 EXT2 EXT15 EXT19
```

NOTE: Reboot is required to enable the saved configuration (if different).

---

Now our saved configuration is exactly what we want. Example 4-38 shows the result of another **show boot port-map** command after rebooting the switch.

*Example 4-38 Displaying current port mapping after changes by using ISCLI*

---

```
Router(config)#show boot port-map

Maximum bandwidth: 240G
Mapped ports booted configuration:
  Used bandwidth: 240G
  INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
  INTB1 INTB2 INTB3 INTB4
  EXT1 EXT2 EXT15 EXT19
Mapped ports saved configuration:
  Used bandwidth: 240G
  INTA1 INTA2 INTA3 INTA4 INTA5 INTA6 INTA7 INTA8 INTA9 INTA10
  INTB1 INTB2 INTB3 INTB4
  EXT1 EXT2 EXT15 EXT19
```

NOTE: Reboot is required to enable the saved configuration (if different).

---

After rebooting the switch, our booted configuration now matches our saved configuration.

## 4.6.2 Flexible port mapping by using the BBI

Remapping ports by using the BBI is a simple process. Figure 4-19 shows the Configure Port-Map window. You select the ports from the mapped ports list that you want to free up and click **Unmapp**. You then select the ports on the available ports list that you want to map and click **Map**.

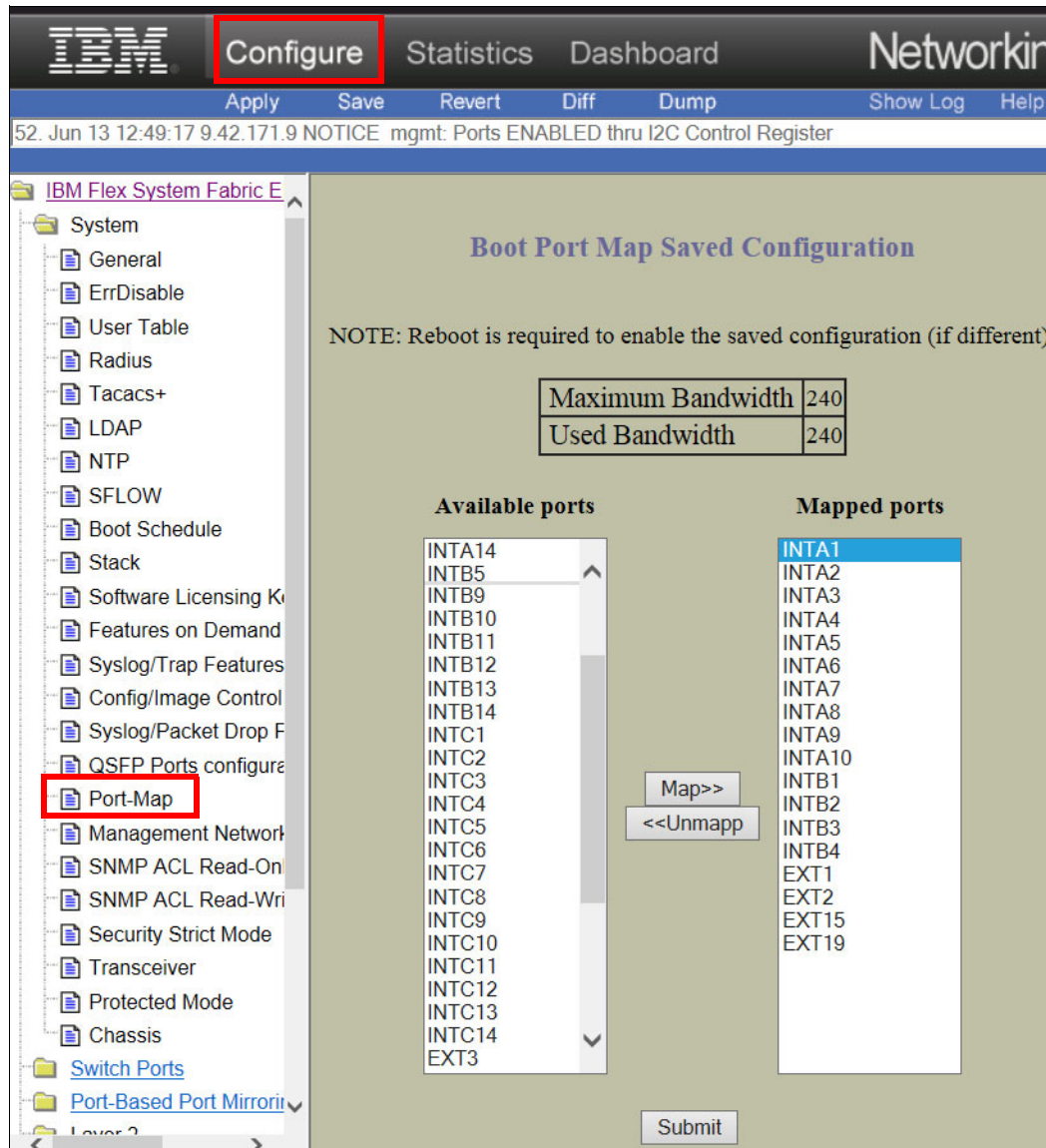


Figure 4-19 Flexible Port Mapping from the switch BBI

After you complete your port mapping selections, click **Submit** and reboot the switch. Your new mappings are applied and active. For more information about how to reboot the switch, see 4.4.2, “Applying Upgrade 1 and verifying” on page 114.





# Servicing

In this chapter, we provide information about servicing systems with IBM Features on Demand (FoD) capabilities. We describe servicing optional hardware components, such as expansion cards that offer FoD functionality.

This chapter includes the following topics:

- ▶ 5.1, “Hardware replacement by using the FoD website” on page 136
- ▶ 5.2, “Replacing a system board” on page 139
- ▶ 5.3, “Replacing an adapter” on page 140
- ▶ 5.4, “Moving an adapter or a switch” on page 141
- ▶ 5.5, “Replacing a switch” on page 148
- ▶ 5.6, “Replacing a chassis management module” on page 148
- ▶ 5.7, “VPD/FoD Update Tool” on page 149
- ▶ 5.8, “Further assistance” on page 153

**Customer responsibilities:** All reactivation procedures for feature activation are the responsibility of the client.

## 5.1 Hardware replacement by using the FoD website

If there is a hardware failure on a server, such as a network adapter or network switch in a Flex chassis, we must update the unique identifier for the replacement part on the FoD website.

The unique identifier is normally referred to as the FoD ID. The Hardware replacement menu is not needed for keys that are tied to the machine type and serial number (MTSN), such as the IMM Advanced Upgrade or ServeRAID adapters. When a system board fails and must be replaced, the IMM Advanced Upgrade automatically is ported over after the MTSN is updated through the VPD Update process that is described in 5.7, “VPD/FoD Update Tool” on page 149.

Complete the following steps:

1. To access the hardware replacement menu, select **Hardware replacement** from the center of the page or from the left navigation pane, as shown in Figure 5-1.

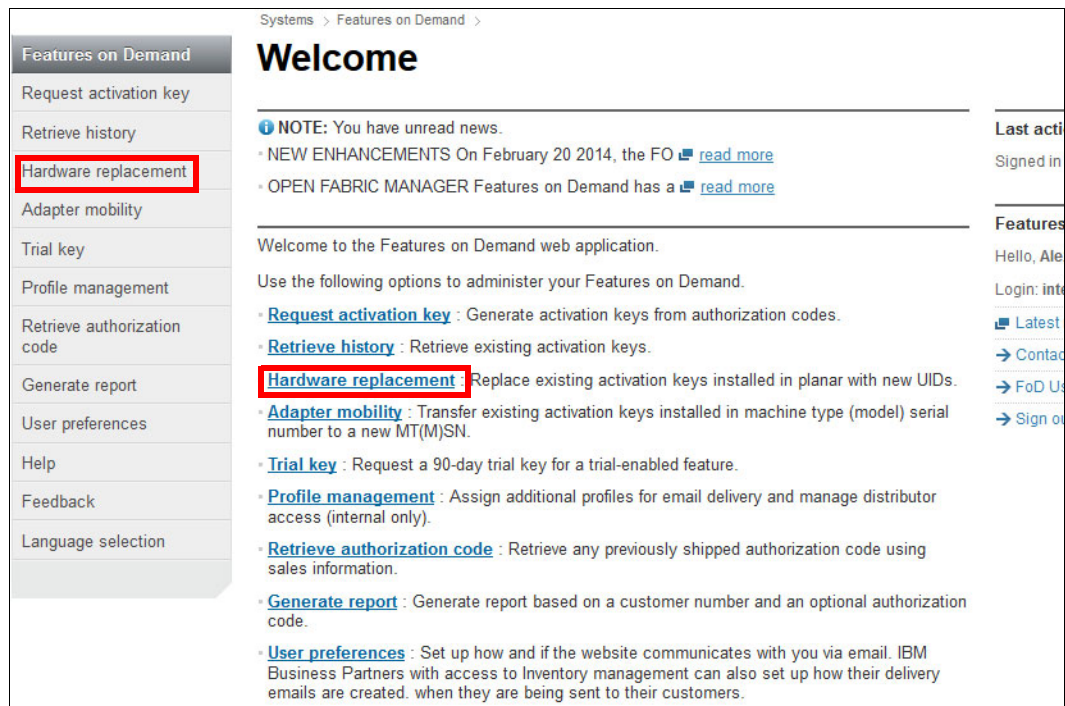


Figure 5-1 Hardware replacement option

- In the drop-down menu, select your machine type from the list. Then, enter the machine type serial number, as shown in Figure 5-2. Click **Continue**.

**Hardware replacement**

**Step 1: Machine details**

Select your machine type and model if available and enter your 7 character machine serial number. (Your machine serial number can be found on the back panel or in one of the system administration tools).

Machine type\*  ⓘ

Model

Machine serial number\*  ⓘ

Figure 5-2 Hardware replacement MTSN input

The available keys for the MTSN that was entered are shown in the next window, as shown in Figure 5-3.

**Hardware replacement**

**Step 2: Activation keys selection**

This lists the activation keys installed in the machine type serial number inputted.  
Select the keys you want to replace its UID.

Installed in system: **872110JON01**

UID	Feature	Details
<input checked="" type="checkbox"/> Y00000000001	A1EL	IBM Flex S ...
<input checked="" type="checkbox"/> Y00000000001	A1EM	Feature description: IBM Flex System Fabric EN4093 10Gb Scalable Switch (Upgrade 1)
<input type="checkbox"/> 10:00:00:27:F8:D2:00:00	A1EP	IBM Flex S ...
<input type="checkbox"/> 10:00:00:27:F8:D2:00:00	A1EQ	IBM Flex S ...
<input type="checkbox"/> 90Y3452Y00000000003	A1QX	IBM Flex S ...
<input type="checkbox"/> 10:00:00:27:F8:D2:00:00	A3HN	IBM Flex S ...
<input type="checkbox"/> 10:00:00:27:F8:D2:00:00	A3HP	IBM Flex S ...
<input type="checkbox"/> Y00000000222	ESW8	IBM Flex S ...
<input type="checkbox"/> Y00000000222	ESW9	IBM Flex S ...
<input type="checkbox"/> Select all		

**Last action:**  
Signed in

**Features on Demand**  
Hello, Jonathan Hiott  
Login: external  
Latest news(4)  
Sign out

Figure 5-3 Installed keys

In this example, we select the top two entries, which are upgrades 1 and 2 for the IBM Flex System EN4093 Scalable switch. When a switch replacement is done, we must enter the new switch's UID into KMS so that upgrades 1 and 2 are available on the replacement switch. Enter new UID in the appropriate fields, as shown in Figure 5-4.

### Hardware replacement

**Step 3: Enter new UIDs**

Here is the list of the activation keys you want to replace.  
Please enter new UIDs for each keys.

Installed in system: **872110JON01**

UID type	Feature	Details
IBM Switch S/N	A1EM	IBM Flex S ...
Old UID	<input type="text" value="Y0000000001"/>	
New UID	<input type="text" value="Y00000000ABC"/>	
IBM Switch S/N	A1EL	IBM Flex S ...
Old UID	<input type="text" value="Y00000000001"/>	
New UID	<input type="text" value="Y00000000ABC"/>	

Continue Cancel

Figure 5-4 Enter new UIDs

3. Confirm your selections in the next window, as shown in Figure 5-5.

### Hardware replacement

**Step 4: Replacement confirm**

Once confirmed, this action cannot be reversed. Please ensure the data displayed corresponds to the key you wish to replace.

Installed in system: **872110JON01**

UID type	Feature	Details
IBM Switch S/N	A1EM	IBM Flex S ...
Old UID	<input type="text" value="Y00000000001"/>	
New UID	<input type="text" value="Y00000000ABC"/>	
IBM Switch S/N	A1EL	IBM Flex S ...
Old UID	<input type="text" value="Y00000000001"/>	
New UID	<input type="text" value="Y00000000ABC"/>	

Confirm Cancel

Figure 5-5 Confirm selections

A successful key transfer is shown in Figure 5-6.

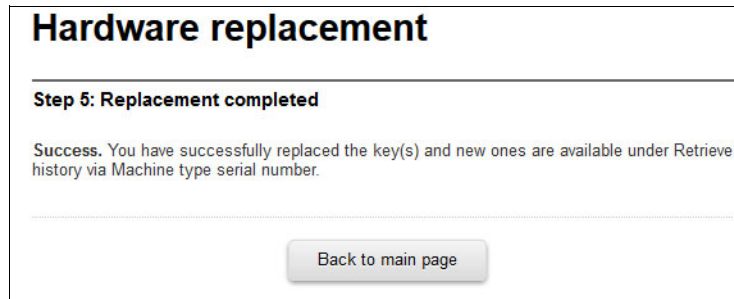


Figure 5-6 Successful hardware replacement

You can now download the new activation key from the FoD website by using the UID of the new switch or by using the MTSN of the chassis or server hosting the switch.

**Responsibility:** It is ultimately the *client's* responsibility to reinstall their FoD keys. However, be advised that in most service scenarios in which a client needs a part replaced, the client often is not aware that they have FoD keys that are applied or might not know how to reapply the keys. In these cases, Remote Support works with the client and Field Technician to reapply the keys.

## 5.2 Replacing a system board

The FoD activation keys for servers are stored on the system board's Integrated Management Module II (IMM2), which is called the FoD key repository. Activation keys are not easily lost, except if the system board is replaced.

If the system board is replaced, you must reinstall all FoD keys. It is important to first make sure that the MTSN of the server is applied to the new system board, as described in 5.7, "VPD/FoD Update Tool" on page 149. Preboot DSA or ASU gives you this capability and access to the VPD/FoD Update Tool. Most of the FoD activation keys are tied to MTSN, so failure to reinstate these values prevents the FoD upgrades from being reapplied.

Use the following information as guidance about how to re-enable FoD upgrades:

- ▶ Complete the following steps for server-level keys, such as ServeRAID, Intel Ethernet, and IMM keys (but excluding Emulex FoD keys):
  - a. Use the IBM FoD website and the Retrieve History function to download all keys that are associated with the server. (For more information, see 2.4.3, "Retrieve history" on page 43.) You must specify the server UID, which is a concatenation of the MTSN (for example, 7160KQ5N05V).
  - b. Reapply the keys to the server by using the IMM2 web interface or tools, such as DSA or ASU. For more information, see Chapter 3, "Installing Server FoD keys" on page 51.

- ▶ For Emulex adapters (that is, for Emulex controllers that are not integrated on the system board), complete the following steps:
  - a. After you reinstall the adapter onto the replacement system board, use the Emulex tools (for example, Emulex OneCommand Manager or HbaCmd) to determine the UID (or both UIDs in the case of the IBM Flex System CN4054 adapter) of the Emulex adapter.  
You can also use Preboot DSA to determine Emulex UIDs, as described in “Obtaining an FoD Identifier by using Preboot DSA” on page 25.
  - b. Use the Retrieve History function on the IBM FoD website to download the key that is associated with the Emulex UID. For more information, see 2.4.3, “Retrieve history” on page 43.
  - c. Reapply the key to the server by using the IMM2 web interface or tools, such as Preboot DSA or ASU. For more information, see Chapter 3, “Installing Server FoD keys” on page 51.
- ▶ For Emulex controllers that are integrated on the system board, when you replace the system board, you receive a new UID for the Emulex controller. When you receive a new UID, your existing FoD activation key is no longer valid.

For more information, see the RETAIN® tip H205574, which is available at this website:

<http://ibm.com/support/entry/portal/docdisplay?lnodocid=MIGR-5090088>

It is suggested that you complete the following steps:

- a. Use the Emulex tools (for example, Emulex OneCommand Manager or HbaCmd) to determine the UID of the Emulex controller on the replacement system board.  
You can also use is Preboot DSA to determine Emulex UIDs, as described in “Obtaining an FoD Identifier by using Preboot DSA” on page 25.
- b. When the new entitlement is transferred (as described in 5.1, “Hardware replacement by using the FoD website” on page 136), use the Retrieve History function on the IBM FoD website to download the key for that UID. For more information, see 2.4.3, “Retrieve history” on page 43.
- c. Reapply the key to the server by using the IMM2 web interface or tools, such as DSA or ASU. For more information, see Chapter 3, “Installing Server FoD keys” on page 51.

**Tip:** The support process is faster if you already know the UID of the Emulex controller on the failed system board.

## 5.3 Replacing an adapter

In all cases (except for Emulex and the QLogic 8200 adapters), re-enabling the FoD functions when an adapter is replaced is automatic. Complete the following steps:

1. Install the replacement adapter.
2. Power on the server. The system firmware interrogates the IMM key repository and activates automatically all FoD keys, including those keys that are related to the replacement adapter.

In the case of Emulex and the QLogic 8200 adapters, when you replace the adapter, you must get a new UID. When this new UID is issued, your existing FoD activation key no longer is valid. For more information about getting a UID, see 2.3, “How to find the Unique Identifiers” on page 17.

For more information about replacing an adapter by using the FoD website, see, 5.1, “Hardware replacement by using the FoD website” on page 136.

**Tip:** The support process is faster if you know the UID of the failed Emulex adapter.

## 5.4 Moving an adapter or a switch

If you move an adapter with FoD features enabled to a new server, those FoD features do not automatically transfer over because the FoD key is stored in the IMM2 of the server. Therefore, you must use the Adapter Mobility feature of the FoD website to transfer the FoD features to the new server.

Some adapters, such as ServeRAID controllers, are not individually licensed for FoD upgrades. Instead, when you apply an ServeRAID FoD upgrade, all ServeRAID adapters that are installed in the server are activated. Therefore, if you move a ServeRAID adapter from one server to another, the FoD features do not transfer to the new server.

If the FoD feature is critical to the operation of the server (for example, RAID 6), it might result in preventing the server from booting. In such a situation, you see the message that is shown in Figure 5-7.

The native configuration is no longer supported by the current controller settings. Please ensure that correct controller, ibutton or key-vault is being used. If you continue the configuration will be marked as foreign and part of it may be imported if possible.

*Figure 5-7 Error message during boot if a required ServeRAID key is not installed*

For switch replacements, FoD keys automatically move with the switch. There is no need to transfer FoD keys when you are moving a switch because the FoD upgrade is tied to the switch.

The switch and adapter transfers are administrative actions only. However, these actions are recommended so that if the particular device breaks, the user or IBM Business Partner can easily find the FoD upgrades to replace them later on by entering the correct serial number of the current chassis or server.

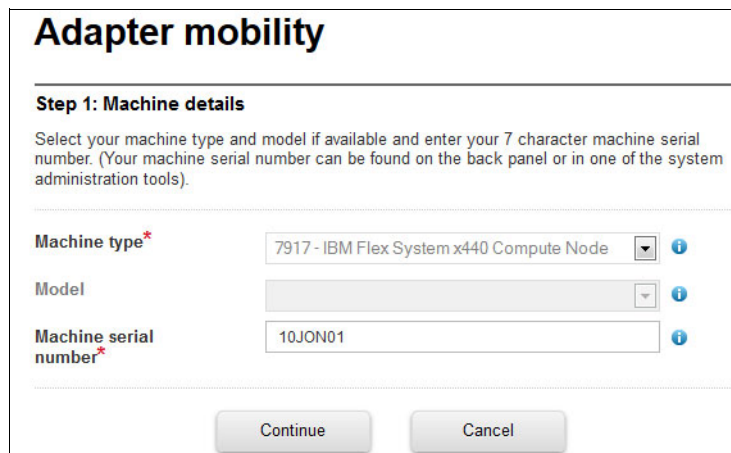
## 5.4.1 Example 1: Moving an adapter

In our first example, we show how you use the Adapter Mobility feature of the FoD website to update the key records and to obtain a new FoD key so that the adapter can be used in a new server. We show moving a CN4054 adapter with FCoE software upgrade to a new Flex System x440 Compute Node.

This particular adapter has two Emulex ASICs and requires two FoD keys. It is important that both keys are moved over to the new adapter in case the adapter fails. In the case of an adapter failure, you find your damaged adapter's upgrades listed under your new compute node and can then reset their ASIC values to that of the replacement adapter's ASICs. From an administrative standpoint, this configuration is considered a good business practice that helps to avoid confusion and downtime in the future if an adapter fails.

Complete the following steps to move an adapter from one server to another when that adapter has FoD upgrades applied:

1. In the Adapter mobility menu, select machine type and enter the machine type and serial number, as shown in Figure 5-8. Then, click **Continue**.



**Adapter mobility**

**Step 1: Machine details**

Select your machine type and model if available and enter your 7 character machine serial number. (Your machine serial number can be found on the back panel or in one of the system administration tools).

Machine type\* 7917 - IBM Flex System x440 Compute Node ⓘ

Model ⓘ

Machine serial number\* 10JON01 ⓘ

Continue Cancel

Figure 5-8 Enter the machine type and serial number (MTSN)

2. Select each upgrade that is to be transferred to the other system, as shown in Figure 5-9 on page 143. In Figure 5-9 on page 143, both FoD keys are selected: one for each ASIC on the Flex System CN4054 adapter. You should ensure that both keys are selected for transfer to the new adapter because the CN4054 has two ASICs and therefore, requires two FoD keys.



**Step 2: Activation keys selection**

This lists the activation keys installed in the machine type serial number inputted.  
Select the keys you want to transfer its UID.

**Installed in system: 791710JON01**

UID	Feature	Details
<input checked="" type="checkbox"/> 00000000000000000000000000000000	A1R0	IBM Flex S ...
<input checked="" type="checkbox"/> 11111111111111111111111111111111	A1R0	IBM Flex S ...
<input checked="" type="checkbox"/> Select all		

Continue Cancel

Figure 5-9 Select each ASICs FoD key

3. Enter the new machine's serial number, verify the keys that are to be transferred, then click **Continue**, as shown in Figure 5-10.

**Step 3: New machine details**

Select your machine type and select model if available and enter your 7 digit machine serial number. (Your machine serial number can be found on the back panel or in one of the system administration tools).

**Note:** Only common Machine types for all selected features are provided here. Please only select those UIDs respectively if you want to transfer to other Machine type.

Machine type\* 7917 - IBM Flex System x440 Compute Node ⓘ

Model ⓘ

Machine serial number\* 10JON02 ⓘ

Below are activation keys you want to transfer to a new installed in system:

**Old installed in system: 791710JON01**

UID type	Feature	Details
Emulex ASIC S/N	A1R0	IBM Flex S ...
UID		00000000000000000000000000000000
Emulex ASIC S/N	A1R0	IBM Flex S ...
UID		11111111111111111111111111111111

Continue Cancel

Figure 5-10 Enter new MTSN

4. Click **Confirm** after you confirm the correct MTSN and keys to be transferred, as shown in Figure 5-11 on page 144.

**Step 4: Transfer confirm**

Once confirmed, this action cannot be reversed. Please ensure the data displayed corresponds to the key you wish to transfer.

---

New installed in system:

Machine type: 7917

Model:

Machine serial number: 10JON02

---

Below are activation keys you want to transfer to a new installed in system:

**Old installed in system: 791710JON01**

UID type	Feature	Details
Emulex ASIC S/N	A1R0	IBM Flex S ...
UID	00000000000000000000000000000000	
Emulex ASIC S/N	A1R0	IBM Flex S ...
UID	11111111111111111111111111111111	

Confirm Cancel

Figure 5-11 Transfer confirm window

A new window indicates that the transfer of FoD keys to new chassis was successful, as shown in Figure 5-12.

**Success.** You have successfully transferred the key(s) and below is updated activation keys tied to the new Machine type (Model) Serial number 791710JON02 .

**Step 5: Transfer completed**

---

New installed in system:

Machine type: 7917

Model:

Machine serial number: 10JON02

---

Updated activation keys installed in new system:

**New installed in system: 791710JON02**

UID type	Feature	Details
Emulex ASIC S/N	A1R0	IBM Flex S ...
UID	00000000000000000000000000000000	
Emulex ASIC S/N	A1R0	IBM Flex S ...
UID	11111111111111111111111111111111	

Back to main page

Figure 5-12 Successful key transfer

- After the keys are transferred on the FoD website, you must add the keys to the new compute node by using the IMM. To download the keys, click the **Retrieve History** menu and enter the new node's MTSN, as described in 2.4.3, "Retrieve history" on page 43. After the keys are downloaded, upload them to the new node's IMM, as described in 3.1, "Installing a key by using IMM2" on page 52.

The FoD adapter features are now ready for use on the new compute node.

## 5.4.2 Example 2: Moving a switch

In our second example, we demonstrate the process that is used to move a switch from one Flex System chassis to another. Again, we use the Adapter mobility menu choice from the FoD website. Complete the following steps:

- To access the Adapter mobility menu, select **Adapter mobility** from the center of the page or from the left navigation pane, as shown in Figure 5-13.

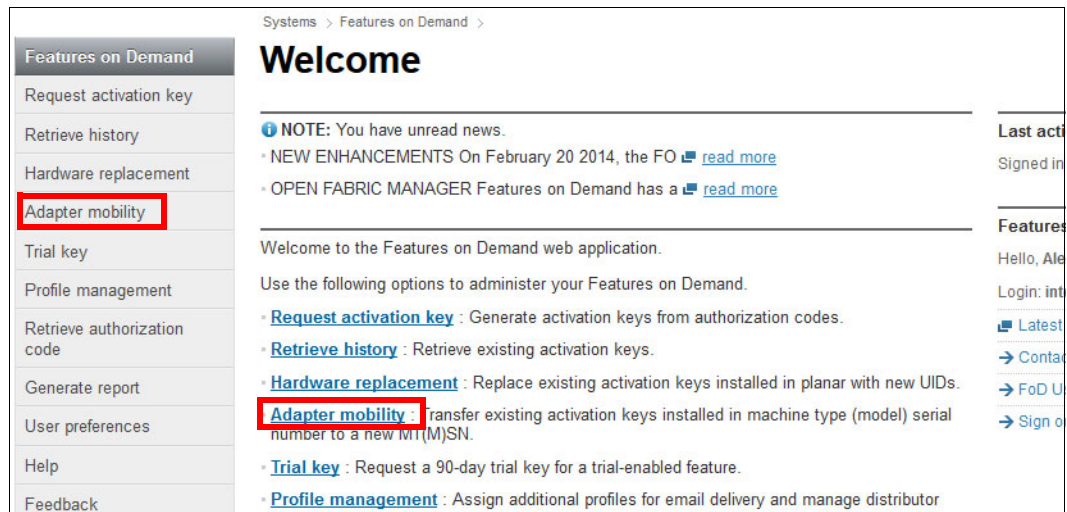


Figure 5-13 Adapter mobility menu

- In the Adapter mobility menu, select **Machine type** and enter the machine type and serial number, as shown in Figure 5-14. Click **Continue**.

Figure 5-14 Adapter mobility input

3. Select each upgrade that is to be transferred to the other chassis, as shown in Figure 5-15.

## Adapter mobility

---

**Step 2: Activation keys selection**

This lists the activation keys installed in the machine type serial number inputted.

Select the keys you want to transfer its UID.

**Installed in system: 872110JON01**

UID	Feature	Details
<input type="checkbox"/> Y00000000ABC	A1EL	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> Y00000000ABC	A1EM	<a href="#">i IBM Flex S ...</a>
<input checked="" type="checkbox"/> 10:00:00:27:F8:D2:00:00	A1EP	<a href="#">i IBM Flex S ...</a>
<input checked="" type="checkbox"/> 10:00:00:27:F8:D2:00:00	A1EQ	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> 90Y3452Y00000000003	A1QX	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> 10:00:00:27:F8:D2:00:00	A3HN	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> 10:00:00:27:F8:D2:00:00	A3HP	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> Y00000000222	ESW8	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> Y00000000222	ESW9	<a href="#">i IBM Flex S ...</a>
<input type="checkbox"/> <b>Select all</b>		

**Last action:**  
UID(s) replaced

---

**Features on Demand**

Hello, Jonathan Hiott

Login: external

[Latest news\(4\)](#)

[Contacts](#)

[FoD User's Guide](#)

[Sign out](#)

Figure 5-15 Switch upgrade FoD Key selection

4. Enter the new machine serial number, as shown in Figure 5-16 on page 147. The Brocade switch's UIDs are listed as the World Wide Name (WWN).

**Different UIDs:** Switch UIDs vary depending on the vendor and type of hardware. For example, the UID for Brocade Fibre Channel switches is the WWN, whereas the UID for the IBM EN4093 Ethernet switch is the switch serial number. The UID for the Mellanox IB6131 InfiniBand switch is a combination of the FRU part number and switch serial number. For more information, see 2.3, "How to find the Unique Identifiers" on page 17.

5. Enter the new chassis serial number, as shown in Figure 5-16.

## Adapter mobility

**Step 3: New machine details**

Select your machine type and select model if available and enter your 7 digit machine serial number. (Your machine serial number can be found on the back panel or in one of the system administration tools).

**Note:** Only common Machine types for all selected features are provided here. Please only select those UIDs respectively if you want to transfer to other Machine type.

Machine type: 8721 - 8721 ⓘ

Model: ⓘ

**Machine serial number\***: 10JOABC ⓘ

Below are activation keys you want to transfer to a new installed in system:

**Old installed in system: 872110JON01**

UID type	Feature	Details
Brocade WWN/L1D	A1EP	ⓘ IBM Flex S ...
UID		10:00:00:27:F8:D2:00:00
Brocade WWN/L1D	A1EQ	ⓘ IBM Flex S ...
UID		10:00:00:27:F8:D2:00:00

Continue Cancel

Figure 5-16 Enter new machine details

- The next window indicates that the transfer of FoD keys to the new chassis was successful, as shown in Figure 5-17.

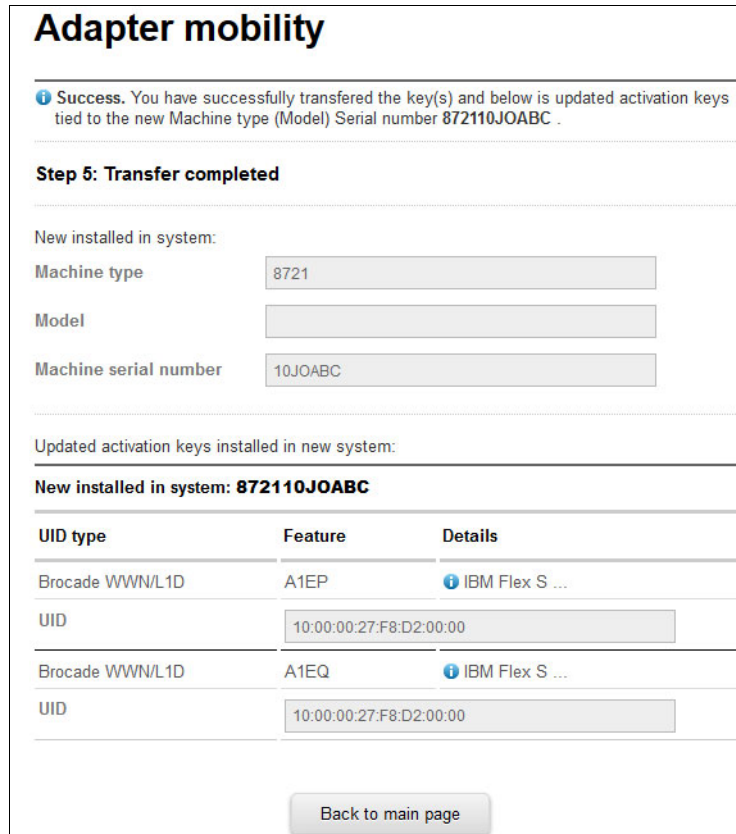


Figure 5-17 Successful key transfer

After the switch’s FoD keys are transferred on the website, the switch is ready for use in the new chassis. No tasks must be performed on the switch because the keys are stored internally in the switch.

## 5.5 Replacing a switch

For more information about replacing a switch, see 5.1, “Hardware replacement by using the FoD website” on page 136.

## 5.6 Replacing a chassis management module

If you have two chassis management modules (CMMs) installed in your Flex System chassis, one CMM is a hot standby backup for the other and both maintain the FoD keys in their respective keystores. As a result, if a CMM fails and you replace it, no further action is needed to reactivate the FoD keys because the keys are automatically copied from one CMM to the other.

If you have only one CMM installed in the chassis, the new FoD keys must be reapplied manually when you replace the CMM.

Currently, FoD keys for IBM Fabric Manager are the only keys that are stored in the CMM. For more information about reapplying the Fabric Manager keys by using ASU, see 3.5, “Installing a key by using ASU” on page 76.

## 5.7 VPD/FoD Update Tool

In this section, we describe what happens when a machine’s system board is replaced and we must recover the FoD activation keys. This process includes the following steps:

1. Update the new system VPD (machine type, machine model, and serial number) to the previous system VPD. The IBM system service representative (SSR) performs this task in most cases.
2. Acquire the FoD keys for the previous system from IBM website or from the removable media and install the keys to the system. This step is considered the client’s responsibility.

The outlined the process for reactivating FoD through Preboot DSA is shown in the flowchart that is shown in Figure 5-18.

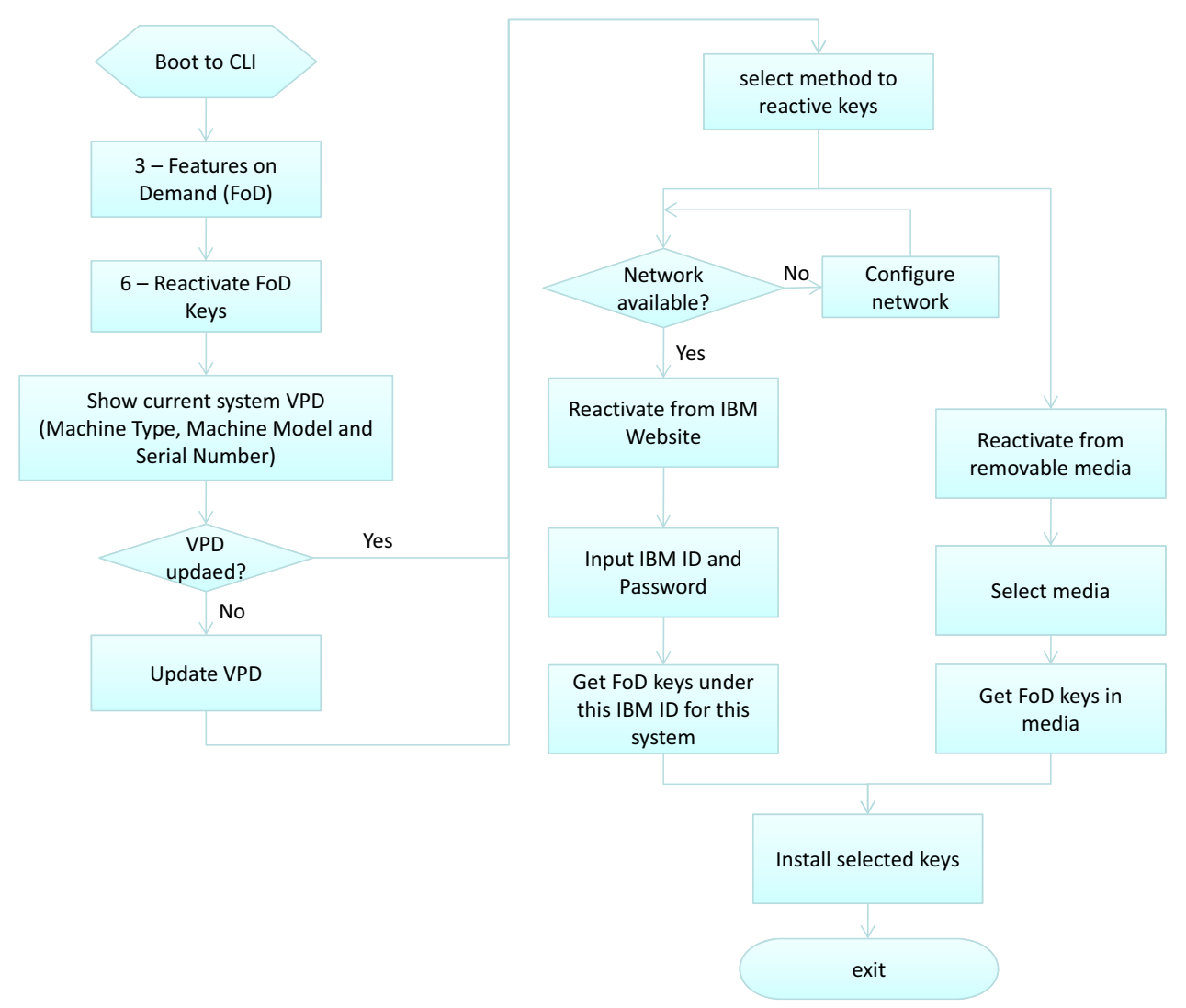


Figure 5-18 Preboot DSA CLI flowchart

The flowchart in Figure 5-19 shows Onboard Emulex FoD reactivation.

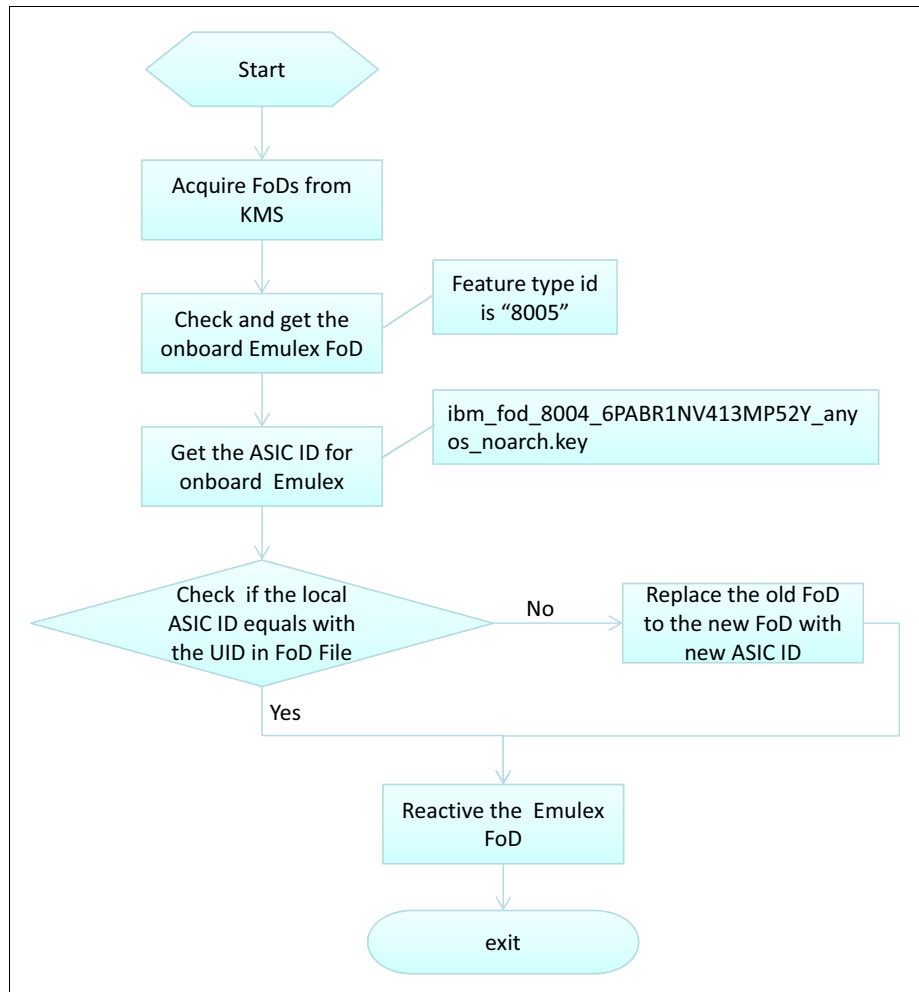


Figure 5-19 Onboard Emulex reactivation

Onboard Emulex reactivations include IBM Virtual Fabric Advanced Software Upgrade (LOM) for BladeCenter HS23 and Flex System x240 and x440 compute nodes and Emulex Embedded VFAIII FCoE/iSCSI License for IBM System x that use the Emulex Dual Port 10GbE SFP+ Embedded Adapter.

### 5.7.1 Reactivating FoD keys through Preboot DSA GUI

This section describes how to reactivate FoD keys through Preboot DSA GUI if there is a hardware replacement.



From Preboot DSA menu, select the keys that you want to reactivate. Then, complete the following steps:

1. Select **Reactivate Activation Keys** menu, as shown in Figure 5-20.

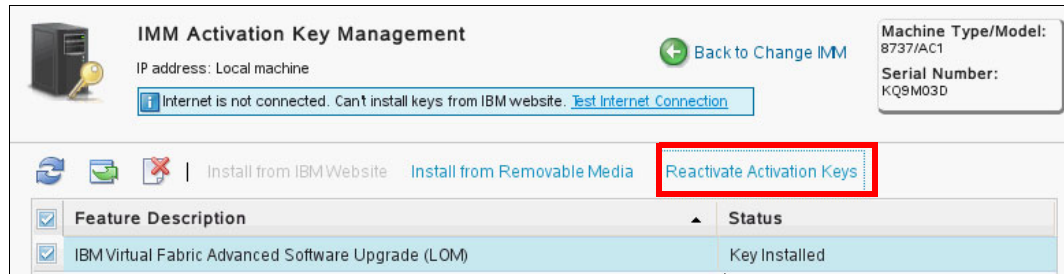


Figure 5-20 Reactivate Activation Keys

2. Enter the previous machines's VPD (machine type and serial number) into the appropriate fields, as shown in Figure 5-21.

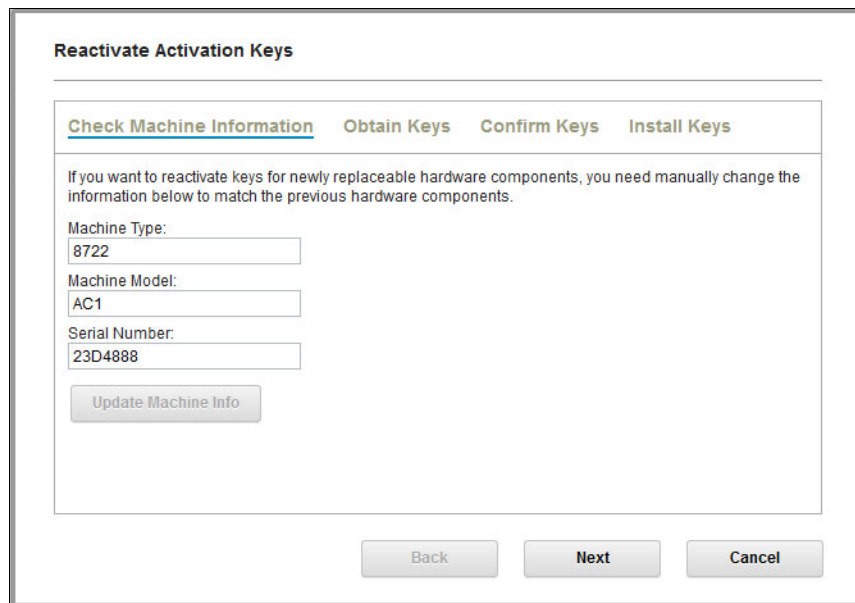


Figure 5-21 Enter machine information

- If your machine is connected to the Internet, select **From IBM website**. Then, enter your IBM ID and password, as shown in Figure 5-22.

**Reactivate Activation Keys**

Check Machine Information Obtain Keys Confirm Keys Install Keys

Provide the following information to obtain the activation keys.

Select where to obtain the activation keys:

From IBM website

From removable media

**Input IBM ID:**

IBM ID:  
restuser@invalid.domain

User Password:  
●●●●●●

Back Next Cancel

Figure 5-22 Enter IBM credentials

- If the keys are stored on removable media or if there is no Internet connection available, select **From Removable media**.
- In the following selection menu, confirm the FoD keys that you want to install, as shown in Figure 5-23.

**Reactivate Activation Keys**

Check Machine Information Obtain Keys Confirm Keys Install Keys

Verify the keys you want to reactivate.

2 keys obtained for the server.

File Name	Feature Description
<input type="checkbox"/> ibm_fod_0001_25820618282_anyos_noarch.key	IBM Integrated Management Module Advanced Upgrade
<input type="checkbox"/> ibm_fod_8005_6PABR1NV413MP52Y_anyos_noarch.key	IBM Virtual Fabric Advanced Software Upgrade (LOM)

Back Next Cancel

Figure 5-23 Confirm keys

6. Install the keys as shown in Figure 5-24.

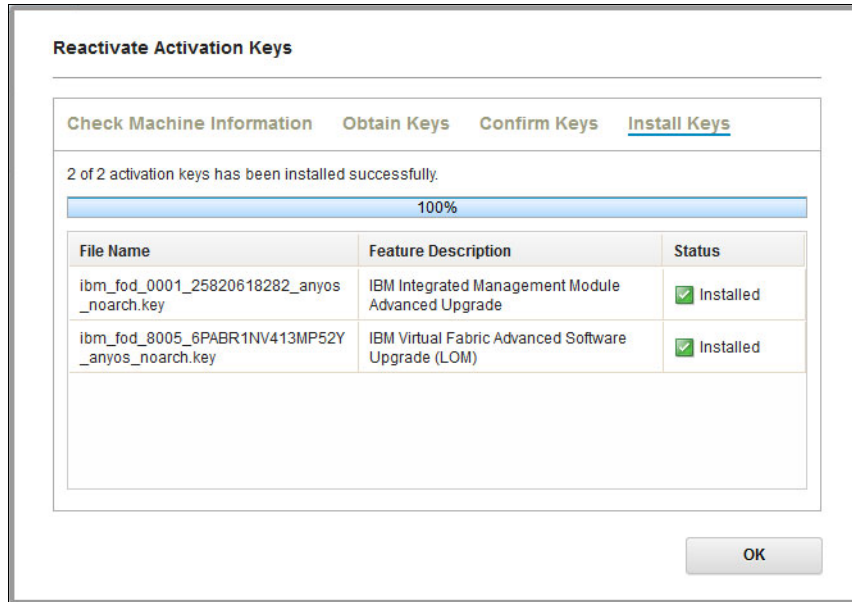


Figure 5-24 Keys installed

## 5.8 Further assistance

For more information about FoD support, see this website:

<https://www-304.ibm.com/systems/x/fod/index.wss>

At the website, click **Contacts** in the left navigation pane. You can also send an English-only email request to [FOD@us.ibm.com](mailto:FOD@us.ibm.com).



## FoD Component reference

In this appendix, we include Table A-1, which lists all hardware-related IBM Features on Demand (FoD) upgrades that were available at the time of this writing.

We also include the following important information that is needed when you are working with these upgrades:

- ▶ The FoD type number, which is displayed by the various management tools (also referred to as the *descriptor type*).
- ▶ Information about how to find the Unique Identifier (UID) that you need during the process of activating a feature. The UID is necessary in the case of a part replacement in that you must enter the UID in to the FoD website to retrieve the FoD activation key.
- ▶ Whether a reboot of the server or component is require to activate the feature after you install it.

**Tips:** Consider the following points:

- ▶ The UID information is especially useful because you might need to know the UID if you must replace a part.
- ▶ Tools, such as DSA, use the decimal version of the FoD type; whereas tools, such as UEFI (F1 Setup), use the hexadecimal version.

Table A-1 FoD type numbers and UIDs

FoD upgrade	FoD type		UID to obtain an authorization code	Reboot required
	Hex	Dec		
<b>Server-based features</b>				
IBM IMM2 Standard Upgrade, 90Y3900	0004	4	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	No
IBM IMM2 Advanced Upgrade, 90Y3901	0001	1	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	No

FoD upgrade	FoD type		UID to obtain an authorization code	Reboot required
	Hex	Dec		
<b>NIC-based features</b>				
Broadcom Ethernet Adapter 5719 - 4 port upgrade, 00AM013	8015	32789	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
Emulex VFA III/IIIr FCoE/iSCSI License for IBM System x, 95Y3760	800B	32779	Emulex ASIC 32 digit FoD identifier	Yes
Emulex VFA5 ML2 FCoE/iSCSI License for IBM System x, 00D8544	801A	32794	Emulex ASIC 32 digit FoD identifier	Yes
Virtual Fabric Advanced FoD Upgrade for IBM BladeCenter, 90Y9350	8001	32769	Emulex ASIC 32 digit FoD identifier	Yes
IBM Flex System CN4054 Virtual Fabric Adapter Upgrade, 90Y3558	8004	32772	Emulex ASIC 32 digit FoD identifier	Yes
IBM Virtual Fabric Advanced Software Upgrade (LOM), 90Y9310	8005	32773	Emulex ASIC 32 digit FoD identifier	Yes
Emulex Embedded VFA III/IIIr FCoE/iSCSI License for IBM System x, 90Y5178				
Intel I-350 Embedded Dual Port GbE Activation for IBM System x (FoD) (Powerville 2-4 Port Upgrade), 90Y9314	8003	32771	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
QLogic 10Gb Virtual Fabric Advanced FoD Upgrade for IBM BladeCenter, 00Y5622	801D	32797	13 character serial number of the adapter (including the letters RFE). For example: RFE1223G29078	Yes
QLogic 8200 VFA FCoE/iSCSI License for IBM System x, 00Y5624	8014	32788	13 character serial number of the adapter (including the letters RFE). For example: RFE1223G29078	Yes
QLogic Embedded VFA FCoE/iSCSI License for IBM System x, 90Y5179	800A	32778	Machine type and serial number of the server, concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
<b>RAID-based features</b>				
ServeRAID M5100 Series SSD Performance Key for IBM System x, 90Y4273	8006	32774	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5100 Series Performance Upgrade for IBM Flex System, 90Y4412				
ServeRAID M5100 Series SSD Caching Key for IBM System x, 90Y4318	8009	32777	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5100 Series SSD Caching Enabler for IBM Flex System, 90Y4447				

FoD upgrade	FoD type		UID to obtain an authorization code	Reboot required
	Hex	Dec		
ServeRAID M5100 Series RAID 6 Upgrade for IBM System x, 81Y4546	8012	32786	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5100 Series RAID 6 Upgrade for IBM Flex System, 90Y4410				
ServeRAID M1100/M5100 Series SWR SAS Upgrade for IBM System x	8013	32787	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M1100 Series Zero Cache/RAID 5 Upgrade for IBM System x, 81Y4542	800C	32780	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M1200 Zero Cache/RAID 5 Upgrade for IBM Systems FoD				
ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade for IBM System x, 81Y4544				
8-pack SATA Enablement Key for IBM System x, 90Y4349	8000	32768	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID C100 RAID 5 Upgrade for IBM System x, 81Y4406	8002	32770	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5200 Series Performance Accelerator for IBM Systems-FoD, 47C8710	8006	32774	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5200 Series RAID 6 Upgrade for IBM Systems-FoD, 47C8706	8012	32786	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5200 Series SSD Caching Enabler for IBM Systems-FoD, 47C8712	8009	32777	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
ServeRAID M5200 Series Zero Cache/RAID 5 Upgrade for IBM Systems-FoD, 47C8708	800C	32780	Machine type and serial number concatenated (no spaces or dashes). For example: 7160KQ5N05V	Yes
<b>Flex System I/O module-based features</b>				
IBM Flex System EN2092 1Gb Ethernet Scalable Switch (Upgrade 1), 90Y3562	0005	5	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System EN2092 1Gb Ethernet Scalable Switch (10Gb Uplinks), 49Y4298	0006	6	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System Fabric EN4093 10Gb Scalable Switch (Upgrade 1), 49Y4798	0007	7	IBM switch serial number (12 characters)	Yes (switch restart)

FoD upgrade	FoD type		UID to obtain an authorization code	Reboot required
	Hex	Dec		
IBM Flex System Fabric EN4093 10Gb Scalable Switch (Upgrade 2), 88Y6037	0008	8	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System Fabric SI4093 System Interconnect Module (Upgrade 1), 95Y3318	0023	35	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System Fabric SI4093 System Interconnect Module (Upgrade 2), 95Y3320	0024	36	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System Fabric CN4093 10Gb Converged Switch (Upgrade 1) (2 x 40Gb), 00D5845	0019	25	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System Fabric CN4093 10Gb Converged Switch (Upgrade 2) (6x Omni Port), 00D5847	001A	26	IBM switch serial number (12 characters)	Yes (switch restart)
IBM Flex System IB6131 InfiniBand Switch (FDR Upgrade), 90Y3462	0009	9	11S Number with the 11S omitted	Yes (switch restart)
IBM Flex System EN4023 10Gb Scalable Switch (FoD 1), 94Y5158	0026	38	World Wide Name (WWN) of the switch	No
IBM Flex System EN4023 10Gb Scalable Switch (FoD 2), 94Y5159	0027	39	World Wide Name (WWN) of the switch	No
IBM Flex System FC5022 16Gb Fabric Watch Upgrade, 00Y3320	001F	31	World Wide Name (WWN) of the switch	No
IBM Flex System FC5022 16Gb ISL/Trunking Upgrade, 00Y3322	0020	32	World Wide Name (WWN) of the switch	No
IBM Flex System FC5022 16Gb SAN Scalable Switch (Upgrade 1), 88Y6382	0013	19	World Wide Name (WWN) of the switch	No
IBM Flex System FC5022 16Gb SAN Scalable Switch (Upgrade 2), 88Y6386	0016	22	World Wide Name (WWN) of the switch	No
<b>Flex System Manager features</b>				
IBM Flex System Manager™ Advanced Upgrade	Not applicable		FSM machine type and serial number (no spaces or dashes). For example: 8731xxxxxxx	Restart of FSM service



In addition to the hardware-related IBM FoD upgrades, there are several software-related upgrades. However, applying software upgrades includes completely different processes that are beyond the scope of this book. However, we include a list of the software upgrades that are available at time of this writing in Table A-2.

Table A-2 Software-related FoD upgrades

Option	Feature Code	Description
00Y6212	A7VJ	IBM Fabric Manager Enterprise License Key
00Y6213	A7VR	IBM Fabric Manager Enterprise License Key
00Y6194	A7VE	IBM Fabric Manager for BCS w/1 Yr S&S
00Y6200	A7VM	IBM Fabric Manager for BCS w/1 Yr S&S
00Y6195	A7VF	IBM Fabric Manager for BCS w/3 Yr S&S
00Y6201	A7VN	IBM Fabric Manager for BCS w/3 Yr S&S
00Y6192	A7VC	IBM Fabric Manager for BladeCenter w/1 Yr S&S
00Y6198	A7VK	IBM Fabric Manager for BladeCenter w/1 Yr S&S
00Y6193	A7VD	IBM Fabric Manager for BladeCenter w/3 Yr S&S
00Y6199	A7VL	IBM Fabric Manager for BladeCenter w/3 Yr S&S
00Y6197	A7VH	IBM Fabric Manager Upgrade for BCS w/1 Yr S&S
00Y6203	A7VQ	IBM Fabric Manager Upgrade for BCS w/1 Yr S&S
00Y6196	A7VG	IBM Fabric Manager Upgrade for BladeCenter w/1 Yr S&S
00Y6202	A7VP	IBM Fabric Manager Upgrade for BladeCenter w/1 Yr S&S
00D7550	A8CP	IBM Fabric Manager w/1 Yr S&S
00D4692	A80E	IBM Fabric Manager w/1 Yr S&S
00D7551	A8CQ	IBM Fabric Manager w/3 Yr S&S
00D4693	A80F	IBM Fabric Manager w/3 Yr S&S
90Y4217	A8KS	IBM Flex System Manager w/1 Yr S&S
95Y1174	A802	IBM Flex System Manager w/1 Yr S&S
90Y4222	A8KX	IBM Flex System Manager w/3 Yr S&S
95Y1179	A807	IBM Flex System Manager w/3 Yr S&S
00D4689	A75K	IBM SN Distributed Virtual Switch 5000V V1.x, 1 Yr S&S
00D4690	A75L	IBM SN Distributed Virtual Switch 5000V V1.x, 3 Yr S&S
00D4691	A75M	IBM SN Distributed Virtual Switch 5000V V1.x, 5 Yr S&S
44X2507	A80U	IBM Sys Director Std Ed for x86 V6 w/IMM Adv Lic w/1 Yr S&S
44X2508	A80V	IBM Sys Director Std Ed for x86 V6 w/IMM Adv Lic w/3 Yr S&S
00D4686	A8CR	IBM Sys Netwkg Distributed Switch 5000V v1.x, Per Proc w/1 Yr S&S
00D4687	A8CS	IBM Sys Netwkg Distributed Switch 5000V v1.x, Per Proc w/3 Yr S&S
00D4688	A8CT	IBM Sys Netwkg Distributed Switch 5000V v1.x, Per Proc w/5 Yr S&S

<b>Option</b>	<b>Feature Code</b>	<b>Description</b>
44X2505	A7ZE	IBM Systems Director Std Ed for x86 V6 VMK FoD-Srvr Lic w/1 Yr S&S
44X2506	A7ZF	IBM Systems Director Std Ed for x86 V6 VMK FoD-Srvr Lic w/3 Yr S&S
00Y4504	A7PS	IBM Upward Integration for MSSC w/IMMv2 Adv, Per Mngd Srv w/1 Yr S&S
00Y4505	A7PT	IBM Upward Integration for MSSC w/IMMv2 Adv, Per Mngd Srv w/1 Yr S&S
00AE209	A7CF	IBM Upward Integration for VMware w/IMMv2 Adv, Per Mngd Srv w/1 Yr S&S
00AE213	A7CK	IBM Upward Integration VMware w/IMMv2 Adv, Per Mngd Srv w/1 Yr S&S
00AE211	A7CH	IBM Upward Integration VMware w/IMMv2 Adv, Per Mngd Srv w/3 Yr S&S
00AE215	A7CM	IBM Upward Integration VMware w/IMMv2 Adv, Per Mngd Srv w/3 Yr S&S

# Abbreviations and acronyms

<b>ASIC</b>	application-specific integrated circuit	<b>SFP</b>	small form-factor pluggable
<b>ASU</b>	Advanced Settings Utility	<b>SLP</b>	Service Location Protocol
<b>BOMC</b>	Bootable Media Creator	<b>SSD</b>	solid state drive
<b>CD</b>	compact disk	<b>STG</b>	Server & Technology Group
<b>CIM</b>	Common Information Model	<b>UEFI</b>	Unified Extensible Firmware Interface
<b>CLI</b>	command-line interface	<b>UID</b>	unique ID
<b>CMM</b>	Chassis Management Module	<b>URL</b>	Uniform Resource Locator
<b>CTO</b>	configure-to-order	<b>USB</b>	universal serial bus
<b>DSA</b>	Dynamic System Analysis	<b>VFA</b>	Virtual Fabric Adapter
<b>FAQ</b>	frequently asked questions	<b>VPD</b>	vital product data
<b>FC</b>	Fibre Channel		
<b>FDR</b>	fourteen data rate		
<b>FOD</b>	Features on Demand		
<b>FSM</b>	Flex System Manager		
<b>GUI</b>	graphical user interface		
<b>I/O</b>	input/output		
<b>IBM</b>	International Business Machines		
<b>ID</b>	identifier		
<b>IMM</b>	integrated management module		
<b>IP</b>	Internet Protocol		
<b>IPMI</b>	Intelligent Platform Management Interface		
<b>IT</b>	information technology		
<b>ITSO</b>	International Technical Support Organization		
<b>KCS</b>	keyboard console style		
<b>KMS</b>	key management system		
<b>LAN</b>	local area network		
<b>LOM</b>	LAN on motherboard		
<b>MAC</b>	media access control		
<b>MTSN</b>			
<b>NIC</b>	network interface card		
<b>PC</b>	personal computer		
<b>PDF</b>	Portable Document Format		
<b>RAID</b>	redundant array of independent disks		
<b>RSS</b>	Receive-side scaling		
<b>SAS</b>	Serial Attached SCSI		
<b>SATA</b>	Serial ATA		
<b>SBB</b>	system building block		



# Related publications

The publications that are listed in this section are considered particularly suitable for a more detailed discussion of the topics that are covered in this paper.

## IBM Redbooks publications

The following IBM Redbooks publications provide more information about the topic in this document. Some publications that are referenced in this list might be available in softcopy only:

- ▶ IBM Redbooks Product Guides on System x servers and options:  
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pgbycat>
- ▶ IBM Redbooks Product Guides on Flex System servers and options:  
<http://www.redbooks.ibm.com/portals/puresystems?Open&page=pgbycat>
- ▶ *IMM and IMM2 Support on IBM System x and BladeCenter Servers*, TIPS0849:  
<http://www.redbooks.ibm.com/abstracts/tips0849.html?Open>

You can search for, view, download, or order these documents and other Redbooks, Redpapers, Web Docs, draft, and other materials, at this website:

<http://www.ibm.com/redbooks>

## Other publications

The following publications are also relevant as further information sources:

- ▶ *Features on Demand User's Guide*  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5089568>
- ▶ *IBM Integrated Management Module (IMM2) User's Guide*  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5086346>
- ▶ *IBM Dynamic System Analysis (DSA) Installation and User's Guide*  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5084901>
- ▶ *IBM Advanced Settings Utility (ASU) User's Guide*  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5085890>

## Online resources

The following websites are also relevant as further information sources:

- ▶ IBM Features on Demand website:  
<http://ibm.com/systems/x/fod>
- ▶ ToolsCenter Suite:  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=tool-tcsuite>
- ▶ IBM Dynamic System Analysis (DSA):  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=SERV-DSA>
- ▶ IBM Advanced Settings Utility (ASU):  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=TOOL-ASU>
- ▶ RETAIN tip: Feature on Demand key replacement process for Emulex VFA/VFA III Adapter:  
<http://ibm.com/support/entry/portal/docdisplay?ln docid=MIGR-5090088>

## Help from IBM

IBM Support and downloads

[ibm.com/support](http://ibm.com/support)

IBM Global Services

[ibm.com/services](http://ibm.com/services)



# Using System x Features on Demand

**Introduces the feature licensing offering for System x rack, tower and blade servers, options, and switches**

**Explains how to acquire, install, and manage the license keys**

**Describes what to do when you replace key hardware components**

Almost any IT infrastructure investment that you make includes capabilities that are well beyond those capabilities that you initially need. In some cases, your environment might grow to need those other capabilities in subsequent months or years while in other cases, you might never need them.

IBM Features on Demand (FoD) is a licensing procedure that makes it easier for you to pay for the capabilities that you need now with your System x, BladeCenter, and Flex System servers, adapters, and switches while also giving you the opportunity to upgrade your initial investment to support more capabilities when you need them.

Conveniently, these capabilities are added through a software key activation without requiring hardware changes; the features are already present in the switch, server, or adapter, and are unlocked with their respective FoD activation key.

This paper describes the processes that are involved with activating and installing the FoD upgrades. We also cover activation key backup and what to do when you are servicing a system that has FoD upgrades already installed. This paper is meant for IBM employees, Business Partners, and customers who want to better understand the FoD offerings and must purchase, install, or service a system with FoD upgrades.

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