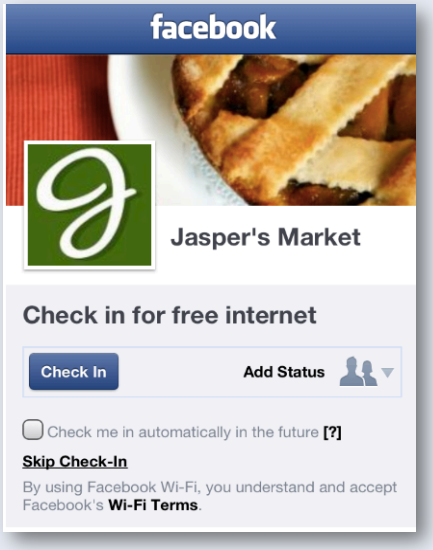
CMX for Facebook Wifi Design & Implementation Guide

Customer Experience

Offer your customers a simple way to access free Wi-Fi

- No codes to enter
- No new accounts to create
- Customers simply check-in to your location on Facebook to connect to free Wi-Fi
- Customers can:
  - Adjust privacy settings for each and subsequent check-ins
  - Skip check-in and still access Wi-Fi
  - Choose to automatically check-in for free Wi-Fi upon return



CMX for Facebook Wifi Overview:

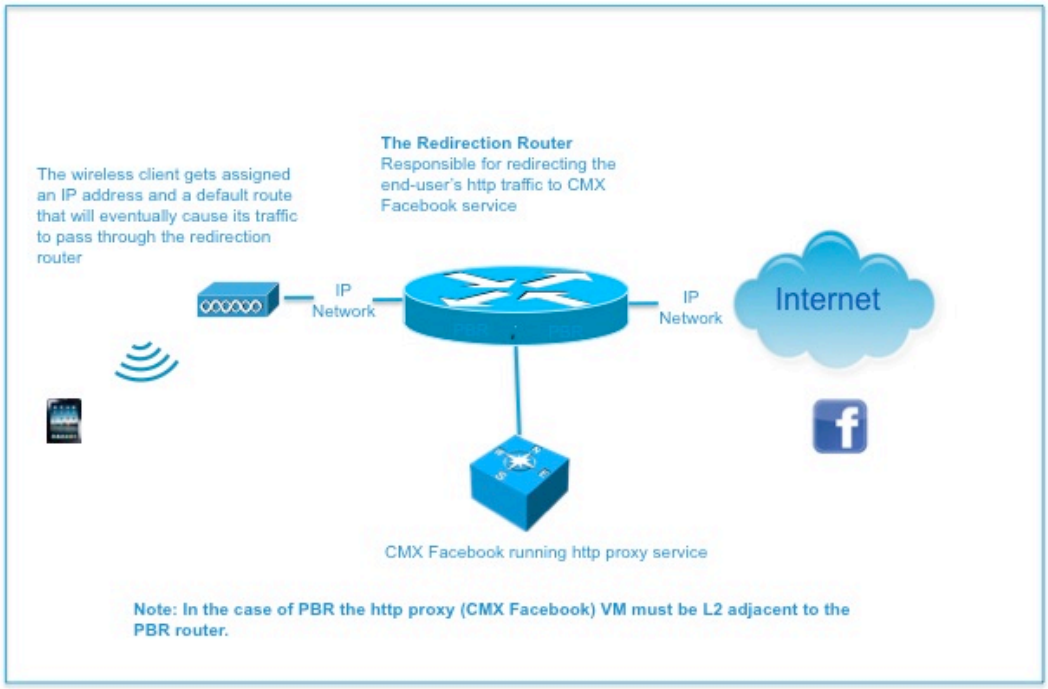
CMX for Facebook is a joint solution by Cisco and Facebook for guest wifi access. Cisco CMX Facebook solution intercepts guest wifi traffic and does URL redirection to a Facebook hosted landing page. Facebook presents a login screen customized to the local business and handles check-in. Facebook also provides aggregate user analytics to the business by combining wifi analytics with social analytics from Facebook. The communication between Cisco CMX for Facebook and Facebook web servers is done via a custom, optimized protocol.

Starting with Mobility Services Engine (MSE) 7.6, CMX for Facebook WiFi will be available as a service. The CMX for Facebook Wifi functionality is licensed as part of the CMX license.

The CMX for Facebook Wifi is composed of 2 main functions:

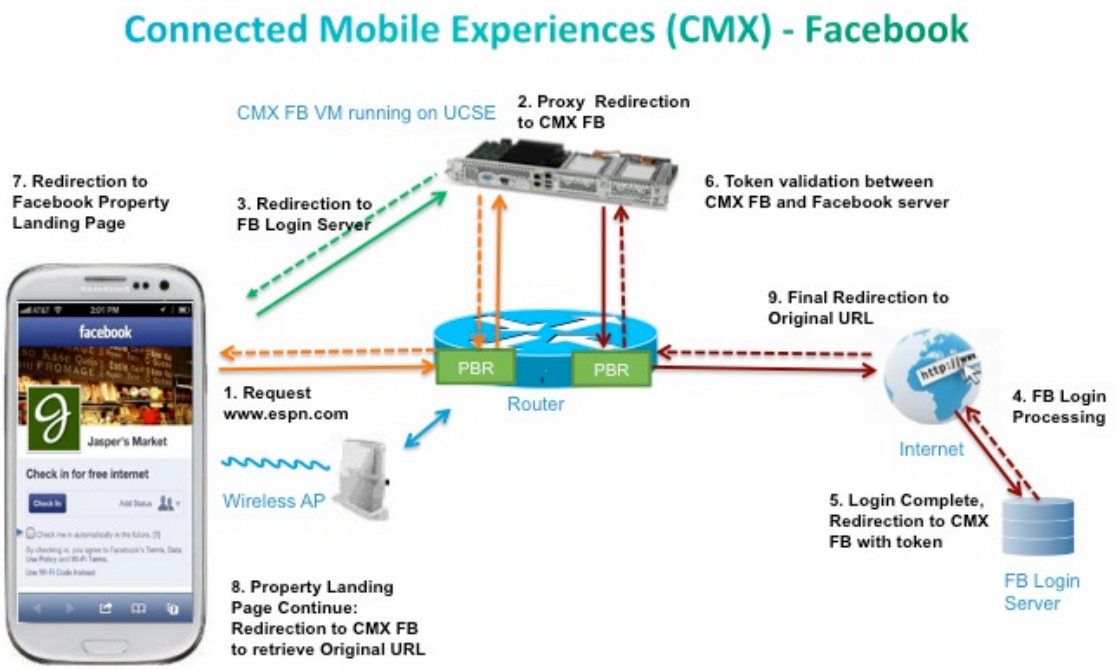
- The merchant's Facebook page which resides on Facebook Data Centers and
- The HTTP Proxy component which can reside on either a central server (for central switched environment) or an ISR router running a UCS-E module (for Flex deployments)..

Beside the above-mentioned CMX for Facebook Wifi services, the other crucial component is a ***Redirection Router***. The router sits in the data path of the end-user's traffic to the Internet and is responsible of intercepting and redirecting the end-user's HTTP traffic to the HTTP Proxy service. This redirection can happen by means of simple Policy Based Routing (PBR).



Note: The End-User device need to be on a different subnet then that of the HTTP Proxy for proper operation.

The following is a key diagram capturing the HTTP flow step by step as it is initiated from a wireless client and the interactions through the various components providing the CMX for Facebook Wifi service.



Hardware and Software requirements to run CMX for Facebook Wifi

CMX for Facebook Wifi runs as a virtual machine and requires 4 vCPU@1 Ghz, 4 GB RAM and 250GB disk space. Supported hypervisors are VMware ESXi 5.0 or 5.1.This virtual machine needs to be L2 adjacent to the redirection router. There is a 1-1 mapping between the Facebook page for a physical venue and CMX for Facebook Wifi instance. So for example, if there are 10 locations or sites for a given customer, you need 10 distinct Facebook pages (all categorized as a local business with a physical address) in a 1-1 mapping with 10 instances of CMX for Facebook Wifi.

Product Specifications

1. All listed server resources should be reserved/dedicated for the virtual machine running the virtual instance of CMX for Facebook. For hard drive configuration a thick configuration should be used.
2. All listed specs are minimum requirements.
3. CMX for Facebook will be provided as a single ova file.
4. Runs on Cisco MSE (base license).
5. One MSE running a CMX for Facebook instance is required per location or store as Facebook location analytics is tied to a physical location.
6. CMX for Facebook needs a Cisco IOS router configured for Policy Based Routing (PBR) to redirect guest WIFI traffic. PBR performance varies depending on the router model.
7. CMX for Facebook can run centrally if guest internet breakouts are from the DC or alternately it can run on the Cisco UCS-E-Series blades on branch office Cisco ISR G2 routers in a distributed fashion if internet break outs are local.

Table 2. Cisco CMX for Facebook Product Specifications

Feature	Cisco MSE Virtual Appliance for CMX Facebook
VMware ESXi version (virtual appliance on a customer-supplied server)	VMware ESXi version 5.0 or 5.1
Minimum server requirements	• Minimum RAM: 4GB • Minimum hard disk space allocation: 250GB with SAS drivers and 900 IOPS • Processors: 4vCPUs at 1.0 GHz or faster & a passmark (cpubenchmark.net) no less than 4,000

Fundamentally there are 2 deployment options for CMX for Facebook Wifi:

1. **Centralized deployment**

This is preferred when the internet breakouts are from a central site or DC. We recommend running the CMX for Facebook Wifi as a virtual machine on a server in the central site /DC. The virtual machine needs to be L2 adjacent to the re-direction router and if the central site is serving more than one location then the guest IP ranges for the different locations needs to be non-overlapping and any IP network address translation rules must be applied only AFTER the CMX for Facebook Wifi service.

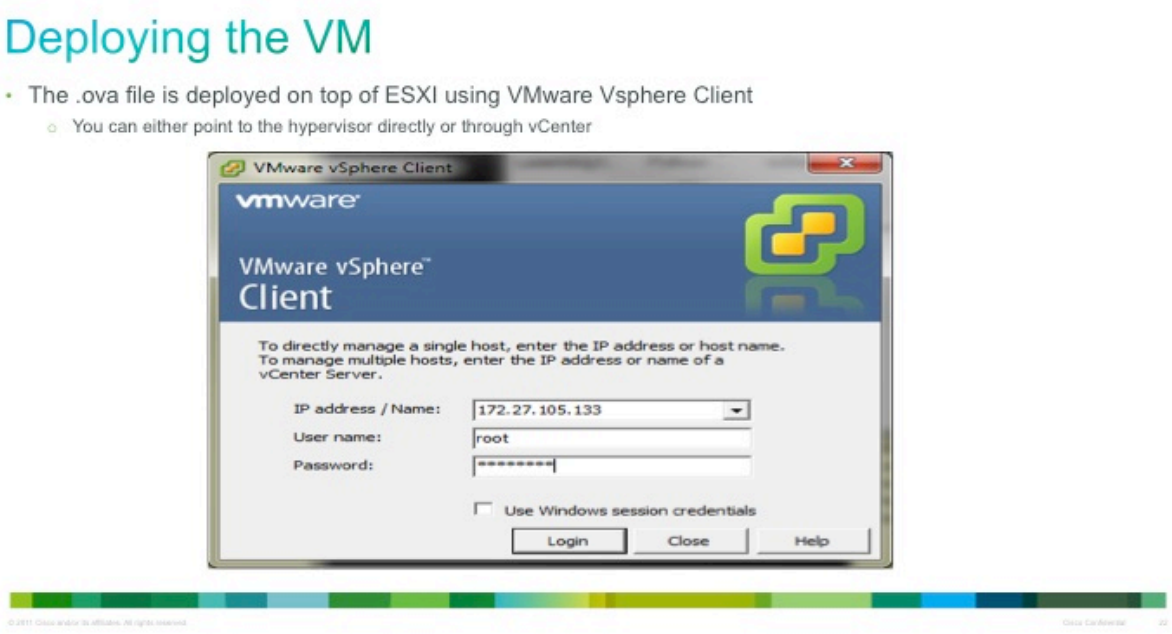
2. **Distributed deployment**

This is preferred when the internet breakout is local. We recommend running the CMX for Facebook wifi on a Cisco UCS-E server in an ISR G2 or any external server that is L2 adjacent to the local redirection router and the guest IP address ranges if need to be translated must be applied after the CMX for Facebook Wifi service.

Now That You're Familiar With The Components, How To Make It All Work Together…

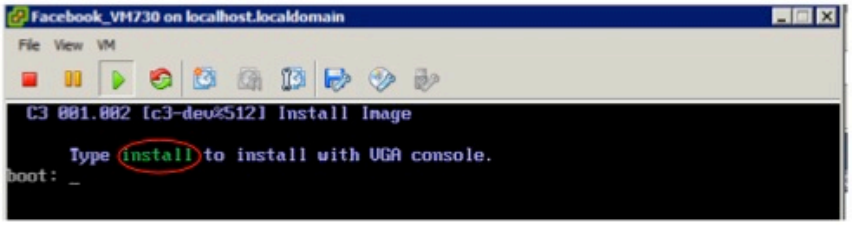
Step 1: Deploying the Virtual Machine

CMX for Facebook Wifi is available in the ova form factor. The ova file is deployed on top of ESXI using VMware VSphere Client.



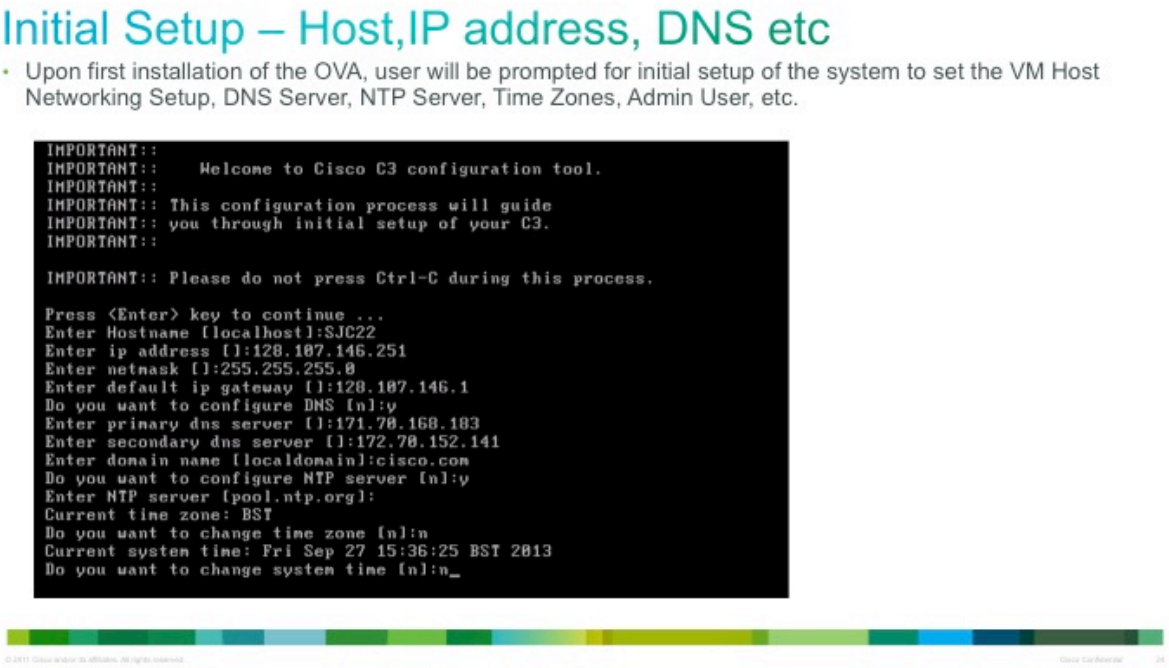
CMX Facebook Install

- Once .ova file is deployed, user gets access to the VGA console of the Virtual Machine (VM)
  - The installation will proceed automatically in a few seconds or you can type the "install" command at the boot prompt



- Upon first installation of the OVA, user will be prompted for initial setup of the system such as admin password, timezones, networking etc.

Step 2: Setting up the host IP address, DNS, admin password.



Remember to setup a custom port for management. Please change it to 8443.

Initial Setup – admin account, management TCP port (use 8443 instead of default 443)

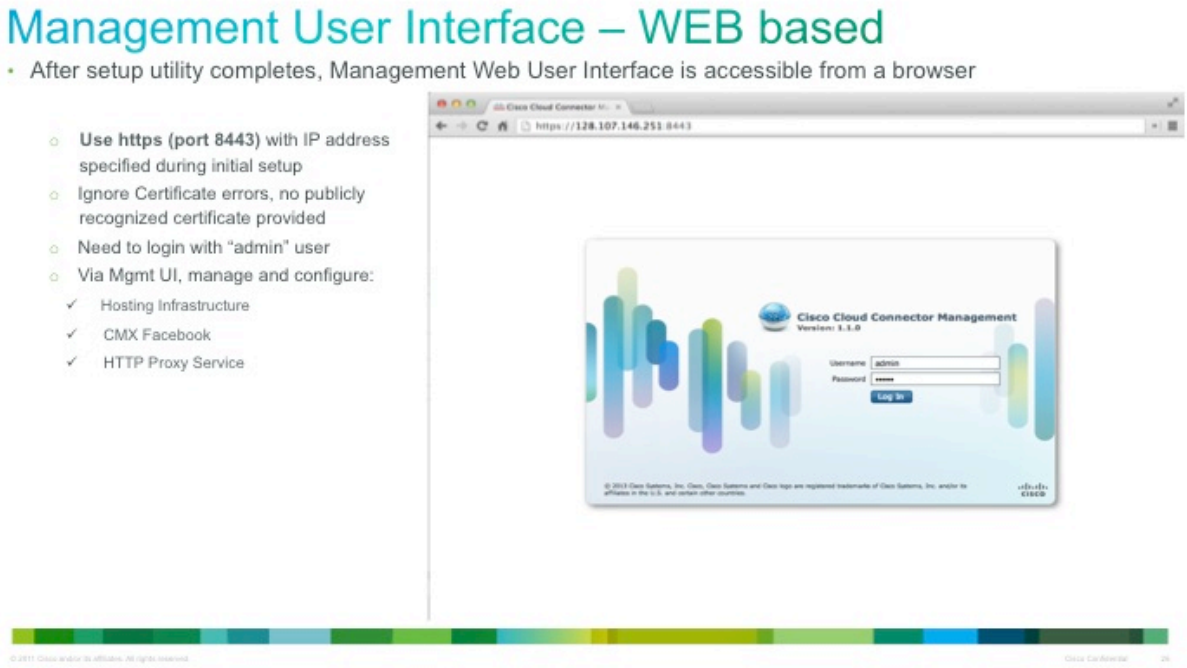
- Setup utility configures C3 hosting environment, Linux Networking and Web Browser Access
  - VGA console transitions to login prompt for interactive Linux shell
  - Only "root" user can login to the Linux shell
  - "admin" user is for administering the WEB UI
  - You can re-run the setup utility to change configured parameters by issuing "setup" at the shell
  - After initial networking setup is complete Linux shell can also be accessed using SSH client
  - Interactive Linux shell is mainly used for debugging and troubleshooting.
  - Most other Management and Configuration tasks are performed via WEB UI

```
Please set password for shell user - root
Changing password for root
New password:
Bad password: too short
Retype password:
Password for root changed by root

Please set password for management interface user - admin
Changing password for admin
New password:
Bad password: too short
Retype password:
Password for admin changed by root
Enter management interface secure port (https) [443]:8443_
```

Step3: The CMX for Facebook Service Configuration:

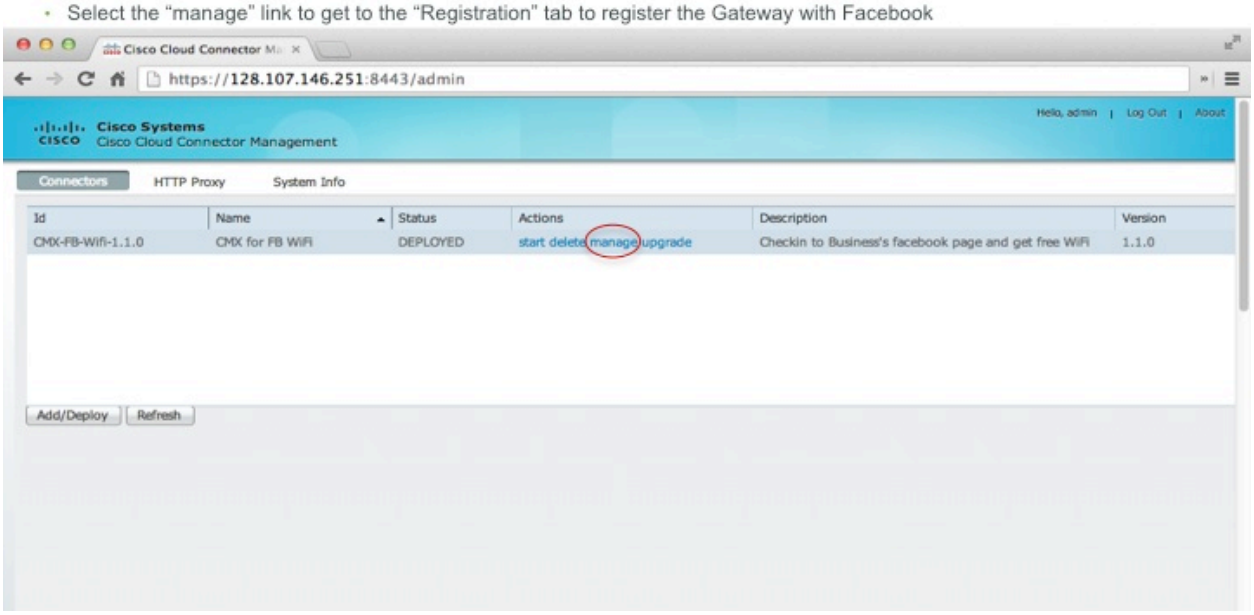
- The graphical user interface of the CMX for Facebook Wifi service is accessible via the https://<CMX_for_Facebook _IP_address>:8443/
  Thee are no default username/passwords. You need to explicitly configure the admin password while setting up the ova.



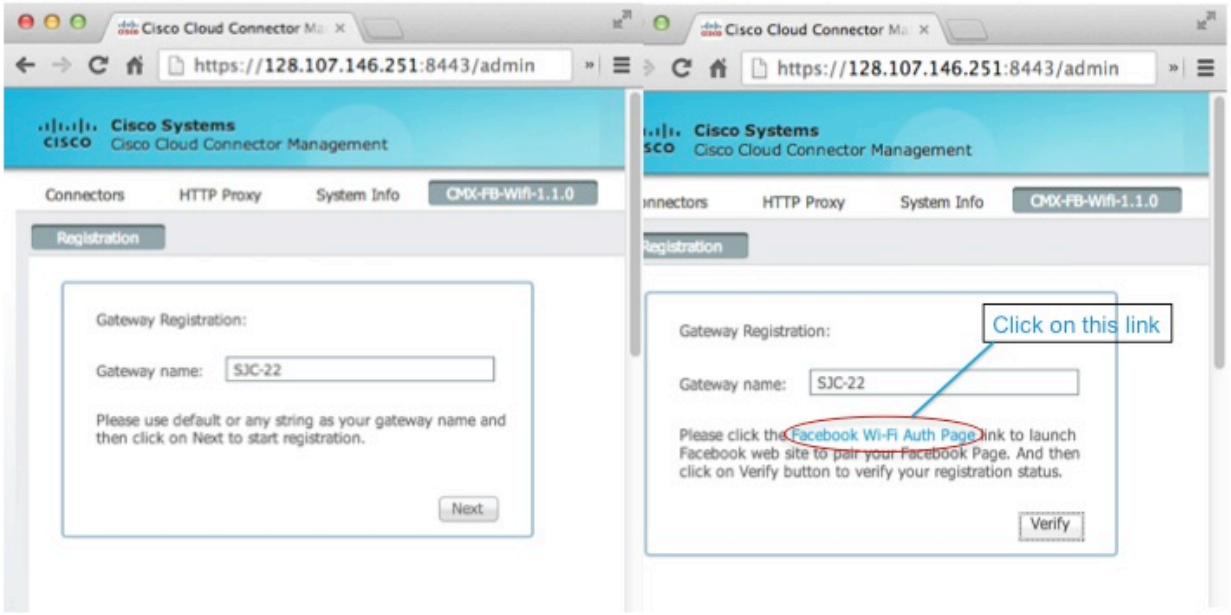
And register the CMX Facebook Wifi service with a Facebook page (Note: You need to have the FB page admin credentials to pair the CMX Facebook service with the corresponding FB page.)

Register CMX Facebook Instance

- Select the "manage" link to get to the "Registration" tab to register the Gateway with Facebook

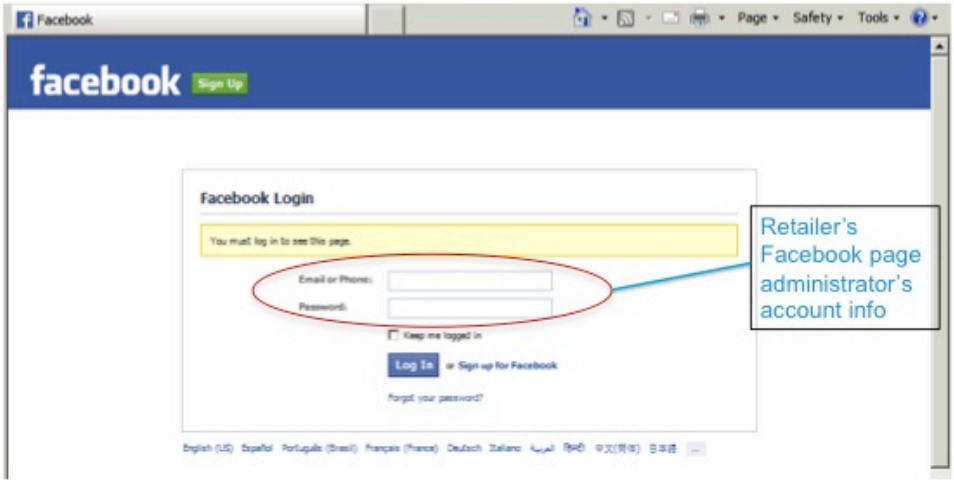


Register with Facebook

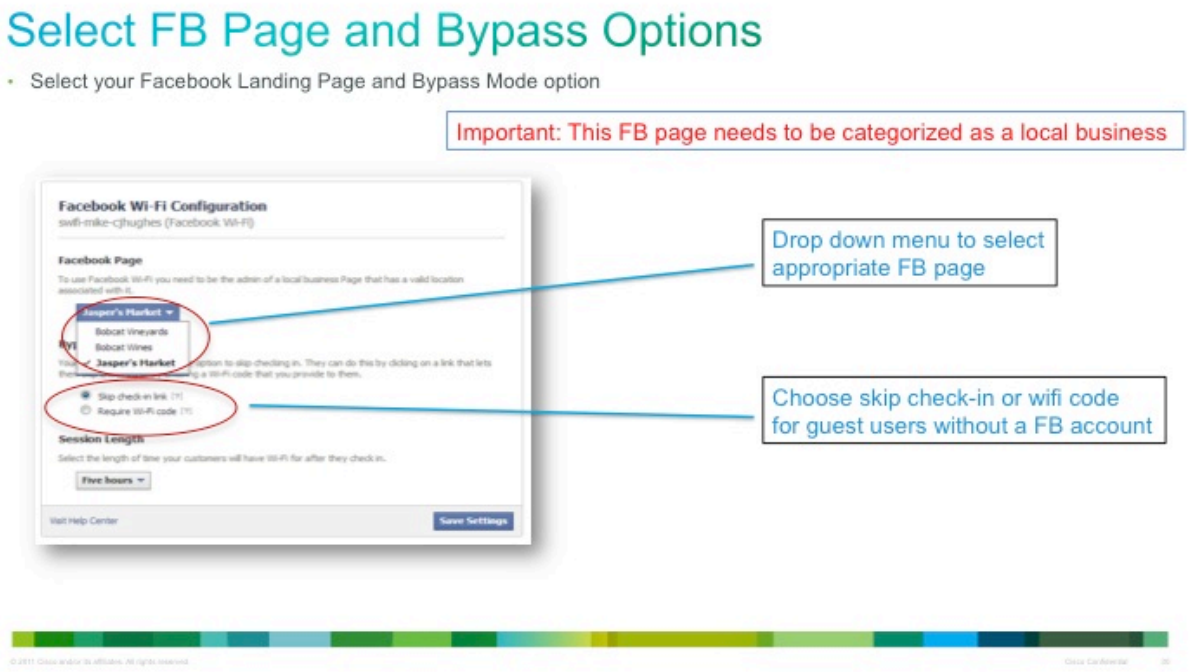


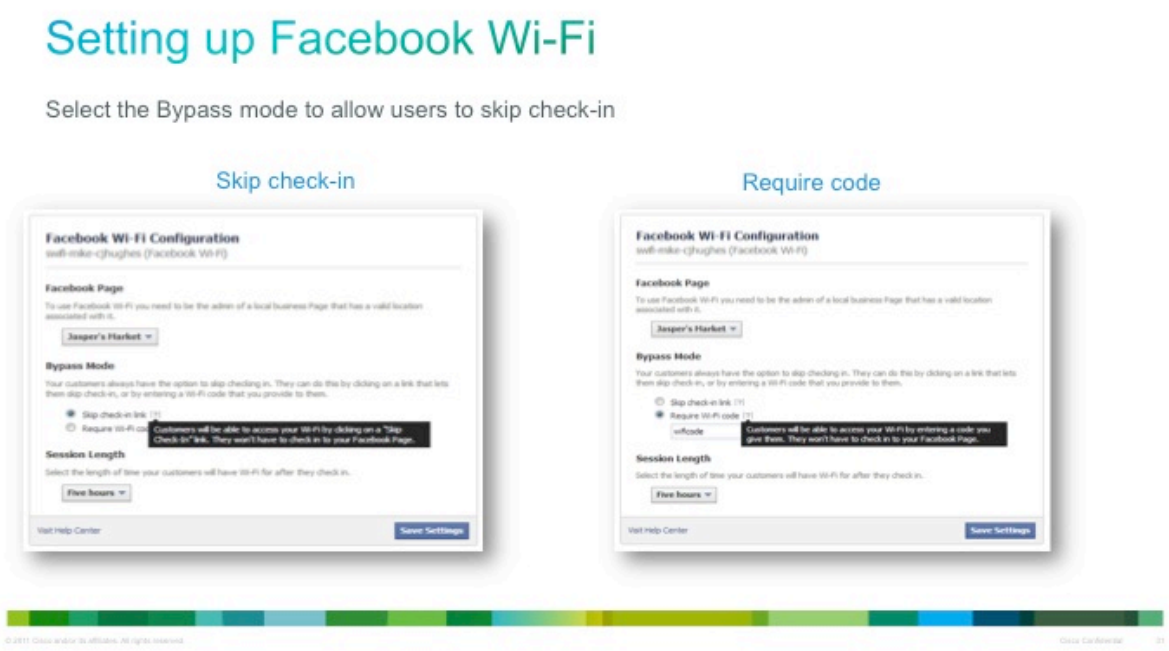
Facebook Wifi Authentication

- Login to Facebook in order to complete the Gateway Registration

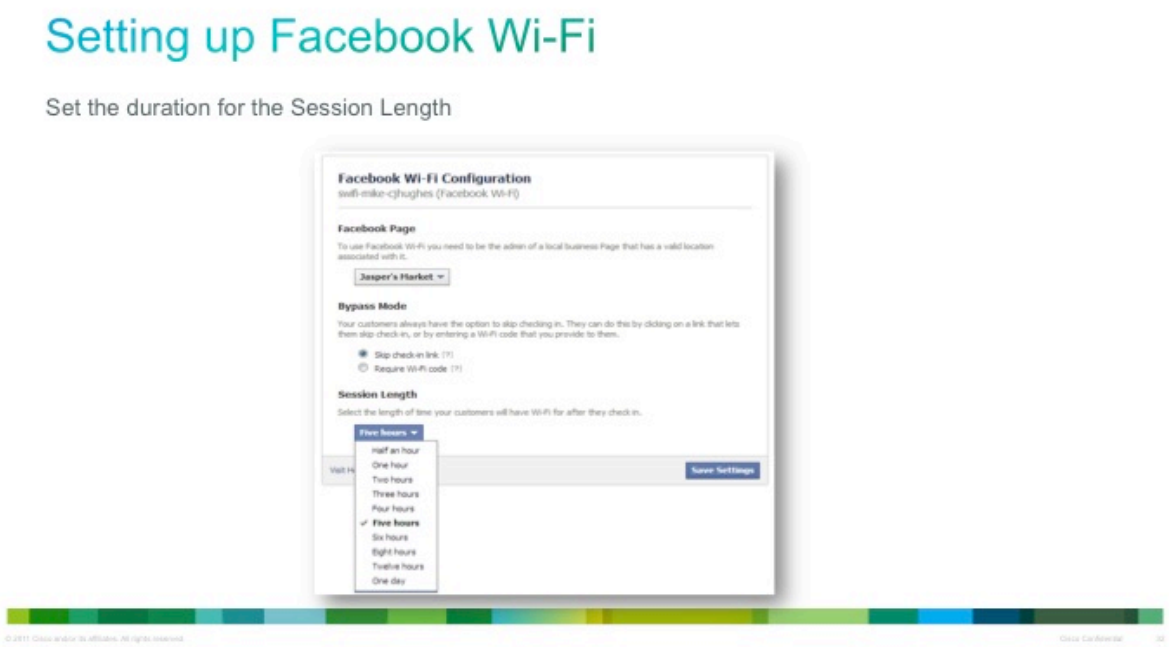


Select the landing page from the drop down menu and choose skip check-in or wifi code for guest users without a FB account.

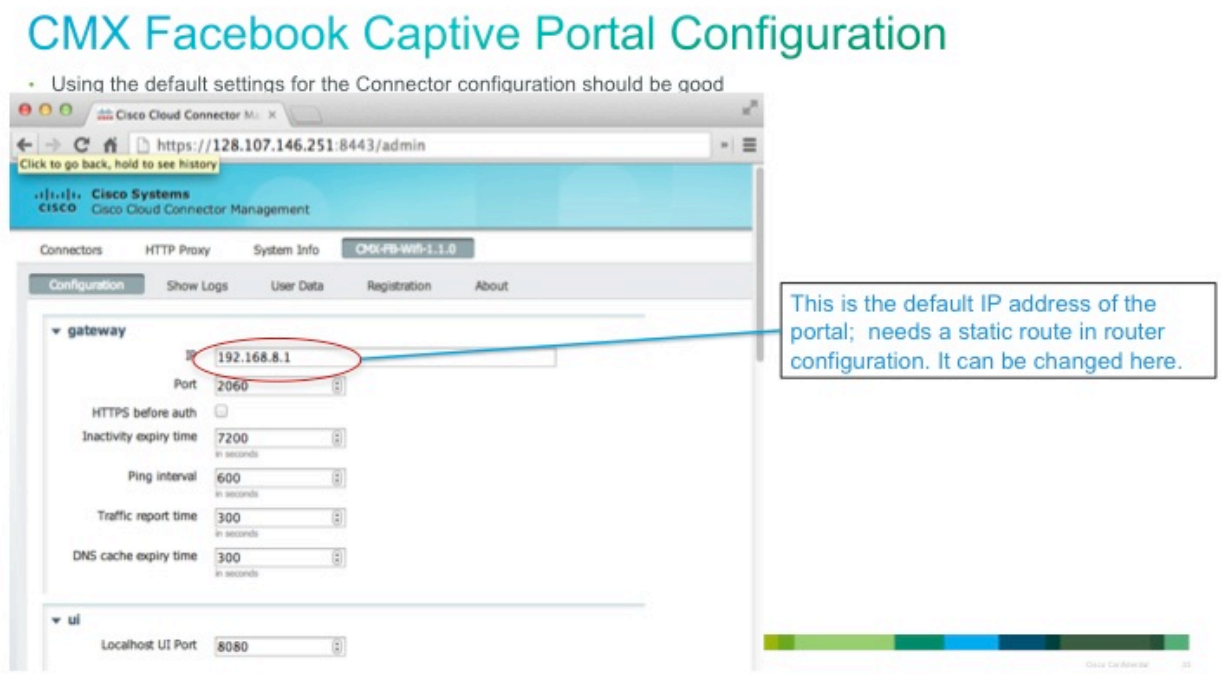




Select the duration for guest's internet session length (ranging from 30 minutes to 24 hours)



Step4: Configure the captive portal IP address, redirect guest wireless LAN traffic and start the service.



Before you start the CMX for Facebook Wifi service make sure you have configured the redirection router for PBR to redirect guest wifi traffic to the CMX for Facebook wifi proxy.

Here's a sample configuration on the router.

Redirect Guest WLAN to CMX Facebook

- PBR is a feature available on most routers, and most network administrators are well-versed in its use
- The configuration is by means of a simple route-map matching on HTTP traffic then altering the MAC address of the destination to become that of the IP next hop (**set ip next-hop x.x.x.x**)
- A key point in this model of deployment is that CMX Facebook ***must*** reside on the same L2 network as the PBR router

```
Interface GigabitEthernet0/0
!description interface to WAN/internet
ip address 10.0.0.1 255.0.0.0
ip policy route-map SC_INTERCEPT
!
Interface vlan 20
Ip address 192.168.200.1 255.255.255.0
Ip policy route-map SC_INTERCEPT
```

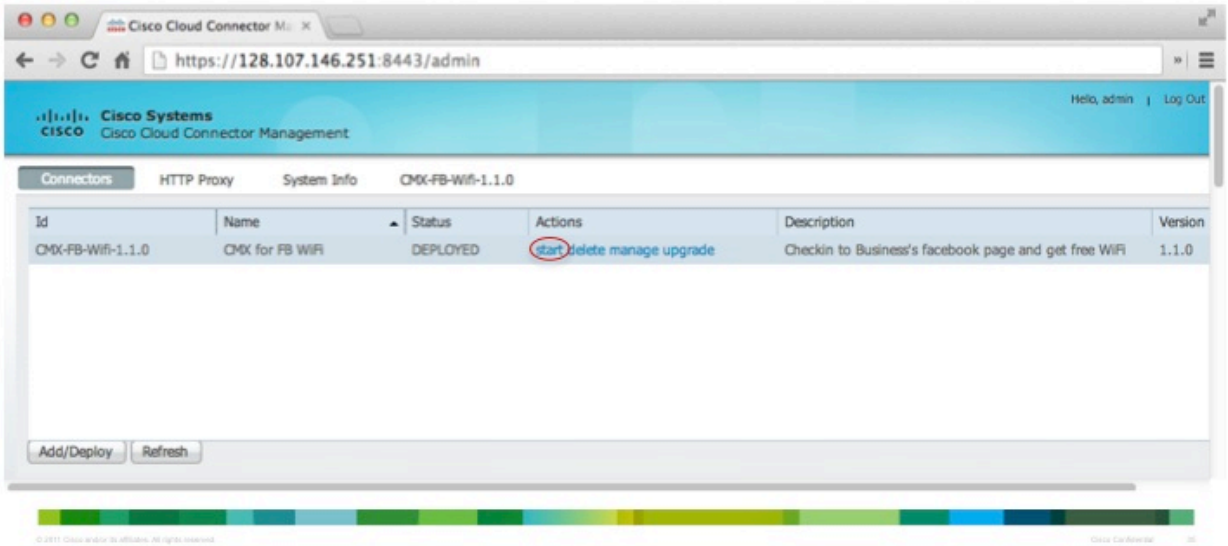
```
ip access-list extended ACCESS_POINT
 permit tcp 192.168.200.0 0.0.0.255 any eq www
 permit tcp any eq www 192.168.200.0 0.0.0.255
 permit tcp 192.168.200.0 0.0.0.255 any eq 443
 permit tcp any eq 443 192.168.200.0 0.0.0.255
 deny   ip any any

route-map SC_INTERCEPT permit 10
 match ip address ACCESS_POINT
  set ip next-hop 100.19.1.17
```

Now you can start the CMX for Facebook wifi service from the management UI. Click on start. The status will change from “deployed “to “running” .

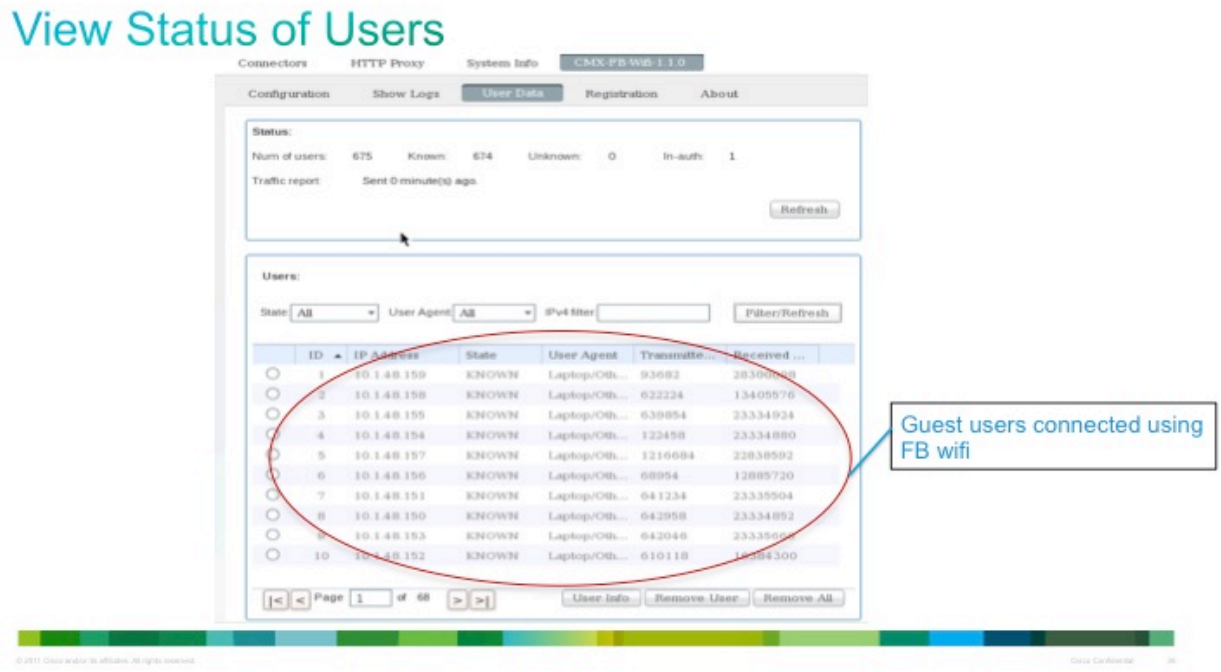
Start CMX Facebook

- Go to the Connectors Tab and start the Connector by clicking the “start” link



Monitoring guest sessions

You can monitor the guest sessions and look at how many users are connected using the CMX for Facebook Wifi service by going to the web UI and selecting User Data tab under the CMX FB Wifi 1.1.0 tab.



Troubleshooting

The CMX for Facebook Wifi functionality, like any software, may not always function as expected. In this section, we will provide some techniques to help to troubleshoot CMX for Facebook Wifi deployments.

1. **Unable to connect to management UI**
   Problem: Unable to connect to UI when you type http://<ip address of VM>
   Solution: Only https is supported for login to management UI.
   Use https://<ip address of VM>:8443

2. **Login Failed**
   Problem: Unable to login to UI using the root account
   Solution: You can login to management UI only using the admin account.

3. **Unable to access captive portal after upgrade**
   Problem: After an upgrade of the ova file typically the user will not be able to reach the captive portal (192.168.8.1:2060)
   Solution: the MAC address on the switch/router arp table needs to be refreshed with the new MAC.

4. **Proxy Log file**
   Problem: No proxy log file is found in /local/local1/errorlog
   Solution: Proxy log file is only created when the first proxy log message is generated. Set the proxy level to "debug" to increase the likelihood of messages being generated and the file being created.

5. **Connection reset and http failures**
   Problem: Proxy connection resets and http failures are observed. In addition the user transmitted bytes and or received bytes statistics under the "User Data" tab are not being updated.
   Solution: Ensure that PBR is correctly set for WAN and LAN interfaces that are used to redirect the http/https traffic. Mis-configuration of PBR would cause an asymmetric route where all internet responses bypass the VM.

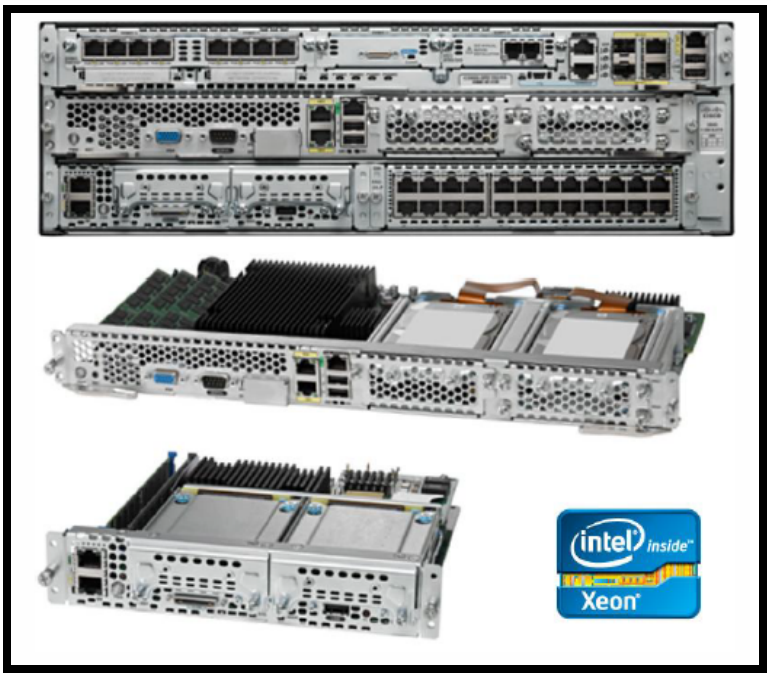
Running CMX Facebook Wifi in Flex local mode:

For Flex local deployments the CMX for Facebook Wifi http proxy feature needs to happen locally at the remote site, where client traffic is being switched. For these types of deployments we can utilize a ISR G2 with Cisco UCS® E-Series Server blade running the CMX for Facebook Wifi feature.

The following process takes place at the local router:

1. Router interface is configured for intercepting packets and to redirect http and https guest traffic to UCSE
2. CMX for Facebook Wifi redirects the guest http request to Facebook landing page
3. Upon successful authentication using Facebook credentials, the CMX for Facebook Wifi directs the guest user to the original url.

Cisco UCS E-Series Servers with Cisco 3945 ISR:



Data sheets for the UCS E –Series servers can be found here:
http://www.cisco.com/en/US/prod/collateral/ps10265/ps12629/data_sheet_c78-705787.pdf

Hardware Comparison Matrix (UCS E-Series):

	UCS-E140S	UCS-E140D(P) / UCS-E160D(P)
Processor	Intel Xeon (Sandy Bridge) E3-1105C (1 GHz)	Intel Xeon (Sandy Bridge) E5-2428L (2 GHz) / E5-2418L (1.8 GHz)
Core	4	4 / 6
Memory	8 - 16 GB DDR3 1333MHz	8 - 48 GB DDR3 1333MHz
Storage	200 GB- 2 TB (2 HDD) SATA, SAS, SED, SSD	200 GB- 3 TB (3 HDD*) SATA, SAS, SED, SSD
RAID	RAID 0 & RAID 1	RAID 0, RAID 1 & RAID 5*
Network Port	Internal: 2 GE Ports External: 1 GE Port	Internal: 2 GE Ports External: 2 GE Ports PCIE Card: 4 GE or 1 10 GE FCOE

Deploying CMX for Facebook Wifi:

Following are the prerequisites for the CMX Facebook to operate:

- You have ISR G2 router with IOS version - 15.2(4)M or later. (IOS version that supports UCS-E hardware)
- You have the UCS-E module pre-installed with VMware ESXI 5.0 or 5.1.
- (UCS-E Spec, 4GB Memory, 4 vCPU and 250GB HD)
- You have installed the UCS-E module inside the ISR router.
- You have configured the UCS-E parameters such as IP address and networking through Cisco Integrated Management Controller (CIMC) GUI.
- You can access the ESXI on the UCS-E module through VMware VSphere client.
- You have the CMX for Facebook Wifi.ova file "CMX-FB-WiFi-1.1.0.ova"

For more details on installing and provisioning the UCS-E module, please see the following link:

http://www.cisco.com/en/US/docs/unified_computing/ucs/e/1.0/roadmap/e_series_road_map.html

*ISR G2 Routers that support the CMX for Facebook wifi are series 2911, 2921, 2951, 3925, 3945, 3925E and 3945E.

Configuration steps:

(*These steps assume the UCS-E blade is installed on Slot 4 of the ISR G2 3945)

```
isr-3945-zs#sh inventory
NAME: "CISCO3945-CHASSIS", DESCR: "CISCO3945-CHASSIS"
PID: CISCO3945-CHASSIS  , VID: V02, SN: FTX1705AJ17

NAME: "Cisco Services Performance Engine 150 for Cisco 3900 ISR on S
PID: C3900-SPE150/K9    , VID: V05 , SN: FOC16512EX9

NAME: "Services Module with Services Ready Engine on Slot 1", DESCR:
PID: SM-SRE-910-K9      , VID: V01 , SN: FOC16516MH2

NAME: "UCSE Server Module on Slot 4", DESCR: "UCSE Server Module"
PID: UCS-E160D-M1/K9    , VID: V01 , SN: FOC17014NVA

NAME: "C3900 AC Power Supply 1", DESCR: "C3900 AC Power Supply 1"
PID: PWR-3900-AC        , VID: V03 , SN: QCS1645P1H5


isr-3945-zs#
```

1) **Router prerequisite configuration**
   - IOS installed - 15.2(4)M or later
   - Configure interface for wireless client traffic (gateway for wireless clients)
   - Configure UCS-E slot with CIMC IP address
   - Set MTU of 1700 on UCS-E interface
   - Configure PBR
   - Set routes from router to access UCS-E for ESXI server and C3 Proxy.

2) **Configure access to Cisco Integrated Management Controller (CIMC) port on the UCS-E server through Router console to install ESXi 5.1**

```
!
interface ucse4/0
 mtu 1700
 ip unnumbered GigabitEthernet0/0.12
 imc ip address 10.89.46.11 255.255.255.0 default-gateway 10.89.46.254
 imc access-port dedicated
!
```

- In the above case we are using dedicated port (Ethernet cable plugged into UCS-E server CIMC port) . You can configure access to the CMIC port through the router (No Ethernet cable plugged into the UCS-E server) using the “imc access-port shared-lom” command. Make sure to include the route to the CIMC port through router if using “shared-lom”

- See link for more details on configuring the CIMC on UCS-E:

  http://www.cisco.com/en/US/docs/unified_computing/ucs/e/2.0/gs/guide/b_2_0_Getting_Started_Guide_chapter_0101.html

- Link to install ESXi via CIMC port:

  http://www.cisco.com/en/US/docs/unified_computing/ucs/e/2.0/gs/guide/b_2_0_Getting_Started_Guide_chapter_01000.html

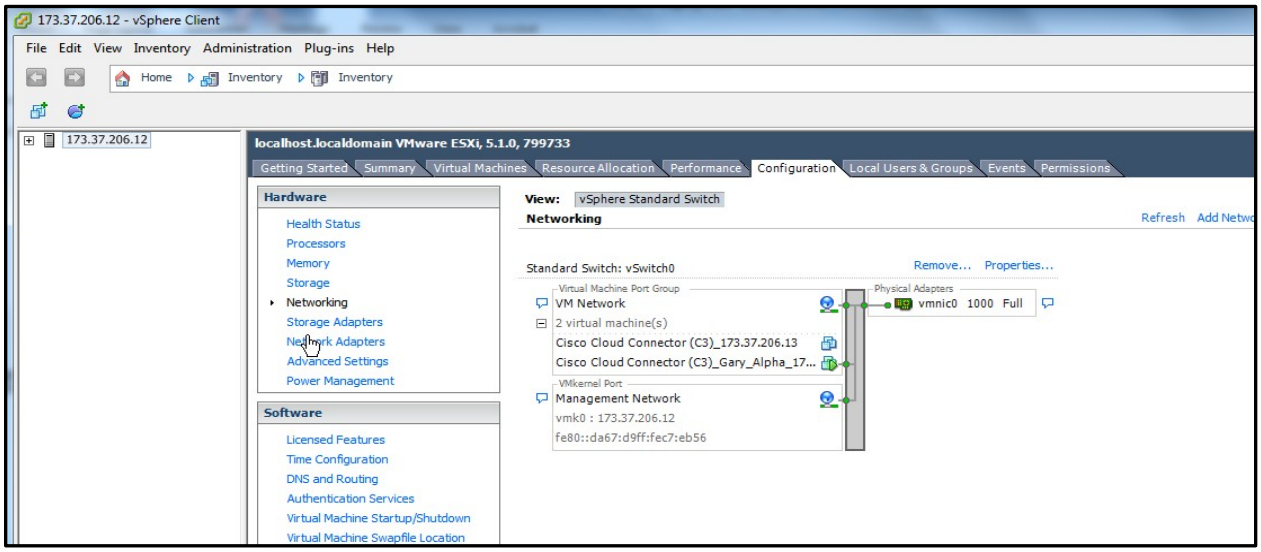
****Ensure that appropriate routes have been setup on the ISR router to access the ESXi server through UCS-E slot. In the below example we have a route to the ESXi Host and C3 connector that will be deployed in the next step.**

ip route 173.37.206.12 255.255.255.255 ucse4/0 (route to ESXi host)
ip route 173.37.206.13 255.255.255.255 ucse4/0 (route to C3 connector running on ESXi host)

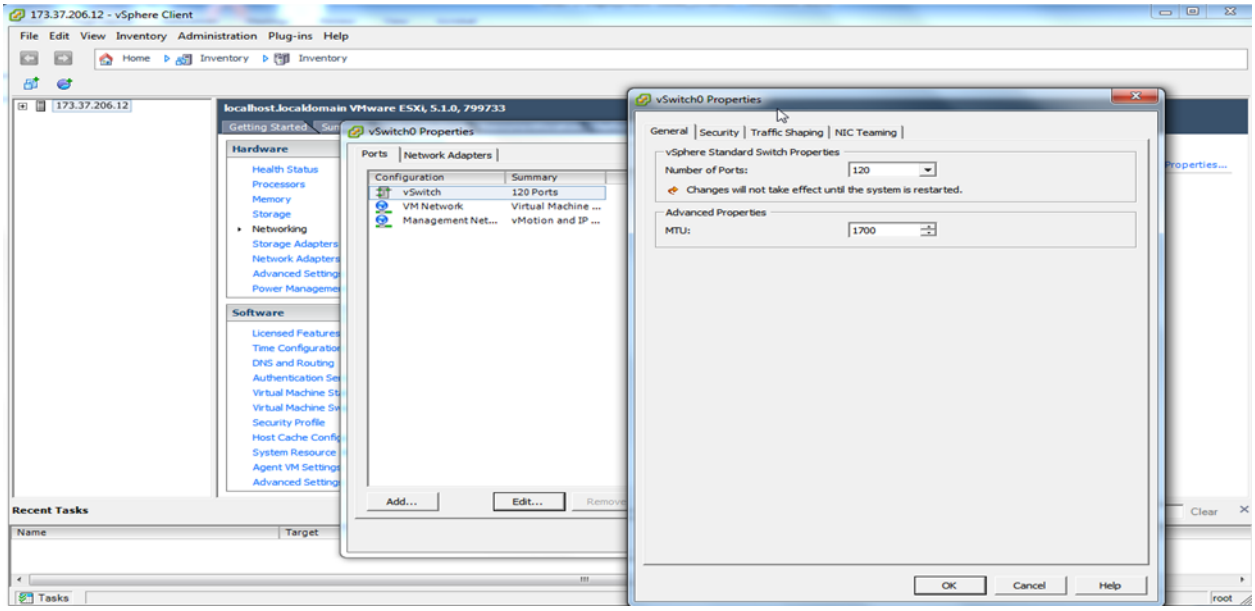
3) **Once ESXI has been loaded onto the UCS-E server using above procedure, we need to deploy the CMX-FB-WiFi-1.1.0.OVA file on to the ESXi server**

4) Once the CMX for Facebook Wifi http proxy has been installed and configured, we need to set the MTU size to 1700 for C3 proxy to process packets accurately. This is accomplished by:

   - Selecting the Host machine\Configuration\Networking.



   - Select the properties under “Standa Switch:vSwitch0” and select edit. Click ok to apply settings.



5) Verify CMX for Facebook wifi http proxy is processing traffic.

To verify that the C3 Proxy is processing client traffic, select the “HTTP Proxy tab”

Performance Data

CMX for Facebook performance has a bearing only on the FB login transactions delays while throughput is a function of Cisco IOS policy based routing feature (PbR) (which varies based on router cpu and forwarding plane architecture), CMX for Facebook VM's forwarding capacity, and WAN uplink speeds. Please note, these performance numbers are merely guidelines based on testing in lab environment and actual results may vary.

Distributed deployment

Performance tests were done with CMX Facebook running on Cisco UCS E140S on a Cisco ISR G2 2911.

Table 3: Cisco UCS-E-Series blade on Cisco ISR 2911

Concurrent Users	CMX FB VM Peak CPU Usage	CMX FB VM Memory Usage	Throughput (Mbps)	ISR CPU usage (avg)
100	55%	17.7%	72.34	60%
500	68%	17.7%	82.04	70%

Centralized Deployment

The same tests were done on Cisco UCS C-Series servers and Cisco ASR 1000 routers for the centralized deployment use case.

Table 4: Cisco UCS C-Series Servers with Cisco ASR 1000 router

Concurrent Users	CMX FB VM Peak CPU Usage	CMX FB VM Memory usage	Throughput (Mbps)	ASR 1k QFP cpu usage (avg)
100	47%	17.8%	236.37	1%
500	61%	18.1%	243.77	1%
1000	72%	18.2%	251.29	1%

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For More Information

For more information about the Cisco MSE and the services it provides to the Wi-Fi network, visit http://www.cisco.com/go/mse. For more information about Cisco Connected Mobile Experiences, visit http://www.cisco.com/go/cmx.

Known caveats:

(1) Desktop Chrome browser stuck at Checkin page during Facebook checkin. Chrome browser is stuck at Checkin page during Facebook checkin. Chrome is blocking the content from web site http://static.ak.fbcdn.net/

(2) “Continue Browsing" option is not always getting displayed
"Continue Browsing" option is not always getting displayed with the following devices:
*Kindle touch reader (PaperWhite) - never displayed
*Mot Xoom tablet running Android 4.0.4 – never displayed
*iPhone 4 running iOS 6.1 – sometimes displayed
*Samsung Galaxy running Android 2.3.6 – sometimes displayed

(3) No “Continue browsing…” after uploading a picture – happens on iPhone5 running iOS7. After uploading a picture, that post does not appear on user’s wall. Instead shows up on the vendor page. No check in story on the user’s wall.

(4) Bookmarked sites change their icon to the blue Facebook icon. Happens with Chrome Browser on a Mac OS laptop.

(5) No “Continue browsing..” with Kindle Fire HD device after checking in or after posting a message with check-in. Rendering issue - poorly formatted Facebook page while trying to browse Facebook site before clicking "Continue browsing" option. Workaround is to use silk browser instead.