



Configuring Fabric In A Box With Embedded Wireless Controller

Fabric in a Box is a single device that is configured as a border node, a control plane node, an edge node. This single device also supports an embedded wireless controller.

The following platforms support Cisco Catalyst 9800 Embedded Wireless Controller for a fabric in a box deployment:

- Cisco Catalyst 9300 Series Switches
- Cisco Catalyst 9400 Series Switches
- Cisco Catalyst 9500 Series Switches

This chapter describes only the configurations that are required to add the wireless functionality in an existing fabric in a box topology for wired endpoints.

- [Prerequisites for Configuring Fabric in a Box with Embedded Wireless, on page 1](#)
- [How to Configure Fabric In A Box with Embedded Wireless, on page 2](#)
- [Configuration Example for Fabric In A Box with Embedded Wireless, on page 5](#)
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Prerequisites for Configuring Fabric in a Box with Embedded Wireless

- Ensure that the Fabric in a Box device is already configured as edge, border, and control plane nodes for wired endpoints.

For configuration details, refer to [Configuring Fabric In a Box for Wired Devices](#).

- A Fabric in a Box device should operate in Install mode for a wireless package to be installed. You can install Cisco Catalyst 9800 Series Wireless Controller as a sub-package on top of the base image on the switch.

Ensure that the wireless package is the same version as the base image on the switch (Cisco IOS XE). For example, if the switch is operating on Cisco IOS XE 17.10.1, install the 17.10.1 version of the wireless package on the switch.

To download a wireless package, go to the [Software Download](#) page, navigate to the switch family, and select the **IOS XE Wireless Controller Software Package** Software Type.

For information on booting a switch in Install mode and installing a sub-package, refer to [Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide](#).

How to Configure Fabric In A Box with Embedded Wireless

Perform the following procedure to enable wireless functionality in a fabric in a box.

Procedure

- Step 1** Enable wireless controller on the switch. Configure the wireless management interface (WMI) as a loopback interface. The WMI is used for all the CAPWAP messages between the wireless controller and the fabric APs.

```
wireless-controller
wireless management interface Loopback0
```

- Step 2** Configure a Switched Virtual Interface (SVI) for the AP VLAN.

Note Ensure that you assign the same MAC address for a given SVI, across all fabric edges within the fabric site. We recommend that you use a MAC address starting from the base range value of 0000.0C9F.F05F.

```
interface Vlan92
description AP SVI
mac-address 0000.0c9f.f42a <--- Common MAC Address
ip address 10.92.1.1 255.255.255.0
ip helper-address 192.168.132.1
no ip redirects
no lisp mobility liveness test
lisp mobility APVlan92-IPV4
no autostate
!
```

- Step 3** Configure an SVI for the Wireless Client VLAN.

Note Ensure that you assign the same MAC address for a given SVI, across all fabric edges within the fabric site. We recommend that you use a MAC address starting from the base range value of 0000.0C9F.F05F.

```
interface Vlan51
description Client SVI
mac-address 0000.0c9f.f7df <-- Common MAC Address
vrf forwarding VN4
ip address 10.51.1.1 255.255.255.0
ip helper-address 192.168.132.1
no ip redirects
no lisp mobility liveness test
lisp mobility wireless-VN-IPV4
no autostate
!
```

- Step 4** Define a Locator set for the wireless controller.

```

router lisp
...
locator-table default
locator-set WLC
 192.168.99.1 //IP address of the WMI
exit-locator-set
!

```

Step 5 Configure open passive TCP sockets on the control plane node to listen for incoming connections.

```
map-server session passive-open WLC
```

Step 6 Configure the LISP Site to accept EID prefixes.

```

...
site site_uci
description map-server1
authentication-key 7 auth-key
eid-record instance-id 4097 10.51.1.0/24 accept-more-specifics
eid-record instance-id 4098 10.92.1.0/24 accept-more-specifics
eid-record instance-id 8188 any-mac
eid-record instance-id 8189 any-mac
exit-site
!

```

Step 7 Configure dynamic EID for the AP subnets in the default instance.

```

...
instance-id 4097
remote-rloc-probe on-route-change
dynamic-eid APVlan92-IPV4
  database-mapping 10.92.1.0/24 locator-set rloc_set
  exit-dynamic-eid
!
exit-instance-id
!

```

Step 8 Configure dynamic EID for the wireless client subnets in the user-defined instance that is mapped to a VRF.

```

...
instance-id 4098
remote-rloc-probe on-route-change
dynamic-eid wireless-VN-IPV4
  database-mapping 10.51.1.0/24 locator-set rloc_set
  exit-dynamic-eid
!
exit-instance-id
!

```

Step 9 Configure Layer 2 VNI for the wireless client VLAN.

```

...
instance-id 8188
remote-rloc-probe on-route-change
service ethernet
  eid-table vlan 51
  database-mapping mac locator-set rloc_set
  exit-service-ethernet
!
exit-instance-id
!

```

Step 10 Configure Layer 2 VNI for the AP VLAN.

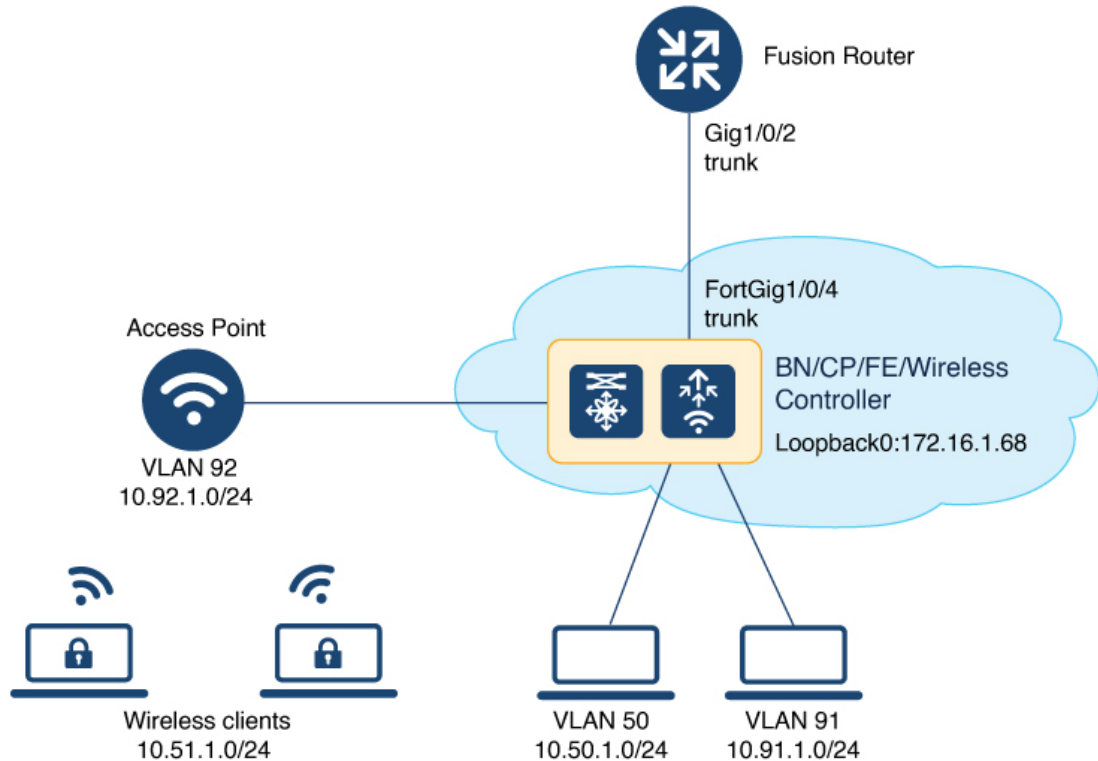
Step	Command or Action	Description
f)	<p>wlan <i>wlan-name wlan-id SSID-name</i></p> <p>Example:</p> <pre>Switch(config)# wlan kFiab-local-open_profile 17 kFiab-local-open Switch(config-wlan)# no shutdown Switch(config-wlan)#end</pre>	<p>Configures a WLAN.</p> <p>This example configures a WLAN with an ID of 17 and an SSID named kFiab-local-open. It also enables the WLAN using the no shutdown command.</p>
g)	<p>wireless profile fabric <i>profile-policy</i></p> <p>Example:</p> <pre>Switch(config)# wireless profile fabric kFiab-local-open_profile Switch(config-wireless-fabric)# description local-open-profile Switch(config-wireless-fabric)# client-l2-vnid 8188 Switch(config-wireless-fabric)# end</pre>	<p>Configures a fabric profile.</p> <p>This example creates a fabric profile named kFiab-local-open_profile and associates the Layer 2 VNI (8188) with the fabric profile.</p>
h)	<p>wireless profile policy <i>profile-policy</i></p> <p>Example:</p> <pre>Switch(config)# wireless profile policy kFiab-local-open_profile // Specify local DHCP mode Switch(config-wireless-policy)# no central dhcp // Configure WLAN for local switching Switch(config-wireless-policy)# no central switching //Provide a description for the wireless policy Switch(config-wireless-policy)# description kFiab-local-open_profile //Map the fabric profile that was created in the previous step Switch(config-wireless-policy)# fabric kFiab-local-open_profile //Enable the profile policy Switch(config-wireless-policy)# no shutdown Switch(config-wireless-policy)# end</pre>	<p>Configures a wireless policy profile and maps the fabric profile to it.</p> <p>The example configures a wireless profile policy named kFiab-local-open_profile and maps a fabric profile to it, using the fabric profile-policy command.</p> <p>You can configure more wireless and fabric profiles as shown in <i>Configuration Example for Fabric In A Box with Embedded Wireless</i>.</p>

Configuration Example for Fabric In A Box with Embedded Wireless

This example shows a sample configuration for a fabric in a box construct in the LISP VXLAN fabric depicted in the topology. The fabric in a box device is a Cisco Catalyst 9000 Series switch that functions as a control

plane node, border node, edge node, and wireless controller. The loopback IPv4 address of switch is 172.16.1.68. A fabric-capable Access Point (AP) with a subnet of 10.92.1.0/24 is connected to the fabric edge node interface.

Figure 1: LISP VXLAN Topology for Fabric in a Box with Embedded Wireless



Fabric in a Box

```
wireless-controller
wireless management interface Loopback0
!
vrf definition VN4
rd 1:4098
!
address-family ipv4
route-target export 1:4098
route-target import 1:4098
exit-address-family
!
interface Vlan92
description AP SVI
mac-address 0000.0c9f.f42a
ip address 10.92.1.1 255.255.255.0
ip helper-address 192.168.132.1
no ip redirects
no lisp mobility liveness test
lisp mobility APVlan92-IPV4
no autostate
!
interface Vlan51
description Client SVI
mac-address 0000.0c9f.f7df
vrf forwarding VN4
```

```
ip address 10.51.1.1 255.255.255.0
ip helper-address 192.168.132.1
no ip redirects
no lisp mobility liveness test
lisp mobility wireless-VN-IPV4
no autostate
!

vrf definition VN3
rd 1:4099
!
address-family ipv4
route-target export 1:4099
route-target import 1:4099
exit-address-family
!
address-family ipv6
route-target export 1:4099
route-target import 1:4099
exit-address-family

vlan 222
name 222
!
interface Vlan222
description vrf-external
vrf forwarding VN3
ip address 10.20.1.1 255.255.255.252
no ip redirects
ipv6 address 2001:DB8:20::1/126
ipv6 enable

!
interface TenGigabitEthernet1/0/4
switchport mode trunk

device-tracking tracking
!
device-tracking policy IPDT_POLICY
no protocol udp
tracking enable
!

interface TenGigabitEthernet1/0/5
device-tracking attach-policy IPDT_POLICY
!
ipv6 nd raguard
ipv6 dhcp guard
!
vlan 50
name AVlan50
!
vlan 91
name AVlan91
!
interface Vlan50
description server1
mac-address 0000.0c9f.f18e
vrf forwarding VN3
ip address 10.50.1.1 255.255.255.0
ip helper-address 172.16.2.2
no ip redirects
ipv6 address 2001:DB8:2050::1/64
ipv6 enable
```

```

ipv6 nd dad attempts 0
ipv6 nd prefix 2001:DB8:2050::/64 2592000 604800 no-autoconfig
ipv6 nd managed-config-flag
ipv6 nd other-config-flag
ipv6 nd router-preference High
ipv6 dhcp relay destination 2001:DB8:2::2
ipv6 dhcp relay source-interface Vlan50
ipv6 dhcp relay trust
no lisp mobility liveness test
lisp mobility AVlan50-IPV4
lisp mobility AVlan50-IPV6
no autostate
!
interface Vlan91
description default-interface
mac-address 0000.0c9f.f984
ip address 10.91.1.1 255.255.255.0
ip helper-address 172.16.2.2
no ip redirects
no lisp mobility liveness test
lisp mobility AVlan91-IPV4
no autostate
!
ip dhcp relay information option
ip dhcp snooping vlan 50,91
ip dhcp snooping

router lisp
locator-table default
locator-set default_etr_locator
  IPv4-interface Loopback0 priority 10 weight 10
  exit-locator-set
!
locator-set rloc_set
  IPv4-interface Loopback0 priority 10 weight 10
  auto-discover-rlocs
  exit-locator-set
!
locator-set WLC
  192.168.99.1
  exit-locator-set
!
locator default-set rloc_set
service ipv4
  encapsulation vxlan
  map-cache publications
  import publication publisher 172.16.1.68
  itr map-resolver 172.16.1.68
  etr map-server 172.16.1.68 key 7 auth-key
  etr map-server 172.16.1.68 proxy-reply
  etr
  sgt
  route-export publications
  distance publications 250
  proxy-etr
  proxy-itr 172.16.1.68
  map-server
  map-resolver
  exit-service-ipv4
!
service ipv6
  encapsulation vxlan
  map-cache publications
  import publication publisher 172.16.1.68

```



```

itr map-resolver 172.16.1.68
etr map-server 172.16.1.68 key 7 auth-key
etr map-server 172.16.1.68 proxy-reply
etr
sgt
route-export publications
distance publications 250
proxy-etr
proxy-itr 172.16.1.68
map-server
map-resolver
exit-service-ipv6
!
service ethernet
itr map-resolver 172.16.1.68
itr
etr map-server 172.16.1.68 key 7 auth-key
etr map-server 172.16.1.68 proxy-reply
etr
map-server
map-resolver
exit-service-ethernet
!

instance-id 4097
remote-rloc-probe on-route-change
dynamic-eid AVlan91-IPV4
  database-mapping 10.91.1.0/24 locator-set rloc_set
  exit-dynamic-eid
!
dynamic-eid APVlan92-IPV4
  database-mapping 10.92.1.0/24 locator-set rloc_set
  exit-dynamic-eid
!
service ipv4
  eid-table default
  map-cache 10.91.1.0/24 map-request
  exit-service-ipv4
!
exit-instance-id
!

instance-id 4099
remote-rloc-probe on-route-change
dynamic-eid AVlan50-IPV4
  database-mapping 10.50.1.0/24 locator-set rloc_set
  exit-dynamic-eid
!
dynamic-eid AVlan50-IPV6
  database-mapping 2001:DB8:2050::/64 locator-set rloc_set
  exit-dynamic-eid
!
dynamic-eid wireless-VN-IPV4
  database-mapping 10.51.1.0/24 locator-set rloc_set
  exit-dynamic-eid
!
service ipv4
  eid-table vrf VN3
  database-mapping 0.0.0.0/0 locator-set default_etr_local default-etr local
  exit-service-ipv4
!
service ipv6
  eid-table vrf VN3
  database-mapping ::/0 locator-set default_etr_local default-etr local

```

```

    exit-service-ipv6
    !
    exit-instance-id
    !
    !
instance-id 8194
    remote-rloc-probe on-route-change
    service ethernet
        eid-table vlan 91
        database-mapping mac locator-set rloc_set
    exit-service-ethernet
    !
    exit-instance-id
    !
    !
instance-id 8197
    remote-rloc-probe on-route-change
    service ethernet
        eid-table vlan 50
        database-mapping mac locator-set rloc_set
    exit-service-ethernet
    !
    exit-instance-id
    !
instance-id 8188
    remote-rloc-probe on-route-change
    service ethernet
        eid-table vlan 92
        database-mapping mac locator-set rloc_set
    exit-service-ethernet
    !
    exit-instance-id
    !
instance-id 8189
    remote-rloc-probe on-route-change
    service ethernet
        eid-table vlan 51
        database-mapping mac locator-set rloc_set
    exit-service-ethernet
    !
    exit-instance-id
    !
    !
map-server session passive-open WLC
site site_uci
    description map-server1
    authentication-key 7 auth-key
    eid-record instance-id 4097 0.0.0.0/0 accept-more-specifics
    eid-record instance-id 4097 10.91.1.0/24 accept-more-specifics
    eid-record instance-id 4097 10.51.1.0/24 accept-more-specifics
    eid-record instance-id 4098 10.92.1.0/24 accept-more-specifics
    eid-record instance-id 4099 0.0.0.0/0 accept-more-specifics
    eid-record instance-id 4099 10.50.1.0/24 accept-more-specifics
    eid-record instance-id 4099 ::/0 accept-more-specifics
    eid-record instance-id 4099 2001:DB8:2050::/64 accept-more-specifics
    eid-record instance-id 8194 any-mac
    eid-record instance-id 8197 any-mac
    eid-record instance-id 8188 any-mac
    eid-record instance-id 8189 any-mac
    allow-locator-default-etr instance-id 4097 ipv4
    allow-locator-default-etr instance-id 4099 ipv4
    allow-locator-default-etr instance-id 4099 ipv6
    exit-site
    !

```

```

ipv4 locator reachability minimum-mask-length 32
ipv4 locator reachability exclude-default
ipv4 source-locator Loopback0
exit-router-lisp
!
router bgp 700
  bgp router-id interface Loopback0
  bgp log-neighbor-changes
  bgp graceful-restart
  !
  address-family ipv4
    bgp redistribute-internal
    bgp aggregate-timer 0
    network 10.91.1.0 mask 255.255.255.0
    network 172.16.1.68 mask 255.255.255.255
    aggregate-address 10.91.1.0 255.255.255.0 summary-only
    redistribute lisp metric 10 route-map LISP_TO_BGP
  exit-address-family
  !
  !
  address-family ipv4 vrf VN3
    bgp aggregate-timer 0
    network 10.20.1.0 mask 255.255.255.252
    network 10.50.1.0 mask 255.255.255.0
    aggregate-address 10.50.1.0 255.255.255.0 summary-only
    redistribute lisp metric 10 route-map LISP_TO_BGP
  exit-address-family
  !
  address-family ipv6 vrf VN3
    redistribute lisp metric 10 route-map LISP_TO_BGP
    bgp aggregate-timer 0
    network 2001:DB8:20::/126
    network 2001:DB8:2050::/64
    aggregate-address 2001:DB8:2050::/64 summary-only
  exit-address-family
  !
  address-family ipv4 vrf VN4
    bgp aggregate-timer 0
    network 10.51.1.0 mask 255.255.255.0
    aggregate-address 10.51.1.0 255.255.255.0 summary-only
    redistribute lisp metric 10 route-map LISP_TO_BGP
  exit-address-family
  !
  !
  route-map LISP_TO_BGP permit 10
    description prefixes_learnt
    set as-path tag
  !
  wireless fabric
  wireless fabric name APVlan92-IPV4 12-vnid 8189 13-vnid 4097 ip 10.92.1.1 255.255.255.0
  control-plane-name default-control-plane
  wireless fabric name wireless-VN-IPV4 12-vnid 8188 control-plane-name default-control-plane
  wireless fabric control-plane default-control-plane ip address 172.16.1.68 key 7 auth-key

wlan kFiab-local-open_profile 17 kFiab-local-open
  radio policy dot11 24ghz
  radio policy dot11 5ghz
  no security wpa
  no security wpa wpa2
  no security wpa wpa2 ciphers aes
  no security wpa akm dot1x
  no shutdown
  !

```

```

wireless profile policy kFiab-local-open_profile
no central dhcp
no central switching
description kFiab-local-open_profile
dhcp-tlv-caching
exclusionlist timeout 180
fabric kFiab-local-open_profile // fabric wireless profile
http-tlv-caching
service-policy input platinum-up
service-policy output platinum
session-timeout 1800
no shutdown
!
!
wireless profile fabric kFiab-local-open_profile // configures wireless profile parameters

client-l2-vnid 8188
description kFiab-local-open_profile
!!

```

Verify Fabric in a Box with Embedded Wireless

You can verify the fabric in a box with embedded wireless configuration using the **show** commands. This section provides the sample outputs for the **show** commands on the fabric in a box device in the topology shown [Figure 1: LISP VXLAN Topology for Fabric in a Box with Embedded Wireless](#).

```

fiab# show lisp session
Sessions for VRF default, total: 4, established: 3
Peer                State      Up/Down      In/Out      Users
172.16.1.68:4342    Up        10:48:14     232/144     10
172.16.1.68:51283   Up        10:48:14     144/232     8
172.16.1.68:60947   Up        10:48:15     48/29       3
fiab#

fiab# show wlan summary

Number of WLANs: 1

ID  Profile Name                SSID                Status  2.4GHz/5GHz Security  6GHz Security
-----
17  kFiab-local-open_profile     kFiab-local-open    UP      [open]

fiab# show wireless fabric summary

Fabric Status      : Enabled

Control-plane:
Name                IP-address          Key                  Status
-----
default-control-plane  172.16.1.68        bcad25df225e410d    Up

Fabric VNID Mapping:
Name                L2-VNID            L3-VNID            IP Address          Subnet              Control plane name
-----
APVlan92-IPV4      8189                4097                10.92.1.1          255.255.255.0      default-control-plane

```

```
wireless-VN-IPV4 8188 0 0.0.0.0 default-control-plane
```

```
fiab#
```

```
fiab# show wireless client summary
```

```
Number of Clients: 1
```

MAC Address	AP Name	Type ID	State	Protocol	Method	Role
4c34.889a.06be	APOCD0.F894.6540	WLAN 17	Run	11ac	None	Local

```
Number of Excluded Clients: 0
```

```
fiab# show wireless client mac-address 4c34.889a.06be details
```

```
Client MAC Address : 4c34.889a.06be
Client MAC Type : Universally Administered Address
Client DUID: NA
Client IPv4 Address : 10.51.1.12
Client IPv6 Addresses : fe80::311d:6e13:9d40:9dab
Client Username: N/A
AP MAC Address : 0cd0.f897.f6c0
AP Name: APOCD0.F894.6540
AP slot : 1
Client State : Associated
Policy Profile : kFiab-local-open_profile
Flex Profile : default-flex-profile
Wireless LAN Id: 17
WLAN Profile Name: kFiab-local-open_profile
Wireless LAN Network Name (SSID): kFiab-local-open
BSSID : 0cd0.f897.f6ce
Connected For : 41 seconds
Protocol : 802.11ac
Channel : 140
Client IIF-ID : 0xa0000001
Association Id : 1
Authentication Algorithm : Open System
Idle state timeout : N/A
Session Timeout : 1800 sec (Remaining time: 1764 sec)
Session Warning Time : Timer not running
Input Policy Name : None
Fabric status : Enabled <--- displays status of the fabric and other details
  RLOC : 172.16.1.68
  VNID : 8190
  SGT : 0
  Control plane name : default-control-plane
```

```
<snip output>
```

```
....
```

```
....
```

```
<snip output>
```

```
fiab#
```

