Miscellaneous AP-Specific Configurations

This chapter contains miscellaneous configurations that are specific to certain access points.

Cisco Aironet 700W Series

Using the LAN ports on 700W APs

The Cisco Aironet 700W series access points have one 10/100/1000BASE-T PoE Uplink/WAN port and four 10/100/1000BASE-T RJ-45 local Ethernet ports for wired device connectivity. The fourth port functions as a PoE-Out port when the AP is powered by 802.3at Ethernet switch, Cisco power injector AIR-PWRJ4=, or Cisco Power Supply.

By default, all four local Ethernet ports are disabled. You can be enable them when required.

You can also configure the local Ethernet ports to a VLAN ID using the interface configuration command, **vlan** *vlan-id*.

Enable LAN ports on 702W

Step 1   Enter global configuration mode.

```
ap#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
```

Step 2   Enable the LAN port.

```
ap(config)#lan-Port port-id 1
ap(config-lan-port)#no shutdown
ap(config-lan-port)#end
```

Assign a VLAN to the LAN ports

Use the commands given in the example below.

```
ap#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ap(config)#lan-Port port-id 1
ap(config-lan-port)#vlan 25
ap(config-lan-port)#end
```

Verifying the LAN Port Configurations

Use the command given in the example below.

```
voip#sh lan  config

LAN table entries:

 Port    Status       Vlan valid    Vlan Id
 ----    ---------    ----------    -------
 LAN1    DISABLED     25            NA
 LAN2    ENABLED      NO            NA
 LAN3    DISABLED     NO            NA
 LAN4    ENABLED      NO            NA
LAN POE out state = ENABLED
```

700W AP as Workgroup Bridge

Like other Cisco Access points 702W AP series also can be configured as a Workgroup Bridge (WGB).

A WGB can provide a wireless infrastructure connection for Ethernet-enabled devices. Devices that do not have a wireless client adapter in order to connect to the wireless network can be connected to the WGB through the Ethernet port.

The WGB supports up to 20 Ethernet-enabled devices to a Wireless LAN (WLAN). The WGB associates to the root AP through the wireless interface. In this way, wired clients obtain access to the wireless network. A WGB can associate to:

- An AP
- A root bridge (in AP mode)
- A controller through a lightweight AP

When a Cisco 702W access point acts as a WGB, the wired Ethernet clients behind the WGB can be either connected to the LAN or WAN ports present on the 702W AP.

Cisco Aironet 1570 Series

GPS and Cable Modem Configuration Commands

The following commands have been introduced to support the Global Positioning System (GPS) module and the cable modem for AP 1570.

Command	Description
show cmodemstatus	Shows the following information about the cable modem: • Software version • AP MAC address • Cable Modem MAC address • Ethernet speed • Ethernet status • Data Over Cable Service Interface Specification (DOCSIS) Registration Status • Upstream Channel status • Downstream Channel status
show gps location	Shows the following information from the GPS module: • GPS location co-ordinates • Collection Time • Position Flags • Latitude • Longitude • Altitude • East Velocity • North Velocity • Up Velocity

Cisco IW3702 Access Point

This section contains the following features which are specific to the Cisco IW3702 access points.

- DLEP Client Support on WGB
- Dual Radio Parallel Redundancy Protocol Enhancement on WGB
- WGB Uplink Coordination
- Dual WGB Distributed PRP
- WGB Dynamic Link Forwarding
- Configuring IGMP Snooping Static Entry on IW3702
- RAP Ethernet Daisy Chain

DLEP Client Support on WGB

The Dynamic Link Exchange Protocol (DLEP) client support feature allows the WGB to report radio link metrics to a router. The WGB acts as the DLEP client, and the router acts as the DLEP server. Routing path selection is based on radio link quality metrics.

For more information, see the DLEP Client Support on WGB section in the Cisco Wireless Controller Configuration Guide.

Dual Radio Parallel Redundancy Protocol Enhancement on WGB

The Dual Radio Parallel Redundancy Protocol (PRP) enhancement is the second phase of the PRP feature, which enables dual radio (2.4 GHz and 5 GHz) workgroup bridge mode on a WGB simultaneously. The WGB is wirelessly connected to the APs, with redundant packet transmissions over the dual 2.4-GHz and 5-GHz subsystem.

For more information, see the Dual Radio Parallel Redundancy Protocol Enhancement on WGB section in the Cisco Wireless Controller Configuration Guide.

WGB Uplink Coordination

The WGB uplink coordination feature allows the WGBs to select preferred parent access point based on configurable signal strength, channel utilization, or load threshold.

The existing PRP over wireless solutions do not have the coordination mechanism to let WGBs select preferred parent AP. Two radios of the WGBs can potentially associate to the same radio interface of one AP, which results in the redundant radio links sharing the same channel and suffering from the same RF interference.

The WGB uplink coordination feature addresses the potential RF interference issue for the PRP redundant wireless paths. When there is an alternate parent AP available and the signal quality meets the requirement, the two WGBs will try to associate to different parent APs. If there is only one single parent AP available, the two WGBs can still associate to the same parent AP.

Note The WGB uplink coordination feature is supported only on WGB mode of the IW3700 series access points.

The WGB Uplink Coordination is based on the comparison of RSSI, Channel utilization (CU), and load thresholds, which will be used to determine whether the WGB is to associate to a different parent AP.

- When only the RSSI threshold is configured:

  If the candidate's RSSI is better than the configured RSSI threshold, the candidate AP will be chosen as the new parent. If the candidate's RSSI is not as good as the threshold, but very close to the peer WGB's parent AP, the candidate AP will also be chosen as the new parent. Otherwise, the uplink selection will be done by the legacy way.

- When only the CU/load threshold is configured:

  As long as the candidate's RSSI is better than the configured RSSI threshold, candidate AP's CU/load will be compared with the configured CU/load threshold. If the candidate's CU/load is better than configured CU/load threshold, the candidate AP will be chosen as the new parent. If the candidate's CU/load is not as good as the threshold, but very close to the peer WGB's parent AP, the candidate AP will also be chosen as the new parent. Otherwise, the uplink selection will be done by the legacy way.

Configuring Association Information Sync

The uplink coordination feature requires the WGB to synchronize its local association information with the peer WGB. The existing roaming coordination feature must be enabled.

✎

Note   For more information about the roaming coordination feature, see https://www.cisco.com/c/en/us/td/docs/wireless/controller/8-4/config-guide/b_cg84/workgroup_bridges.html

Configuring Thresholds for AP Selection

You can configure the following thresholds on a specific radio interface of the WGB. If the candidate AP meets the requirements of these thresholds, WGB will choose it as the new parent AP.

- **CU**—Channel utilization of the AP.

  You can configure this threshold in the range of 0-100 in percentage. The default is 0, which means the CU value will not be compared during the AP selection.

- **Load**—Load of the AP.

  You can configure this threshold in the range of 0-100 in percentage. The default is 0, which means the AP load will not be compared during the AP selection. If both CU and AP load are configured, CU will be used during AP selection.

- **RSSI**—Signal strength of the AP.

  You can configure this threshold in the range of 1-100 dBm. The default is 60 dBm. If CU and Load thresholds are not configured, the uplink coordination will use the RSSI value for AP selection.

Use the following command to configure the CU, Load, and RSSI thresholds:

```
WGB(config-if)#coordination-uplink threshold {[cu cu]|[load load]|[rssi rssi]}
  cu     Uplink coordination channel utilization threshold
  load   Uplink coordination AP load threshold
  rssi   Uplink coordination rssi threshold
```

Configuring AP-Based or Radio-Based Coordination

The feature is based on the roaming coordination feature. Make sure the roaming coordination feature is properly configured and enabled.

Note For more information about the roaming coordination feature, see https://www.cisco.com/c/en/us/td/docs/wireless/controller/8-4/config-guide/b_cg84/workgroup_bridges.html

You can configure ap-based or radio-based coordination for the following two scenarios:

- AP-based coordination—The two WGBs select different APs for the two uplinks if the pre-configured thresholds are met. It can be used to avoid single point of failure.

- Radio-based coordination—The two WGBs select different radio interfaces rather than selecting the same radio interface. It can be used to achieve throughput maximization.

Use the following command to configure radio-based or AP-based coordination. By default, the uplink coordination is disabled.

```
WGB(config)#dot11 coordinator uplink {ap-based|radio-based}
```

Configuring Same Radio Association Forbidden

When two WGBs associate to the same radio because no other radio meets the threshold requirement, the end-to-end traffic can benefit from the redundant wireless link, but the throughput may be affected because of the shared radio.

If you do not want two WGBs to associate to the same radio, you can use the following command to forbid the same radio association:

```
WGB(config)#dot11 coordinator uplink same-radio-forbidden
same-radio-forbidden  not allow WGB associate to same radio
```

When this CLI is configured, if a different radio is scanned by WGB, a minimum RSSI threshold will be checked to avoid an association of poor quality. This RSSI value is defined by the **coordination-uplink threshold rssi** command under the radio interface. If the scanned radio is the same one that the peer WGB is associated with, it will not be associated.

If the peer association information is not available or the peer WGB is not associated, the first WGB will associate to the radio, and synchronize the current uplink RSSI to the peer WGB. The association information is updated when the WGB is associated or disassociated, or when the coordination tunnel between two WGBs is up or down.

If two WGBs are associated to the same radio unexpectedly during booting or communication tunnel up/down period, the RSSI will be compared with the peer WGB. The WGB with poor RSSI will drop the association. If the two RSSI values are identical, the slave WGB will drop the association.

Disassociation or roaming will trigger the peer WGB scan immediately.

If one WGB is associated but the other WGB is not associated, when the associated WGB prepares to roam, it will notify the peer WGB to start association first, and roam after the peer WGB is associate successfully.

> **Note**   The DFS channel takes as long as 110ms to scan. In the same-radio-forbidden mode, one WGB may keep unassociated during this period. To accelerate the association or re-association process, the DFS channel should not be used, otherwise the traffic drop may increase in certain roaming case.

> **Note**   In roaming coordination dual-radio mode, if **same-radio-forbidden** is configured, it works the same as radio-based coordination.

802.11v AP Selection

When 802.11v Basic Service Set (BSS) Transition is enabled, it allows WGB to request for a neighbor list and receive it from the current associated parent AP. WGB can use this list to identify a small set of channels to scan to find a better option of AP to re-associate with. The AP selection of 802.11v uses the existing neighbor list, where the RSSI variation trend is the main consideration for 802.11v AP selection, so only RSSI is stored and updated during the selection, and only the RSSI and the RSSI variation trend (Negative or Positive) will be checked. CU and AP load will not be used in 802.11v AP selection.

If the coordination is AP-based, after the initial selection, the selected AP will check if the RSSI value is greater than the configured threshold. If the RSSI value is not greater than the threshold, the AP will try radio-based coordination. If radio-based coordination fails too, no coordination will take effect.

Verifying the Configuration

The following command shows the current WGB and peer WGB association information if roaming coordination is in single radio mode, or both radio associations information if roaming coordination is in dual radio mode.

```
WGB#show dot11 coordinator association
Uplink Coordination : AP Based
Roaming Coordination : Single Radio mode
Peer info: asso Yes slot 1 bssid cc46.d616.ad8b channel 149
Local info: asso Yes slot 1 bssid 0081.c4d0.26bc channel 36
```

Use the following command to debug WBG association information synchronization:

```
3700-ap#debug dot11 coordinator detail
3700-ap#
*Apr 12 19:41:34.053: DOT11 coordinator set state 3, timeout 0
*Apr 12 19:41:34.053: Look up slot in state 2 from peer radio table
*Apr 12 19:41:34.053: Sync asso info to peer: asso: Yes slot 1 ssid 2cd0.2df5.71dc,
channel 161, rssi 27
3700-ap#
```

Use the following command to debug WGB association and AP selection process:

debug dot11 d[*x*] **trace print uplink**

where *x* is the radio slot ID, 0 or 1.

Dual WGB Distributed PRP

The Cisco Wireless Controller Release 8.7 provides the Dual WGB Distributed PRP feature to extend the existing Dual Radio Parallel Redundancy Protocol Enhancement on WGB functionality to wired connections (see Figure 1). This feature also eliminates the dependency on external PRP switch on WGB side which is needed in the PRP Phase 1 feature (see Parallel Redundancy Protocol Enhancement on AP and WGB).

Note   The Dual WGB Distributed PRP feature is supported only on WGB mode of the IW3700 Series access points.

In Figure 1, two IW3702 access points working in WGB mode interconnect through Ethernet port or via a non-PRP switch, working as master WGB and slave WGB respectively.

A PRP tunnel is introduced between the two WGBs, which is a unique dot1q tagged VLAN between the master and slave WGBs. The upstream traffic goes from the master to the slave, and the downstream traffic goes from the slave to the master.

The switch is to carry the PRP tunnel traffic and the MTU on the switch should be configured to at least 1526 bytes, because of the additional tunnel overhead and PRP trailer.

The major PRP function is implemented on the master WGB, including packet duplication and discard.

For the upstream traffic, the master WGB duplicates the packet. One copy is sent via radio interface, the other will be encapsulated and sent to the slave WGB via the PRP tunnel. When the slave WGB receives the packet, it will decapsulate the packet and send it out via its own radio interface.

For the downstream traffic, both WGBs will receive the identical packet respectively. The packet from the slave side will be encapsulated and sent to the master via the PRP tunnel. When the master WGB receives the packet, it will decapsulate it and filter it through the PRP stack as well as the packet received from its own radio interface, so that the packet discard is completed.

The master WGB will have a virtual interface which contains a radio interface for the WGB role, and an Ethernet interface used as the tunnel.

The wired client is only detected by the master WGB. It will synchronize the client information with the slave WGB.

Figure 1   *Dual WGB Distributed PRP*
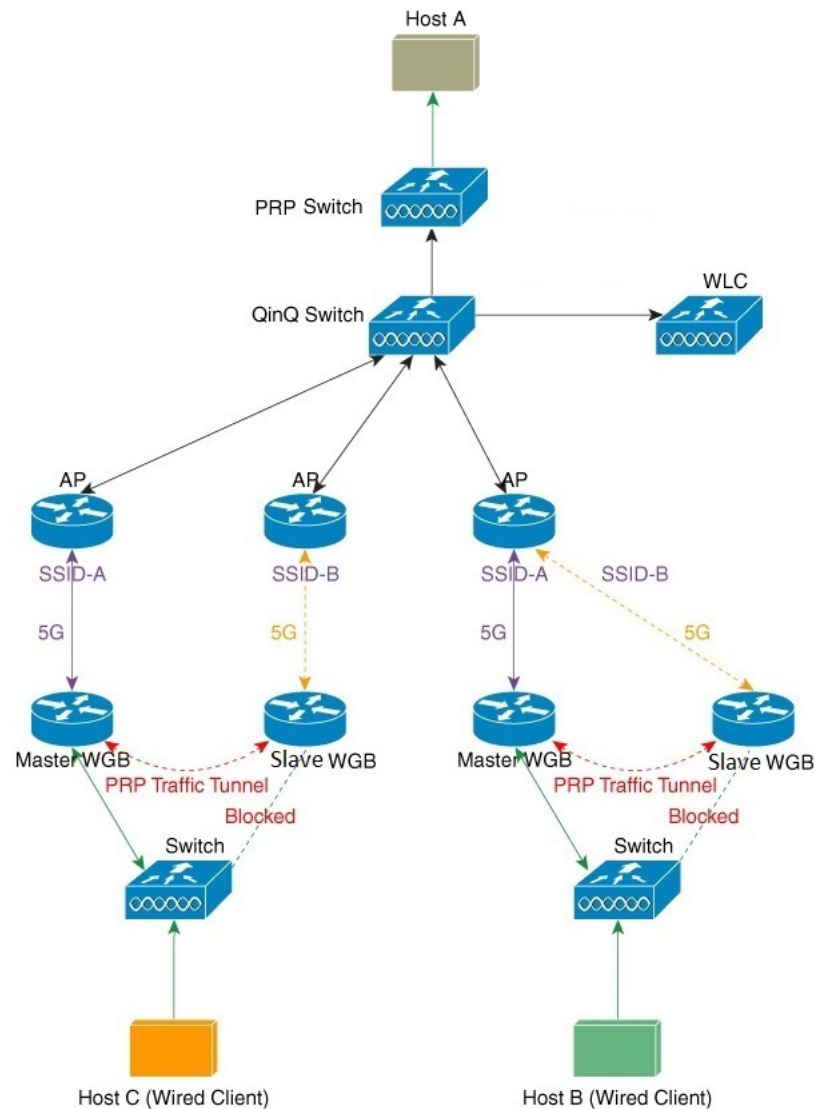
Configuring Dual WGB Distributed PRP Function

> **Note**   If the following commands were configured under the uplink radio interface before, when the WGB Distributed PRP feature is enabled, these configurations will be lost.
> You need to manually reconfigure these commands again:

```
mobile station scan VALUE
mobile station period VALUE threshold VALUE
neighbor-list ignore CCX neighbor-list reports
```

Use the **dot11 wgb dual-uplink** command to configure the Dual WGB Distributed PRP function.

```
iw3702(config-dualuplink)#dot11 wgb dual-uplink
```

```
iw3702(config-dualuplink)#?
Dual-uplink configuration commands:
  exit        Exit from dual-uplink sub mode
  linksel     Link(s) selection method
  mode        Enable specified dual-uplink option
  no          Negate a command or set its defaults
  tunnel      Set tunnel for master/slave mode
```

Use the following command to configure standard PRP redundant links.

```
iw3702(config-dualuplink)#linksel prp
  prp         PRP mode
```

Use the following command to configure the WGB as master or slave WGB.

```
iw3702(config-dualuplink)#mode {master|slave}
  master         dual-wgb master mode
  slave          dual-wgb slave mode
```

Use the following command to configure uplink radio for the master WGB.

```
iw3702(config-dualuplink)#mode master radio
<0-1> Select dual-uplink radio band.
```

Use the following command to configure uplink radio for the slave WGB.

```
iw3702(config-dualuplink)#mode slave radio
 <0-1> Select dual-uplink radio band.
```

Use the following command to configure the PRP tunnel between the master and slave WGBs, where peer-mac is the MAC address of the peer GigabitEthernet interface.

```
iw3702(config-dualuplink)#tunnel interface gigabitEthernet {0|1} vlan XXX peer-mac
XXXX.XXXX.XXXX
```

Example

```
dot11 wgb dual-uplink
    tunnel interface GigabitEthernet 1 vlan 8 peer-mac 0081.c4b3.8039
    linksel prp
    mode master radio 1
```

You should configure a unique tunnel sub-interface on both the master WGB and the slave WGB. The following is an example:

```
interface GigabitEthernet0.8
encapsulation dot1Q 8
bridge-group 8
no bridge-group 8 spanning-disabled
end
```

The IGMP snooping should also be disabled on the tunnel vlan. The following is an example:

```
no ip igmp snooping vlan 8
```

Verifying the Status and Debug Commands

- Use the show dot11 wgb dual-uplink command to check the status of both the master and slave WGBs.

  – Master side:

    ```
    #show dot11 wgb dual-uplink
    Current work mode: master
    Link selection mode: PRP
    ```

```
Available uplink count: 2
Index: 0  Status: UP  Name: Dot11Radio1/Virtual-Dot11Radio0  Peer: a493.4c6e.4f70
Index: 1  Status: UP  Name: GigabitEthernet0.8  Peer: 64f6.9dde.a081
================= PRP STATISTICS ==================
LAN-A Send             :         0
LAN-B Send             :         0
Send Difference        :         0
LAN-A Rcv              :         0
LAN-B Rcv              :         0
Rcv Difference         :         0
LAN-A Error            :         0
LAN-B Error            :         0
Discard                :         0
INTERNAL:Table Usage   :         0
INTERNAL:Max Dup-Delay :         0
===================================================

Client count: 4
    vlan: 9       MAC: 1111.1111.1111
    vlan: 1       MAC: 68f7.28e0.5e6e
    vlan: 9       MAC: 00fe.c826.aa07
    vlan: 1       MAC: 00fe.c826.aa07
```

In above command output, LAN-A values refer to the master WGB radio interface statistics, and LAN-B values refer to the master WGB tunnel interface statistics.

– Slave side:

```
#show dot11 wgb dual-uplink
Current work mode: slave
Link selection mode: PRP
Tunnel heartbeat: in sync
Client count: 4
    vlan: 9       MAC: 1111.1111.1111
    vlan: 1       MAC: 68f7.28e0.5e6e
    vlan: 9       MAC: 00fe.c826.aa07
    vlan: 1       MAC: 00fe.c826.aa07
```

- Use the **clear dot11 wgb dual-uplink statistics** command to clear the statistics.

```
#clear dot11 wgb dual-uplink statistics

clear statistics.
```

- Use the **debug dot11 dual-uplink** command to enable or disable the debug messages.

```
dprp-wgb-1#debug dot11 dual-uplink {bvi|bypass|config|downlink|events|forward|trailer}
  bvi       bvi logs
  bypass    bypass packets with PRP trailer
  config    configuration
  downlink  downlink to debug PRP downstream packets/events
  events    events
  forward   forwarding
  trailer   keep dual_uplink trailer
```

WGB Dynamic Link Forwarding

The WGB Dynamic Link Forwarding feature provides the ability to determine the data forwarding path based on radio metrics when two radio paths between WGB and AP are configured. While keeping both uplinks associated to AP, the uplink with the best link quality (referred to as active link) will be selected to transmit traffic.

To apply this feature, you do not have to change the existing AP facilities as long as they are in local mode or bridge mode. You can fine tune the radio metric thresholds to achieve promising throughput and latency.

The following two modes are supported for the WGB Dynamic Link Forwarding feature:

- Dual WGB Mode—Use one radio, either 2.4G or 5G, as the uplink on each of the two WGBs
- Single WGB Mode—Use both 2.4G and 5G as uplinks on one single WGB

> **Note**   The WGB Dynamic Link Forwarding feature is supported only on the IW3700 Series access points.

The following topics are described for this feature:

- Overview of Dual WGB Mode
- Overview of Single WGB Mode
- Link Metrics Parameters
- Best Link Selection
- Dual WGB Mode Configuration
- Single WGB Mode Configuration
- Debug Commands

Overview of Dual WGB Mode

The dual WGB mode requires to use the same SSID for both master and slave WGBs. While keeping the uplinks of both WGBs associated to the AP, the uplink (WGB) with the best link quality will be selected to transmit traffic. The Internet Access Point Protocol (IAPP) messages are sent to associated AP only by the WGB with the best link quality.

A tunnel between two WGBs is established to switch traffic either from the master WGB or from the slave WGB, but never both. The master WGB detects whether the tunnel between the two WGBs is broken. If three consecutive heartbeat messages (the heartbeat message is sent every 500ms) are lost, the active link will be switched to the master WGB.

Figure 2 shows an example of the dual WGB mode topology where the master WGB has the better link.

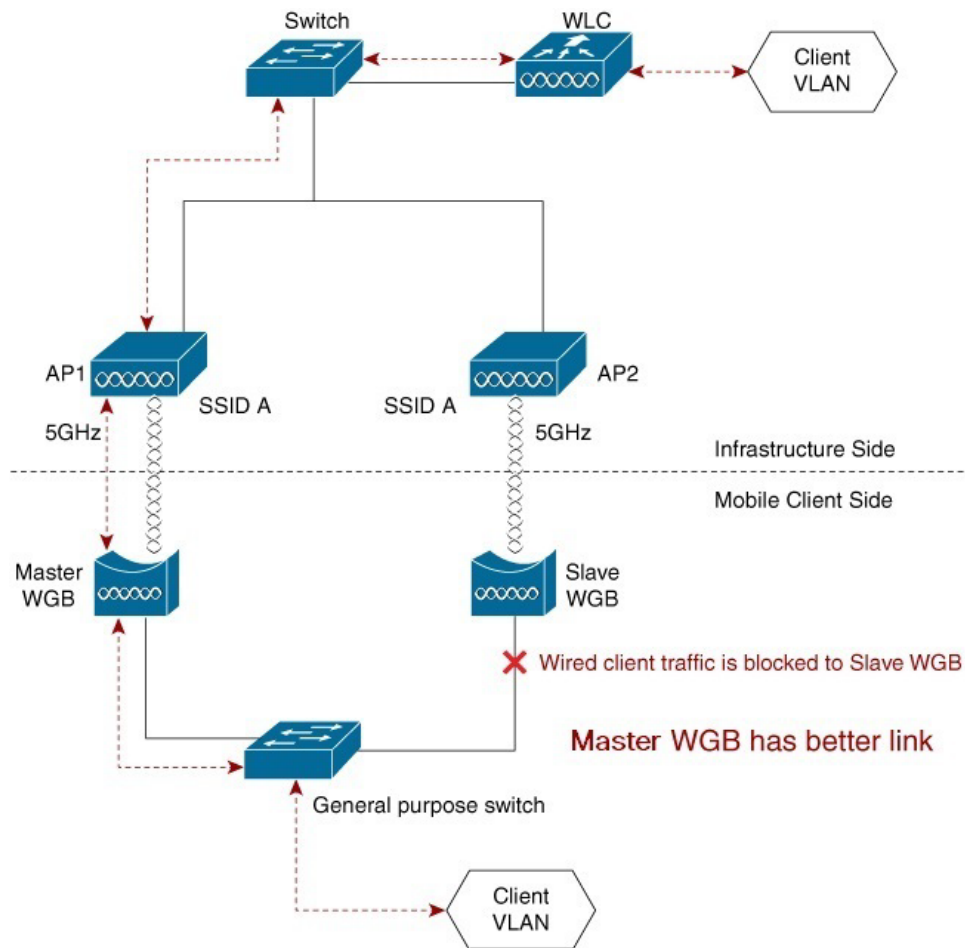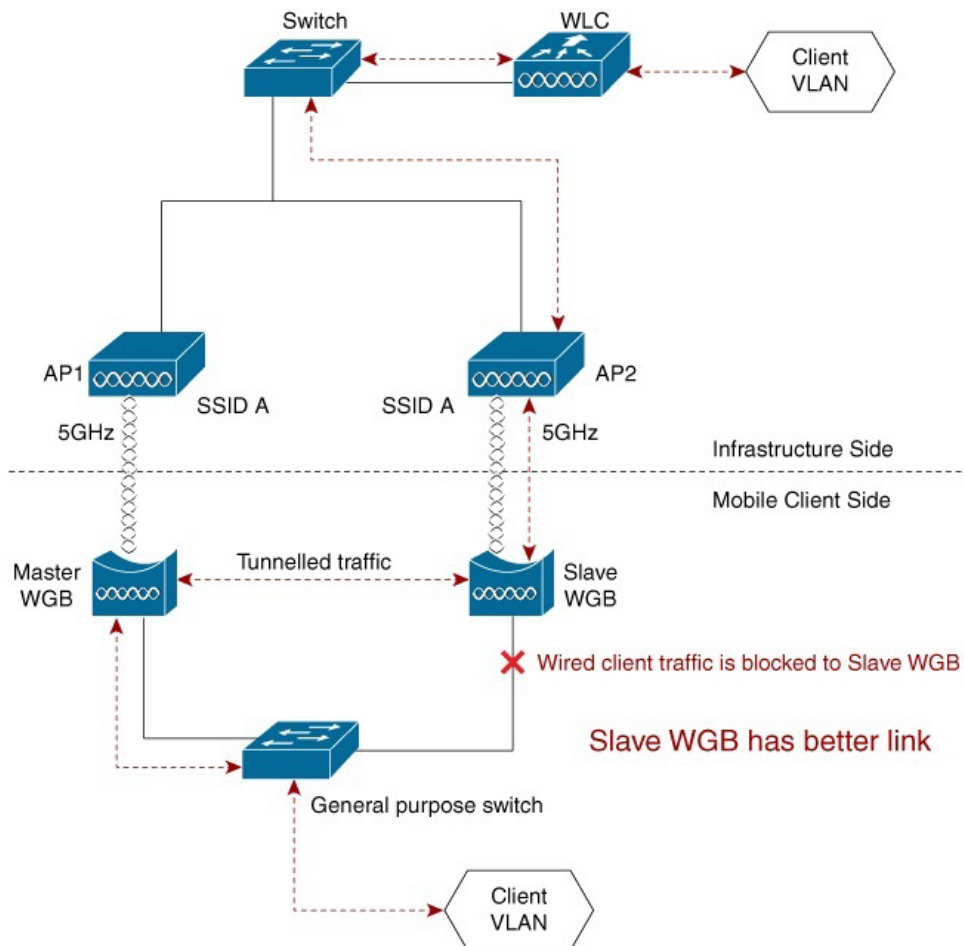*Figure 2*   *Example of Dual WGB Mode With Master WGB Having Better Link*

Figure 3 shows an example of the dual WGB mode topology where the slave WGB has the better link.

Figure 3   Example of Dual WGB Mode With Slave WGB Having Better Link

> **Note**   Even though you are not limited to choose different radio bands on WGBs, it is strongly recommended that you select the same radio band because the link metrics under different radio bands might not be consistent.

> **Note**   The tunnel between two WGBs introduces 20 bytes additional overhead. Make sure that MTU setting on the middle switch does not discard tunneled packets.

Overview of Single WGB Mode

In the single WGB mode, while keeping both 2.4GHz and 5GHz radio uplinks associated to the AP, the radio with the best link quality will be selected to transmit traffic.

The IAPP messages are sent to associated AP only by the radio with best link quality.

Figure 4 shows an example of the single WGB mode topology where the 2.4G radio is the better link.

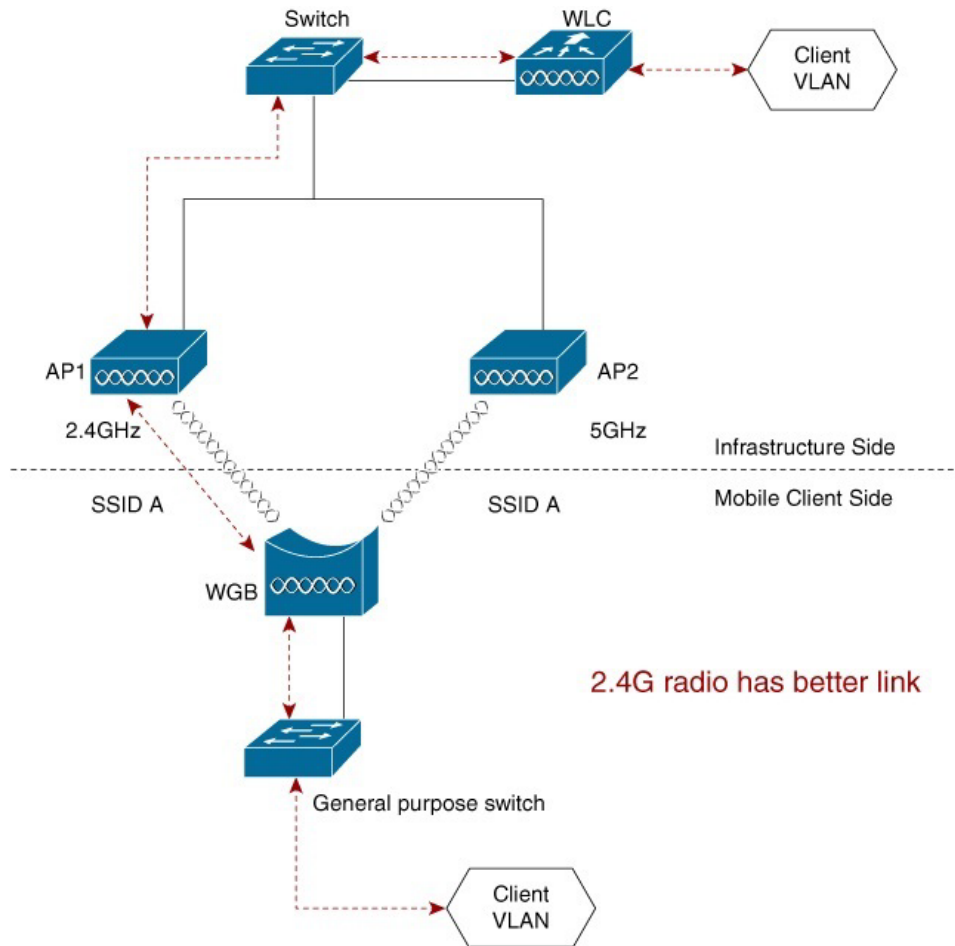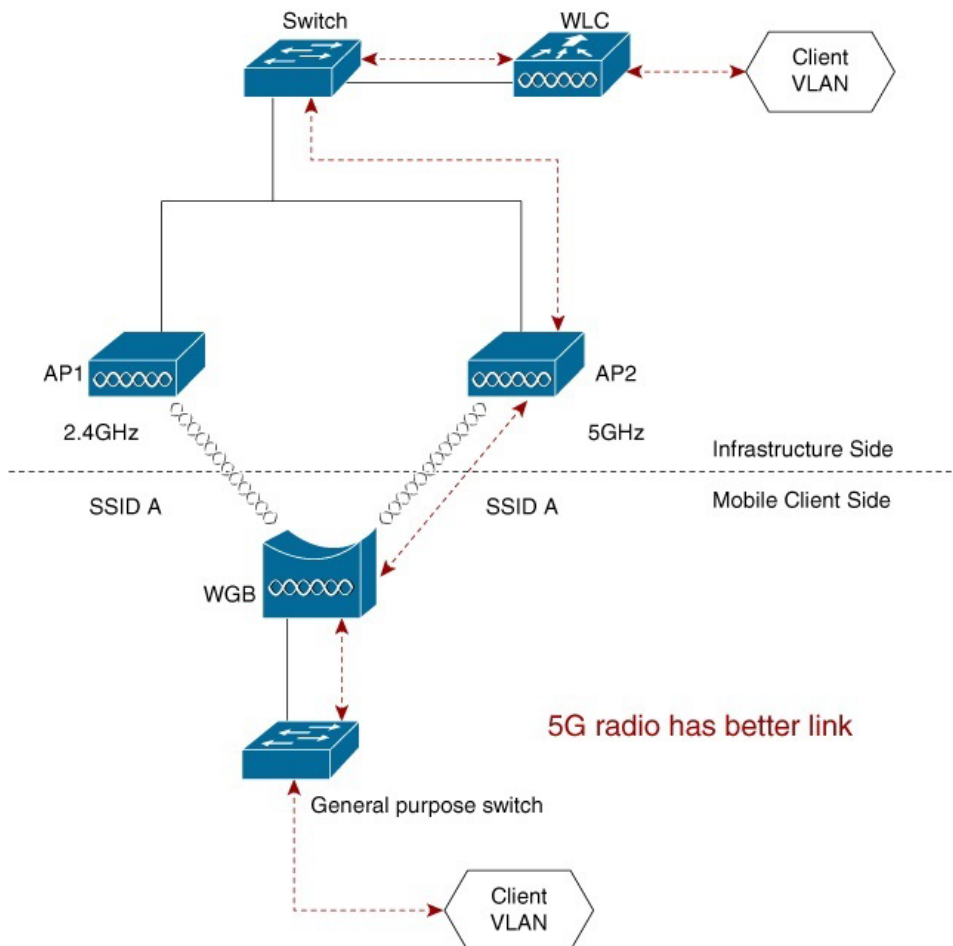*Figure 4*   ***Example of Single WGB Mode Topology With 2.4G Radio as Better Link***

Figure 5 shows an example of the single WGB mode topology where the 5G radio is the better link.

Figure 5   Example of Single WGB Mode With 5G Radio as Better Link

Link Metrics Parameters

Link quality calculation involves the following parameters:

- RSSI
- Current Data Rate (CDR)
- Packet Retry/Packet Drop

The values of these parameter are collected every 500ms by default. But with the threshold setting enabled, a crossover of the threshold event will trigger an update (and hence the recomputing) of the link metrics immediately.

Best Link Selection

Best link selection is based on RSSI/CDR link metrics calculation and packet drop/retry based link metrics calculation. On the inactive side, the CDR and drop/retry data might be inaccurate if there is no traffic. Some test traffic with 200 pps is sent to AP to improve the accuracy of calculation.

Signal strength is one of the important factors that needs to be taken into account when calculating link quality in wireless network. And different data rate is sensitive to signal strength. So RSSI and CDR are used to measure the link quality.

Normally, RSSI/CDR based metrics can evaluate the link quality well. But in some circumstances, best link selection algorithm needs to take packet drop/retry counter of the link into consideration.

When the metrics calculation is triggered, the RSSI/CDR based link metrics is calculated first to select one of the uplinks as the better one.

The data for link quality calculation is collected or updated when the following events happen:

- Periodical polls by timer

    When the timer expires, the current link quality metrics will be retrieved.

    For dual WGB mode, on the slave WGB, the link quality value will be sent to master WGB via the tunnel. The master WGB will compare the values and update the current best-link information.

- Link association status change

    When a link association is down, the link quality of this association will be reset to 0 and the link quality update will be triggered. When the link association is restored and associated to the AP, the link quality update will be triggered as well.

    For dual WGB mode, if the link of the slave WGB is down, the link quality value of 0 will be sent to the master WGB as well. The master WGB will compare the values and update the current best-link information.

    Radio shutdown from WGB or WGB reload will trigger a link association status change event. Link quality will be updated accordingly and active link switch will happen timely.

> **Note** Radio shutdown from AP or AP reload may cause 1-2 seconds traffic loss during the switching. The WGB may not respond timely because it detects loss of AP only after three consecutive beacon frames are lost.

- Link metrics thresholds trigger events

    Link metrics thresholds are configurable via CLI (see (Optional) Configuring Threshold Settings). When the link metric values are above the configured thresholds, a new quality update will be triggered, and the current best-link information will be updated if needed.

    For dual WGB mode, the master WGB will compare the values and update the current best-link information.

- Roaming events

    When roaming happens on the current best link, it will trigger the link metric update, and change the best link to the other.

(Optional) Configuring Threshold Settings

Use the following command to configure the thresholds to trigger RSSI/CDR link metrics calculation:

```
iw3702(config-if)#uplink-metrics {cdr-threshold|rssi-threshold}
  cdr-threshold   current data rate at which bad signal quality start
  rssi-threshold  Signal strength at which bad signal quality start
```

Switch Flapping Prevention

Consecutive switch within one second is forbidden by the algorithm to prevent switch flapping. But in dual-radio case, roaming event triggers switching anyway.

Dual WGB Mode Configuration

This section contains the following topics:

- New Commands for Dual WGB Mode Configuration
- Configuration to Avoid Bridge Loop
- Modifying Existing Dual WGB Mode Configuration
- Configuring Roaming Coordination for Dual WGB Mode
- Verifying the Configuration

New Commands for Dual WGB Mode Configuration

Use the following commands to configure dual WGB mode:

- Enter dual uplink configuration submode:

```
iw3702(config-dualuplink)#dot11 wgb dual-uplink
iw3702(config-dualuplink)#?
Dual-uplink configuration commands:
  exit          Exit from dual-uplink sub mode
  linksel       Link(s) selection method
  mode          Enable specified dual-uplink option
  no            Negate a command or set its defaults
  tunnel        Set tunnel for master/slave mode
```

- Configure link selection method:

```
iw3702(config-dualuplink)#linksel {best|prp}
  best        best quality link
  prp         standard PRP redundant links
```

- Configure master or slave WGB:

```
iw3702(config-dualuplink)#mode {master|slave} radio {0|1}
  master        dual-wgb master mode
  slave         dual-wgb slave mode
```

- Configure tunnel for dual WGB mode:

```
iw3702(config-dualuplink)#tunnel interface gigabitEthernet (0|1) vlan vlan_id
peer-mac  MAC_address
```

In dual WGB mode, a unique tunnel VLAN subinterface must be configured on both WGBs' tunnel Ethernet interface. The following example configures tunnel VLAN 8:

```
interface GigabitEthernet0.8
encapsulation dot1Q 8
bridge-group 8
no bridge-group 8 spanning-disabled
end
```

> ✎
>
> **Note**   The switch port which connects to the slave WGB must block wired client traffic. For the
> configuration of how to block the traffic, refer to the interface configuration of the switch which
> is connected behind the WGB.

Configuration to Avoid Bridge Loop

Wired network on WGB side can introduce a bridge loop if you connect the Ethernet port of two WGBs
directly. You must configure ACL to the Ethernet interface on both WGBs to avoid bridge loop.

```
WGB(config)# access-list 700 deny 0000.0000.0000 ffff.ffff.ffff
```

Configure the following on the Ethernet interface through which WGBs are connected:

```
WGB(config-if)# bridge-group 1
WGB(config-if)# bridge-group 1 input-address-list 700
```

### Modifying Existing Dual WGB Mode Configuration

To change the existing dual WGB mode configuration of WGB tunnel interface number, link selection
method, mode, or radio, which are configured under the **dot11 wgb dual-uplink** submode, follow the
steps below:

Step 1   Disable the Dynamic Link Forwarding feature by using the **no dot11 wgb dual-uplink** command.

Step 2   Execute the **dot11 wgb dual-uplink** command again to enable the feature.

Step 3   Configure WGB tunnel interface number, link selection method, mode, and radio with new values.

Configuring Roaming Coordination for Dual WGB Mode

To reduce the chance of simultaneous roaming, you are recommended to enable the roaming
coordination function. The roaming coordination feature can be configured either on GigabitEthernet0
interface or on a separate GigabitEthernet1 interface.

In the following example, client VLAN 800, SSID VLAN 801, and tunnel VLAN 50 are configured on
the WGBs.
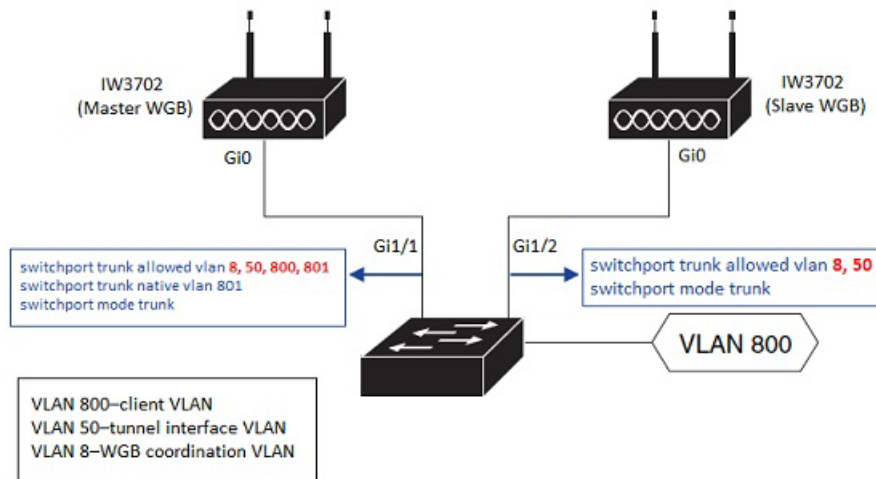
Note VLAN 8, 50, and 800 need to be created locally on this WGB connected switch.

Master WGB Configuration Example

In the following example, peer-mac 0081.c4b3.8038 is obtained by executing the **show interfaces gigabitEthernet 0** comm and on the slave WGB.

```
hostname WGB-MASTER
dot11 coordinator uplink single Dot11Radio1
!
dot11 ssid DYN
 vlan 801
 authentication open
!
dot11 wgb dual-uplink
 tunnel interface GigabitEthernet 0 vlan 50 peer-mac 0081.c4b3.8038
 link-sel best
 mode master radio 1
!
interface Dot11Radio1
 ssid DYN
 mobile station period 1 threshold 68
 station-role workgroup-bridge
!
interface Dot11Radio1.800
 encapsulation dot1Q 800
 bridge-group 2
 bridge-group 2 spanning-disabled
!
interface Dot11Radio1.801
 encapsulation dot1Q 801 native
 bridge-group 1
 bridge-group 1 spanning-disabled
!
interface GigabitEthernet0.8
 encapsulation dot1Q 8
 ip address 192.168.8.50 255.255.255.0
 ip coordinator peer-addr 192.168.8.49
!
interface GigabitEthernet0.800
 encapsulation dot1Q 800
```

```
 bridge-group 2
!
interface GigabitEthernet0.801
 encapsulation dot1Q 801 native
 bridge-group 1
 bridge-group 1 spanning-disabled

interface GigabitEthernet0.50
 encapsulation dot1Q 50
 bridge-group 50
!
workgroup-bridge service-vlan 8
workgroup-bridge unified-vlan-client
```

Slave WGB Configuration Example

In the following example, peer-mac 003a.7d0d.521c is obtained by executing the **show interfaces gigabitEthernet 0** comm and on the master WGB.

```
hostname WGB-SLAVE
dot11 coordinator uplink single Dot11Radio1
!
dot11 ssid DYN
 vlan 801
 authentication open
!
dot11 wgb dual-uplink
 tunnel interface GigabitEthernet 0 vlan 50 peer-mac 003a.7d0d.521c
 link-sel best
 mode slave radio 1

interface Dot11Radio1
 ssid DYN
 mobile station period 1 threshold 65
 station-role workgroup-bridge
!
interface Dot11Radio1.800
 encapsulation dot1Q 800
 bridge-group 2
 bridge-group 2 spanning-disabled
!
interface Dot11Radio1.801
 encapsulation dot1Q 801 native
 bridge-group 1
 bridge-group 1 spanning-disabled
!
interface GigabitEthernet0.8
 encapsulation dot1Q 8
 ip address 192.168.8.49 255.255.255.0
 ip coordinator peer-addr 192.168.8.50
!
interface GigabitEthernet0.50
 encapsulation dot1Q 50
 bridge-group 50
!
workgroup-bridge service-vlan 8
workgroup-bridge unified-vlan-client
```

Verifying the Configuration

Use the **show dot11 wgb dual-uplink** command to view the statistics of the WGB Dynamic Link Forwarding configuration. The following examples show the outputs of master and slave WGBs:

On Master WGB:

```
#show dot11 wgb dual-uplink
Current work mode: master
Link selection mode: BEST
Available uplink count: 2
Index: 0  Status: UP  Name: Dot11Radio1/Virtual-Dot11Radio0  Peer: 7070.8bc7.aceb
Index: 1  Status: UP  Name: GigabitEthernet0.8  Peer: 3890.a5a0.69b4
Best-link Selected: NO
Wired Client count: 2
    vlan: 831     MAC: f40f.1b8b.ce92
    vlan: 823     MAC: f40f.1b8b.ce92
Sync with slave: YES
Statistics:
    Radio Send: 460132, Rcv: 666232923
    Tunnel Send: 666506066, Rcv: 34020
    Link Switches    : 820
    Cdr-rssi events  : 820
    Retry events     : 0
```

On Slave WGB:

```
#show dot11 wgb dual-uplink
Current work mode: slave
Link selection mode: BEST
Best-link Selected: YES
Wired Client count: 2
    vlan: 831     MAC: f40f.1b8b.ce92
    vlan: 823     MAC: f40f.1b8b.ce92
Sync with master: YES
Statistics:
    Radio  Send: 666509287, Rcv: 34018
    Tunnel Send: 34018, Rcv: 666509301
```

Single WGB Mode Configuration

This section contains the following topics:

- New Commands for Single WGB Mode Configuration
- Modifying Existing Single WGB Mode Configuration
- Examples of Single WGB Mode Configuration
- Verifying the Configuration

New Commands for Single WGB Mode Configuration

Use the following commands to configure single WGB mode:

- Enter dual uplink configuration submode:

```
iw3702(config-dualuplink)#dot11 wgb dual-uplink
iw3702(config-dualuplink)#?
Dual-uplink configuration commands:
  exit        Exit from dual-uplink sub mode
  linksel     Link(s) selection method
  mode        Enable specified dual-uplink option
  no          Negate a command or set its defaults
```

- Configure link selection method:

```
iw3702(config-dualuplink)#linksel {best|prp}
  best        best quality link
  prp         standard PRP redundant links
```

- Configure BVI interface:

```
iw3702(config-dualuplink)#mode dual-radio bvi-vlanid vlan_id
```

where *bvi-vlanid* is the VLAN ID of the BVI interface for single WGB mode.

> ✎
>
> **Note**   In single WGB mode, BVI is treated as a wired client. You need to specify the *vlan_id* explicitly by the optional CLI **bvi-vlanid**, so that BVI can be assigned with IP address properly by WLC.

To disable the Dynamic Link Forwarding feature of single WGB mode, the software reload is required after you disable this feature.

Modifying Existing Single WGB Mode Configuration

To change the existing single WGB mode configuration of link selection method, or BVI vlan_id, which are configured under the **dot11 wgb dual-uplink** submode, follow the steps below:

Step 1   Disable the Dynamic Link Forwarding feature by using the **no dot11 wgb dual-uplink** command.

Step 2   Execute the **dot11 wgb dual-uplink** command again to enable the feature.

Step 3   Configure link selection method, mode, and BVI vlan_id with new values.

Examples of Single WGB Mode Configuration

This section contains two configuration examples of the single WGB mode for different scenarios.

Single WGB Mode Configuration Example 1

In this example, the WGB connects to a switch and supports multiple VLANs, where VLAN 201 maps to management interface, and VLAN 800 serves for wired client which resides in dynamic interface 800.

```
dot11 ssid dyn
  vlan 201
  authentication open
!
dot11 wgb dual-uplink
  link-sel best
  mode dual-radio bvi-vlanid 201
!
interface Dot11Radio0
 no ip address
 ssid dyn
 station-role workgroup-bridge
interface Dot11Radio0.201
 encapsulation dot1Q 201 native
 bridge-group 1
 no bridge-group 1 spanning-disabled
interface Dot11Radio0.800
 encapsulation dot1Q 800
 bridge-group 2
 bridge-group 2 spanning-disabled
!
interface Dot11Radio1
 no ip address
 ssid dyn
 station-role workgroup-bridge
!
interface Dot11Radio1.201
 encapsulation dot1Q 201 native
 bridge-group 1
 no bridge-group 1 spanning-disabled
!
interface Dot11Radio1.800
 encapsulation dot1Q 800
 bridge-group 2
 bridge-group 2 spanning-disabled
!
interface GigabitEthernet0
  duplex auto
 speed auto
 bridge-group 1
 bridge-group 1 spanning-disabled
!
interface GigabitEthernet0.800
 encapsulation dot1Q 800
 bridge-group 2
 bridge-group 2 spanning-disabled
!
workgroup-bridge unified-vlan-client
```

Single WGB Mode Configuration Example 2

In this example, the WGB connects to a host, which means it does not support multiple VLANs.

```
dot11 ssid dyn
  authentication open
```

```
!
dot11 wgb dual-uplink
  link-sel best
  mode dual-radio
!
interface Dot11Radio0
 no ip address
 ssid dyn
 station-role workgroup-bridge
 bridge-group 1
 no bridge-group 1 spanning-disabled
!
interface Dot11Radio1
 no ip address
 ssid dyn
 station-role workgroup-bridge
 bridge-group 1
 no bridge-group 1 spanning-disabled
!
interface GigabitEthernet0
  duplex auto
 speed auto
  bridge-group 1
  bridge-group 1 spanning-disabled
```

Verifying the Configuration

Use the **show dot11 wgb dual-uplink** command to view the statistics of the WGB Dynamic Link Forwarding configuration. The following example shows the output of single WGB mode configuration:

```
#show dot11 wgb dual-uplink
Current work mode : dual-radio
Link selection mode : BEST
Available uplink count: 2
Best-link selected : Dot11Radio1
Index: 0 Status: UP Name: Dot11Radio0/Virtual-Dot11Radio0 Peer: 4c77.6d5d.ebf0
Index: 1 Status: UP Name: Dot11Radio1/Virtual-Dot11Radio1 Peer: 00a7.42ba.eebf
================================================================
Dot11Radio0          Send: 291355          UnicastRcv: 206415
Dot11Radio1          Send: 11306825        UnicastRcv: 11016248
Dot11Radio0    MulticastRcv: 0              BroadcastRcv: 69
Dot11Radio1    MulticastRcv: 0              BroadcastRcv: 54
Dot11Radio0  NotBestButSend: 0           NotBestButRcv: 6525
Dot11Radio1  NotBestButSend: 0           NotBestButRcv: 863
Dot11Radio0 NotBestButRcvBC: 93        NotBestButRcvMC: 0
Dot11Radio1 NotBestButRcvBC: 4         NotBestButRcvMC: 0
Dot11Radio0       DualSend: 0
Dot11Radio1       DualSend: 0
Dot11Radio0       RoamSend: 232433
Dot11Radio1       RoamSend: 0
================================================================
Link switches: 99
Cdr-rssi events : 65
Retry events    : 0
Roaming events  : 34

Wired client count: 4
    vlan: 819    MAC: 3037.a623.4f89
    vlan: 819    MAC: 0030.9400.0002
    vlan: 1      MAC: 3037.a623.4f89
    vlan: 823    MAC: 3037.a623.4f89
```

Debug Commands

Use the **clear dot11 wgb dual-uplink statistics** command to clear the statistics.

Use the **(no) debug dot11 dual-uplink dynlink** command to enable or disable best link selection debug messages.

Roam-Base Dynamic Link Forwarding

Roam-Base Dynamic Link Forwarding was introduced in Cisco Wireless Release 8.10.130.0, as an enhancement to the existing WGB Dynamic Link Forwarding feature, where the best link switch will happen based on CDR/RSSI, Retry/Drop and during roaming events. But, this Roam-Base Dynamic Link Forwarding enhancement allows the best link switch to happen only during the roaming events and to stay intact until the next roam triggers on the active link.

For dual WGB mode, when the roam-base CLI is configured, the link switch happens only when either of the WGBs holding the best link goes for roam.

For single WGB mode, when the roam-base CLI is configured, the link switch happens only when either of the radios holding the best link goes for roam. In addition, a preferred radio can be configured so that the best link stays intact with selected radio until it roams, and gets back the best link once it completes the roam.

This section contains the following topics:

- Configuring Dual WGB Mode
- Configuring Single WGB Mode
- Configuring Roam-Base Best Link Selection With Preferred Radio for Single WGB Mode

Configuring Dual WGB Mode

Follow these steps to configure roam-base best link selection for dual WGB mode:

Step 1 Enter dual uplink configuration submode:

```
IW3702(config)#dot11 wgb dual-uplink
IW3702(config-dual-uplink)#?
Dual-uplink configuration commands:
  exit      Exit from dual_uplink sub mode
  link-sel  Link(s) selection method
  mode      Enable specified dual-uplink option
  no        Negate a command or set its defaults
  tunnel    Set tunnel for master/slave mode
```

Step 2 Configure tunnel for dual WGB mode:

```
IW3702(config-dualuplink)#tunnel interface gigabitEthernet (0|1) vlan vlan_id peer-mac
MAC_address
```

Step 3 Configure roam-base link selection method:

```
IW3702(config-dual-uplink)#link-sel ?
  best  Best quality link
  prp   Standard PRP redundant links

IW3702(config-dual-uplink)#link-sel best ?
  roam-base  Link Switch through Roaming
IW3702(config-dual-uplink)#link-sel best {roam-base}
```

Step 4   Configure primary or secondary WGB:

```
IW3702(config-dualuplink)#mode {master|slave} radio (0|1)
master      Dual-wgb master mode
slave       Dual-wgb slave mode
```

Primary WGB Configuration Example

```
dot11 ssid test
   authentication open
!
dot11 coordinator uplink single Dot11Radio1
dot11 wgb dual-uplink
  tunnel interface GigabitEthernet 1 vlan 10 peer-mac f80f.6f48.ba00
  link-sel best roam-base
  mode master radio 1
!
interface Dot11Radio1
 no ip address
 !
 ssid dlf
 !
 antenna gain 0
 peakdetect
 station-role workgroup-bridge
 mobile station period 1 threshold 68
 bridge-group 1
 bridge-group 1 spanning-disabled
```

Secondary WGB Configuration Example

```
dot11 ssid dlf
   authentication open
!
dot11 coordinator uplink single Dot11Radio1
dot11 wgb dual-uplink
  tunnel interface GigabitEthernet 1 vlan 10 peer-mac f80f.6f48.bad0
  link-sel best roam-base
  mode slave radio 1
!
interface Dot11Radio1
 no ip address
 !
 ssid dlf
 !
 antenna gain 0
 peakdetect
 station-role workgroup-bridge
 mobile station period 1 threshold 68
 bridge-group 1
 bridge-group 1 spanning-disabled
```

Note   In case of roam-base best link selection method, the uplink-metrics configuration under radio interfaces are not required and will not be accepted even if you try to configure it.

Verifying the Configuration

To verify the configuration, use the **show dot11 wgb dual-uplink** command on primary and secondary WGBs.

Output on primary WGB:

```
Current work mode: Master
Link selection mode: BEST
available uplink count: 2
Index: 0 Status: UP Name: Dot11Radio0/Virtual-Dot11Radio0 Peer: 7070.8bc7.aceb
Index: 1 Status: UP Name: GigabitEthernet0.8 Peer: 3890.a5a0.69b4
Best-link: NO
Client count: 2
vlan: 831 MAC: f40f.1b8b.ce92
vlan: 823 MAC: f40f.1b8b.ce92
Sync with slave: YES
Statistics:
Radio Send: 460132, Rcv: 666232923
Tunnel Send: 666506066, Rcv: 34020
Link Switches : 820
Cdr-rssi events : 820
Retry events : 0
```

Output on secondary WGB:

```
Current work mode: Slave
Link selection mode: BEST
Best-link: YES
Client count: 2
vlan: 831 MAC: f40f.1b8b.ce92
vlan: 823 MAC: f40f.1b8b.ce92
Sync with master: YES
Statistics:
Radio Send: 666509287, Rcv: 34018
Tunnel Send: 34018, Rcv: 666509301
```

Configuring Single WGB Mode

Follow these steps to configure roam-based best link selection for single WGB mode:

Step 1   Enter dual uplink configuration submode:

```
IW3702(config)#dot11 wgb dual-uplink
IW3702(config-dual-uplink)#?
Dual-uplink configuration commands:
  exit      Exit from dual_uplink sub mode
  link-sel  Link(s) selection method
  mode      Enable specified dual-uplink option
  no        Negate a command or set its defaults
  tunnel    Set tunnel for master/slave mode
```

Step 2   Configure roam-base link selection method:

```
IW3702(config-dual-uplink)#link-sel ?
  best  Best quality link
  prp   Standard PRP redundant links

IW3702(config-dual-uplink)#link-sel best ?
  roam-base  Link Switch through Roaming
IW3702(config-dual-uplink)#link-sel best {roam-base}
```

Step 3   Configure mode:

```
IW3702(config-dual-uplink)#mode ?
  dual-radio  Dual-radio mode
IW3702(config-dual-uplink)#mode dual-radio
```

Configuration Example

```
dot11 ssid dlf
   authentication open
!
dot11 coordinator uplink both
dot11 wgb dual-uplink
  link-sel best roam-base
  mode dual-radio
!
interface Dot11Radio0
 no ip address
 !
 ssid dlf
 !
 antenna gain 0
 station-role workgroup-bridge
mobile station period 1 threshold 65
 bridge-group 1
 bridge-group 1 spanning-disabled
!
interface Dot11Radio1
 no ip address
 !
 ssid dlf
 !
 antenna gain 0
 peakdetect
 station-role workgroup-bridge
 mobile station period 1 threshold 68
 bridge-group 1
 bridge-group 1 spanning-disabled
```

Verifying the Configuration

To verify the configuration:

```
IW3702#show dot11 wgb dual-uplink
Current work mode      : dual-radio
Link selection mode    : BEST
Available uplink count: 2
Best-link selected     : Dot11Radio0
Index: 0  Status: UP  Name: Dot11Radio0/Virtual-Dot11Radio0  Peer: 00ee.ab25.6860
Index: 1  Status: UP  Name: Dot11Radio1/Virtual-Dot11Radio1  Peer: 00ee.ab25.686f
================================================================
Dot11Radio0          Send: 10             UnicastRcv: 17
Dot11Radio1          Send: 0              UnicastRcv: 0
Dot11Radio0    MulticastRcv: 9          BroadcastRcv: 0
Dot11Radio1    MulticastRcv: 0          BroadcastRcv: 0
Dot11Radio0  NotBestButSend: 0          NotBestButRcv: 0
Dot11Radio1  NotBestButSend: 0          NotBestButRcv: 11
Dot11Radio0 NotBestButRcvBC: 0         NotBestButRcvMC: 0
Dot11Radio1 NotBestButRcvBC: 0         NotBestButRcvMC: 9
Dot11Radio0        DualSend: 0
```

```
Dot11Radio1       DualSend: 0
Dot11Radio0       RoamSend: 0
Dot11Radio1       RoamSend: 0
==============================================================

Link switches: 1
Cdr-rssi events : 1
Retry events    : 0
Roaming events  : 0
        D0 Roaming  events     :0
        D1 Roaming  events     :0
Background Traffic PPS : 0

Wired client count: 0
```

Configuring Roam-Base Best Link Selection With Preferred Radio for Single WGB Mode

When preferred radio is configured with roam-base link selection for dual-radio of single WGB mode, the best link sticks with the preferred radio. When the preferred radio goes for roam, the best link changes to the other radio. Once the roam is completed, the best link will change back to the preferred radio from non-preferred radio.

Note   The preferred radio configuration is not applicable to dual WGB mode.

Follow these steps to configure roam-based best link selection with preferred radio for single WGB mode:

Step 1   Enter dual uplink configuration submode:

```
IW3702(config)#dot11 wgb dual-uplink
IW3702(config-dual-uplink)#?
Dual-uplink configuration commands:
  exit      Exit from dual_uplink sub mode
  link-sel  Link(s) selection method
  mode      Enable specified dual-uplink option
  no        Negate a command or set its defaults
  tunnel    Set tunnel for master/slave mode
```

Step 2   Configure roam-base link selection method and preferred radio:

```
IW3702(config-dual-uplink)#link-sel ?
  best  Best quality link
  prp   Standard PRP redundant links

IW3702(config-dual-uplink)#link-sel best ?
  roam-base  Link Switch through Roaming
IW3702(config-dual-uplink)#link-sel best {roam-base}

IW3702(config-dual-uplink)#link-sel best roam-base ?
  prefer-radio  Select preferred radio
IW3702(config-dual-uplink)#link-sel best roam-base {prefer-radio}

IW3702(config-dual-uplink)#link-sel best roam-base prefer-radio ?
  <0-1>  Dot11Radio interface number
IW3702(config-dual-uplink)#link-sel best roam-base prefer-radio {0|1}
```

Step 3   Configure mode:

```
IW3702(config-dual-uplink)#mode ?
  dual-radio  Dual-radio mode
IW3702(config-dual-uplink)#mode dual-radio
```

Configuration Example

```
dot11 ssid dlf
   authentication open
!
dot11 coordinator uplink both
dot11 wgb dual-uplink
  link-sel best roam-base prefer-radio 0
  mode dual-radio
!
interface Dot11Radio0
 no ip address
 !
 ssid dlf
 !
 antenna gain 0
 station-role workgroup-bridge
mobile station period 1 threshold 65
 bridge-group 1
 bridge-group 1 spanning-disabled
!
interface Dot11Radio1
 no ip address
 !
 ssid dlf
 !
 antenna gain 0
 peakdetect
 station-role workgroup-bridge
 mobile station period 1 threshold 68
 bridge-group 1
 bridge-group 1 spanning-disabled
```

Verifying the Configuration

To verify the configuration:

```
IW3702#show dot11 wgb dual-uplink
Current work mode     : dual-radio
Link selection mode   : BEST
Available uplink count: 2
Best-link selected    : Dot11Radio0
Index: 0  Status: UP  Name: Dot11Radio0/Virtual-Dot11Radio0  Peer: 00ee.ab25.6860
Index: 1  Status: UP  Name: Dot11Radio1/Virtual-Dot11Radio1  Peer: 00ee.ab25.686f
================================================================
Dot11Radio0          Send: 0              UnicastRcv: 0
Dot11Radio1          Send: 1              UnicastRcv: 0
Dot11Radio0    MulticastRcv: 2          BroadcastRcv: 0
Dot11Radio1    MulticastRcv: 0          BroadcastRcv: 0
Dot11Radio0  NotBestButSend: 0          NotBestButRcv: 0
Dot11Radio1  NotBestButSend: 0          NotBestButRcv: 0
Dot11Radio0 NotBestButRcvBC: 0        NotBestButRcvMC: 0
Dot11Radio1 NotBestButRcvBC: 0        NotBestButRcvMC: 2
Dot11Radio0       DualSend: 0
Dot11Radio1       DualSend: 0
Dot11Radio0       RoamSend: 0
Dot11Radio1       RoamSend: 0
```

```
==================================================================

Link switches: 2
Cdr-rssi events : 1
Retry events    : 0
Roaming events  : 0
        D0 Roaming  events     :0
        D1 Roaming  events     :0
Prefer radio link switch events :1
Background Traffic PPS : 0

Wired client count: 0
```

> ✎ **Note**   In case of roam-base best link selection method in single WGB mode, for both roam-base or roam-base with preferred radio, the uplink-metrics configuration under either radio interface is not required. Even if you try to configure it, the command will not be accepted.

Configuring IGMP Snooping Static Entry on IW3702

Internet Group Management Protocol (IGMP) snooping streamlines multicast traffic handling for VLANs. By examining (snooping) IGMP membership report messages from interested hosts, multicast traffic is limited to the subset of VLAN interfaces on which the hosts reside.

From AireOS 8.8, WGBs can be configured to receive flooded downstream multicast from any dynamic interface defined in the IGMP snooping static table. The client behind WGB can receive multicast packets without sending IGMP join message.

You can also determine whether the entry in IGMP snooping table is added statically, or dynamically by device IGMP join message.

> ✎ **Note**   This feature is supported only for the Cisco IW3702 Access Point.

WLC Configuration

If the client behind WGB cannot send IGMP join, for the WGB to receive multicast packets, IGMP snooping should be disabled on WLC. Use the following command to enable WLC multicast and disable IGMP snooping:

```
(Cisco Controller)>Config network multicast global enable
(Cisco Controller)>Config network multicast igmp snooping disable
```

WGB Configuration

Before configure IGMP snooping static entry on WGB, make sure that the following are configured:

- Enable IGMP snooping on WGB with the following command:

  ```
  wgb(config)#ip igmp snooping
  ```

- Enable wgb unified-vlan-client on WGB with the following command:

  ```
  wgb(config)#workgroup-bridge unified-vlan-client
  ```

To configure IGMP Snooping static group, use the following command:

(config)#**ip igmp snooping vlan** *<vlan-id>* **static** *<group-address>* **interface** *<interface>*

Note   The VLAN ID should be the same as the VLAN of GigabitEthernet subinterface.

Example

```
ip igmp snooping vlan 800 static 226.1.1.1 interface GigabitEthernet0.800
ip igmp snooping vlan 900 static 226.1.1.1 interface GigabitEthernet0.900
…
interface Dot11Radio1
 no ip address
 !
 encryption mode ciphers aes-ccm
 !
 ssid wgb_test
 !
 antenna gain 0
 peakdetect
 stbc
 station-role workgroup-bridge
 bridge-group 1
 bridge-group 1 spanning-disabled
…
interface GigabitEthernet0.800
 encapsulation dot1Q 800 native
 bridge-group 1
 no bridge-group 1 spanning-disabled
!
interface GigabitEthernet0.900
 encapsulation dot1Q 900
 bridge-group 2
 no bridge-group 2 spanning-disabled
…
workgroup-bridge unified-vlan-client
```

Verifying the Configuration

To display configured static groups, use the following command:

#**show ip igmp snooping groups vlan** *<vlan-id>*

Example

```
WGB#show ip igmp snooping groups vlan 800
Vlan      Group        Type      Version     Port List
-----------------------------------------------------------
800       226.1.1.1    user                  GigabitEthernet0.800
800       226.0.0.13   igmp      v2          GigabitEthernet0.800
```

Cisco AP803 Integrated Access Point

This section contains the following features which are specific to the CiscoAP803 Integrated Access Points.

- Configuring Web Passthrough Captive Portal Support
- Configuring Service VLAN

Configuring Web Passthrough Captive Portal Support

The Web Passthrough Captive Portal Support feature is an extension of Autonomous AP Web Passthrough feature, to enable mobile devices to automatically complete the authentication process with the help of Captive Portal Assistant (CPA) of the mobile devices.

When a mobile device connects to the Wi-Fi SSID of IR829 AP803, the mobile device's CPA launches a popup browser window, showing the consent page sent by captive portal. When the "Accept" button on the consent page is clicked, the browser window refreshes to display the "Thanks for accepting …" page. After several seconds, the "Thanks for accepting …" page redirects to another URL and the client is allowed to connect to the internet.

You can also configure the following functions of this feature:

- Customization of the consent page

  By default, the consent page is an empty page which only contains the "Accept" and "Not accept" buttons. This feature allows you to customize the consent page by using your own template which contains customized content or advertisements. Copy your own template HTML file into the flash drive and execute the following command to set it as the consent template:

  ip admission consent-banner file flash:*custom-consent-page.html*

- Avoid Consent Expired error on Android devices

  Sometimes the Android devices get unexpected "Consent Expired" error when accepting the consent. To support most Android devices and support embedding advertisement in consent page without causing the false "consent expired" error, use the following command to increase the timestamp queue:

  ip admission max-login-attempts *<count>*

  where the value of *<count>* has the default of 5, and maximum of 64.

- Redirection after accepting the consent

  If you want to redirect the clients to another URL after the they accept the consent other than displaying the default "Thanks for accepting …" page, use the following command:

  ip admission proxy http success redirect *<URL>*

  where *<URL>* is the redirect URL that you want the clients to be redirected after they accept the consent.

- Advertisements in consent page

  If you want to embed advertisements from some external server on the consent page before the clients accept the consent, you should add the IP address of advertisement server into access list using the following command:

  dot11 webauth allowed incoming ad_server outgoing ad_server
  ip access-list extended ad_server

```
       permit tcp any host ip_address
```

- Web pass through customization can have both file and text. Use the following CLI for the custom consent page with text:

```
ip admission consent-banner text <LINE c banner-text c>
```

where 'c' is a delimiting character.

Configuration Example

Before you start, enable the existing Web Passthrough feature with the exiting commands.

> **Note** Do not embed too many advertisements in the consent page. If the HTTP request count of your advertisements is larger than 63, the timestamp queue will be overwritten. It will cause the Consent Expired error.

Follow these steps to configure AP803:

Step 1 Basic configuration.

```
ip admission name webpass consent param-map webpass
parameter-map type consent webpass
ip http server
no ip http secure-server
```

Step 2 Customize the consent page.

```
ip admission consent-banner file flash:custom-consent-page.html
```

Step 3 Support most Android devices and support embedding advertisement in consent page by increasing the timestamp queue.

```
ip admission max-login-attempts 64
```

Step 4 Set redirect URL, for example, http://cisco.com.

```
ip admission proxy http success redirect http://cisco.com/
```

Step 5 Create web passthrough SSID.

```
dot11 ssid webpass-ssid
    authentication open
    web-auth
    guest-mode
```

Step 6 Associate the SSID configuration to dot11Radio configuration. You can use either do11Radio 0 or dot11Radio 1.

```
interface dot11Radio 0
    ssid webpass-ssid
    ip admission webpass
    station-role root
```

Step 7 Create whitelist for the advertisement server, for example, 72.163.4.161.

```
dot11 webauth allowed incoming ad_server outgoing ad_server
ip access-list extended ad_server
    permit tcp any host 72.163.4.161
```

Configuring Service VLAN

The service VLAN function provides additional layer-3 subinterface for WGB mode. You can use the sub-interface as another management interface, create the service VLAN, and configure sub-interface of the VLAN under the Ethernet interface.

Supported mode:

- WorkGroup Bridge (WGB)
- Universal WorkGroup Bridge (uWGB)

Supported platform:

- Cisco IW3702 Access Point
- AP803

Follow these steps to configure service VLAN:

Step 1   Use the following command to configure the service VLAN with a vlan ID:

```
WGB(config)#workgroup-bridge service-vlan <vlan_id>
```

Example:

```
WGB(config)#workgroup-bridge service-vlan 10
```

Step 2   Use the following commands to configure the sub-interface:

```
WGB(config)#interface GigabitEthernet1.10
WGB(config-subif)#encapsulation dot1q 10
WGB(config-subif)#ip address 10.0.0.1 255.255.255.0
```

Note   The service VLAN feature is supported on the GigabitEthernet interface which is also configured with sub-interface in bridge mode.

Note   Do NOT configure bridge group under the sub-interface.