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Introduction

This example provides a sample configuration of Cisco Intelligent Services Gateway (ISG) deployed in a service provider's broadband network that is delivering triple-play services to subscribers through DSL, Ethernet, and WiMAX access.

Design

DSL, Ethernet and Fixed WiMAX Access

- DSL Forum TR-101 functions
- Metro Ethernet Forum (MEF) 6/10 Ethernet services models
- N:1 and 1:1 VLAN multiplexing models
- Multi VC, trunk and non-trunk user network interface (UNI) options
- Ethernet to the home and business (ETTx) Spanning-Tree Protocol (STP) access rings and hub and spoke
- WiMAX nodes integrated in the ETTx access
- DSL access nodes with redundant connectivity

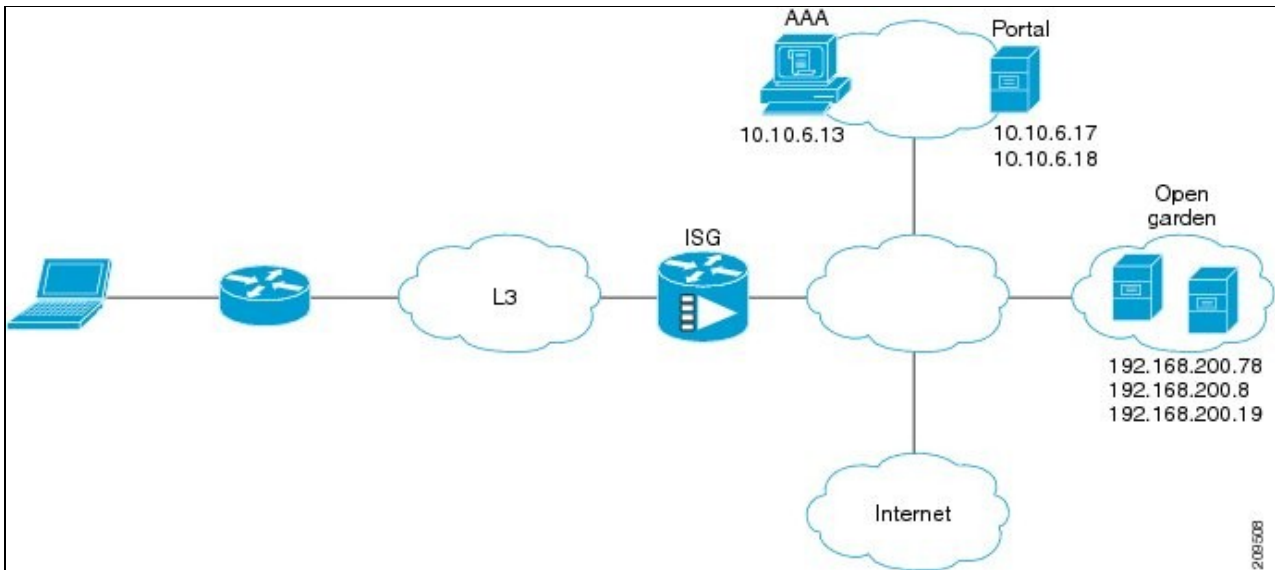
Transport Functions between Access and Edge

- Intelligent access multiplexing
- MPLS/IP Layer 2 and Layer 3 transport services
- Transparent virtualized Ethernet point-to-point (P2P) and multipoint (MP) transport (EoMPLS and H-VPLS) for services with IP/L3VPN/L2VPN Edge in broadband network gateway (BNG) and multiservice edge (MSE)
- Service-aware IP transport for triple-play services (IPTV, VoD, Voice)
- L2/L3 MPLS/IP transport layer provides flexibility scalability, transparency, virtualization and service awareness when required
- Aggregation network provides the option for implementing L2/L3 business VPN services

Subscriber and Service Edge

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

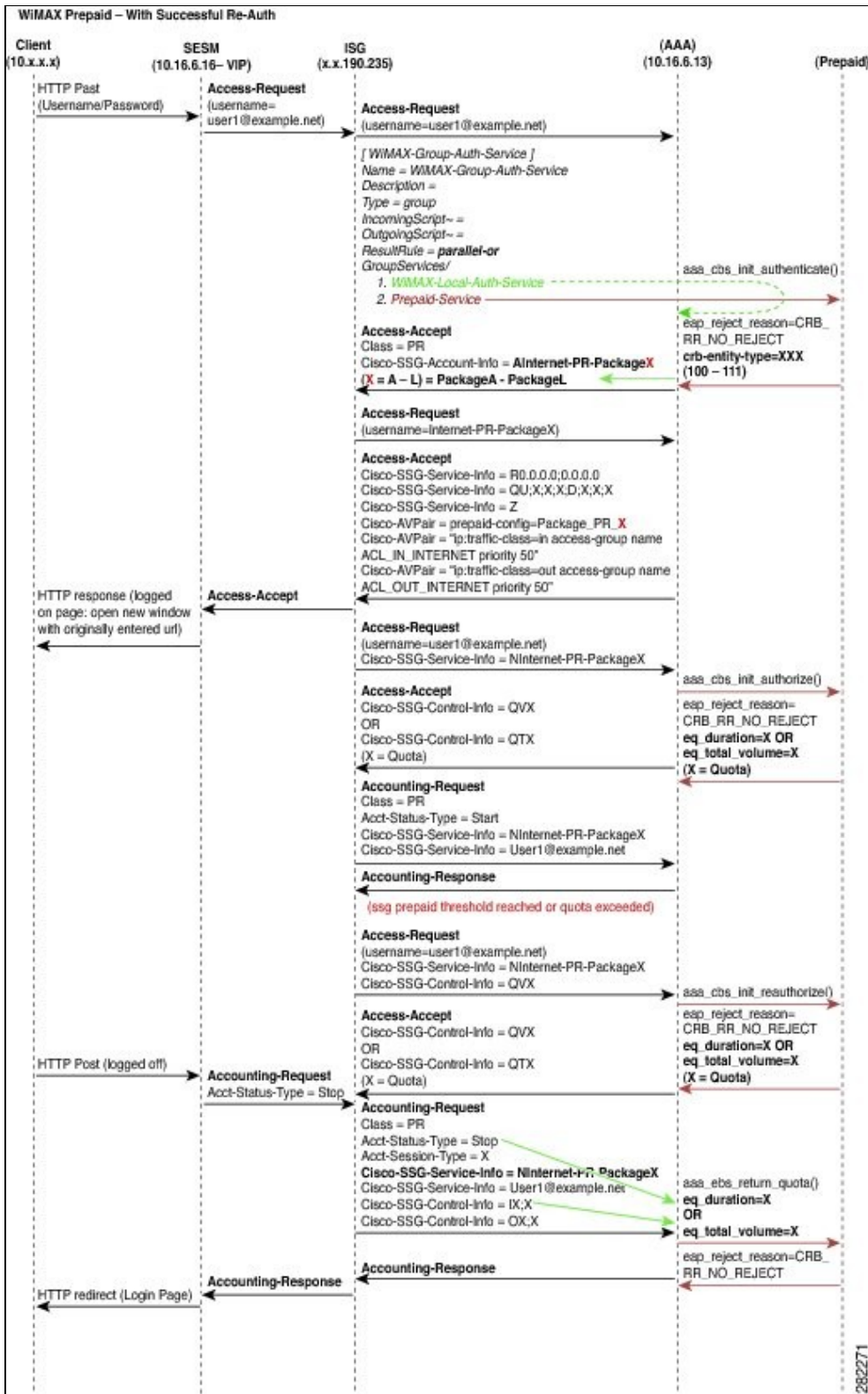
- Residential H.323 signaling interface (HSI) in BNG
- Business L2/3 VPNs in MSE



Call Flows

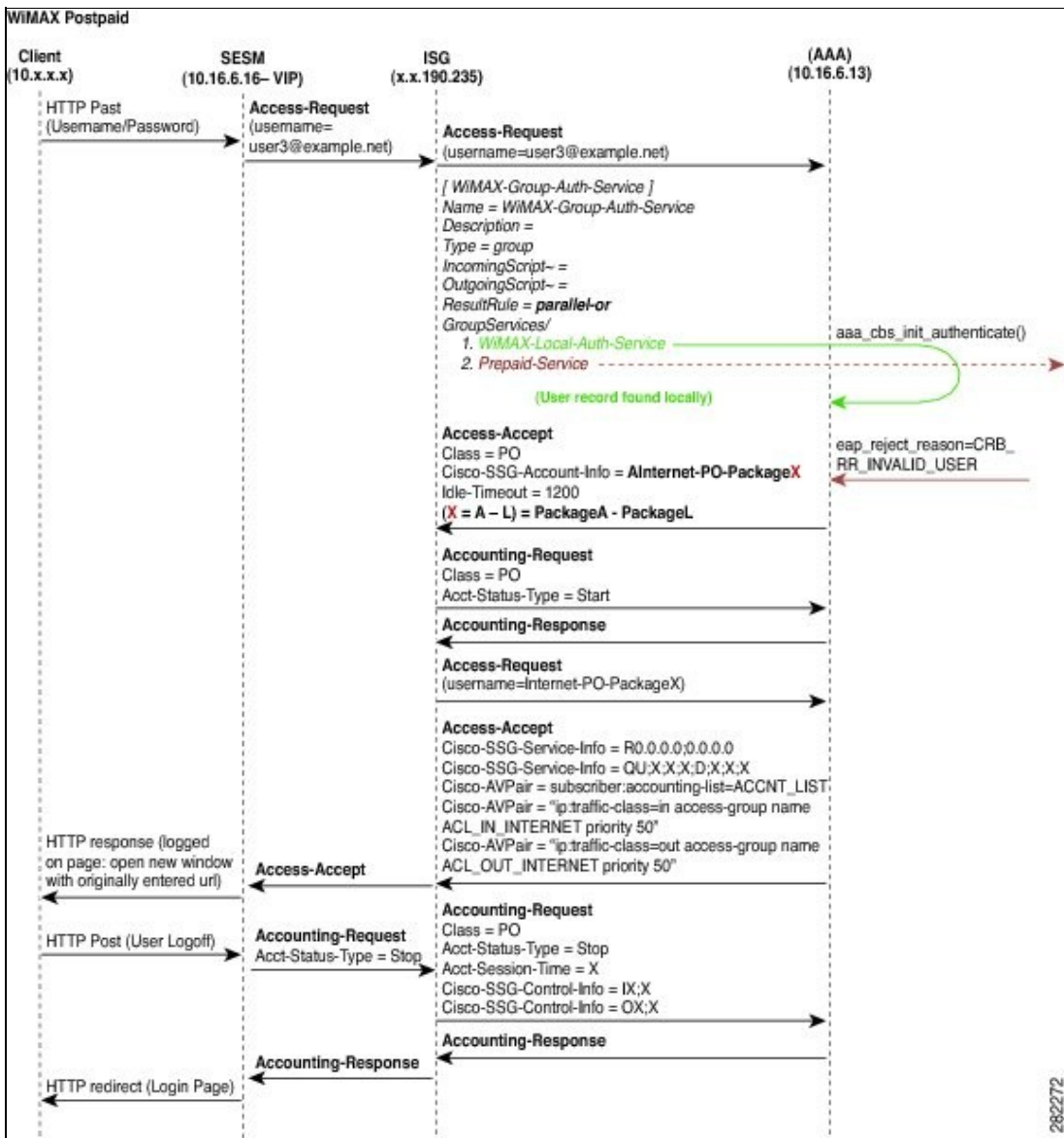
WiMAX Prepaid

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

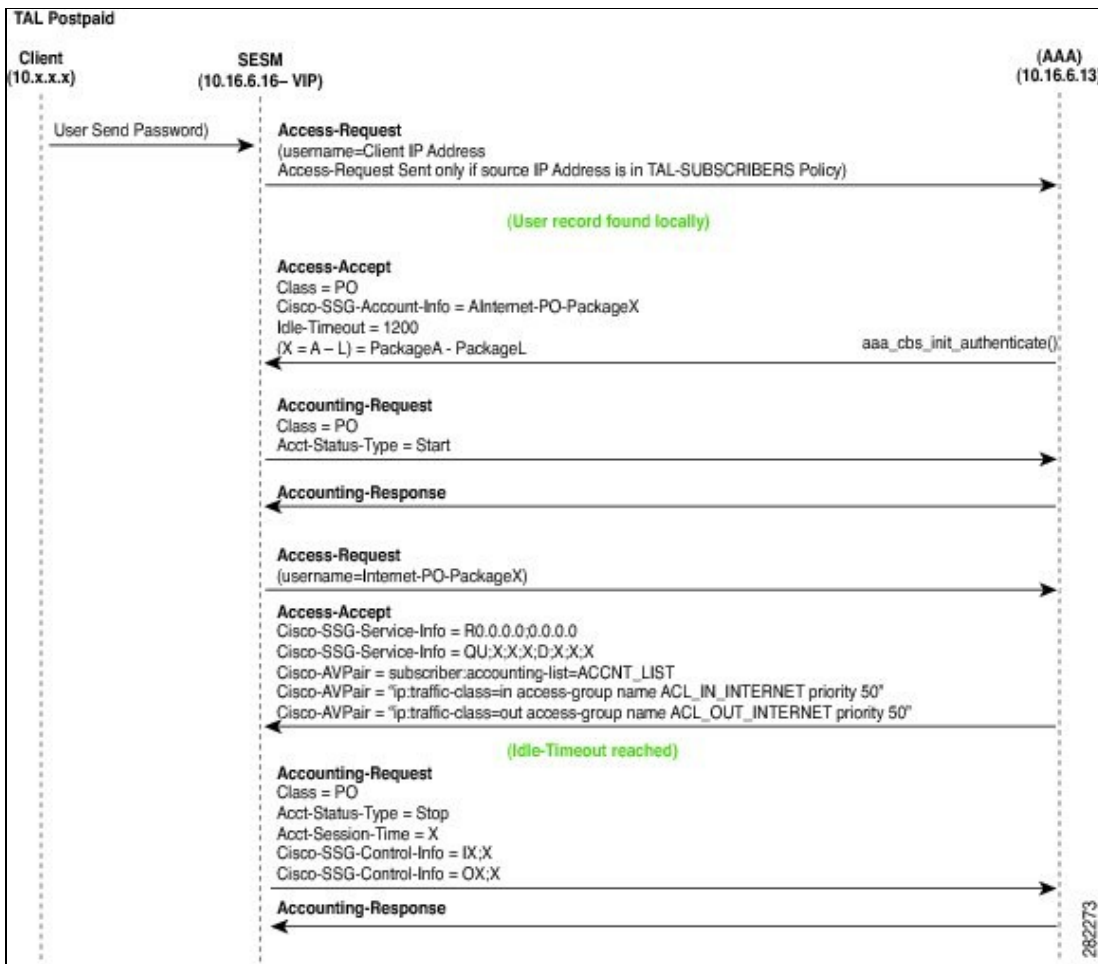


WiMAX Postpaid

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example



Transparent Auto-Logon (TAL) Postpaid



Configuration

The following example shows the configuration of a routed subscriber network using the Port-Bundle Host Key (PBHK) and Layer 4 Redirect features. The basic behavior of the ISG is summarized in the control policy that is used when a First Sign of Life (FSOL) is detected. In this example, the FSOL is an unclassified source IP address.

Control Policy

The key to understanding an individual ISG configuration is generally the control policy, which maps out the actions taken by the ISG when different ISG events occur. The following example shows a control policy that allows some source IP address traffic to pass through the ISG without authentication, performing Transparent Auto Logon (TAL) for a set of predefined IP addresses, and performing web (portal) authentication for all other subscribers.

```
policy-map type control isg-control
```

Control
policy
definition

Session Start Events

```
class type control PASSTHROUGH event session-start  
10 service local-passthrough
```

FSOL traffic that m
map PASSTHROU

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

!

```
class type control TAL_IP_SUBSCRIBERS event session-start
  10 authorize aaa list AUTHOR_LIST1 password svcisco identifier source-ip-address
  20 service-policy type service name DEFAULT_NETWORK_SERVICE
  30 set-timer IP-UNAUTH-timer 5
```

!

```
class type control always event session-start
  10 service-policy type service name DEFAULT_NETWORK_SERVICE
  20 service-policy type service name PBHK_SERVICE
  30 service-policy type service name L4_REDIRECT_SERVICE
  40 service-policy type service name OPENGARDEN_SERVICE
  50 set-timer IP-UNAUTH-timer 5
```

!

through any authentication redirection. It simply is applied to it.

FSOL traffic that matches the map is sent for authentication. If authentication fails, the DEFAULT_NETWORK_SERVICE is applied, and an authentication timer is set.

Any FSOL traffic that does not match the previous configuration is handled here.

- Apply default service
- Apply PBHK service
- Apply L4 Redirect service
- Apply Open Garden service
- Set unauthenticated timer

Account Logon Events

```
class type control always event account-logon
  10 authenticate aaa list AUTHEN_LIST1
  20 service-policy type service unapply name L4_REDIRECT_SERVICE
```

!

On an account-logon event, authenticate the subscriber.

Upon successful authentication, unapply the L4_REDIRECT_SERVICE.

Account Logoff Events

```
class type control always event account-logoff
  10 service disconnect delay 5
```

!

Upon a account-logoff event, disconnect after a 5 second delay. This should ensure that the client TCP sessions close before disconnection.

Service Start Event

```
class type control always event service-start
  10 service-policy type service identifier service-name
```

Upon a service-start event, apply the service defined in the message.

Service Stop Event

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

```
class type control always event service-stop
  10 service-policy type service unapply identifier service-name
```

Upon a service-stop event, unapply the service defined in the message.

Timed Policy Expiry Event

```
class type control UNAUTHEN_COND event timed-policy-expiry
  10 service disconnect
```

Upon a timed-policy-expiry event, if the class-UNAUTHEN_COND is true, disconnect session.

Quota Depleted Event

```
class type control always event quota-depleted
  10 set-param drop-traffic TRUE
```

Upon a quota-depleted event, drop the session traffic.

Credit Exhausted Event

```
class type control always event credit-exhausted
  10 service-policy type service name PREPAID_REDIRECT_SERVICE
```

Upon a credit-exhausted event, apply the service PREPAID_REDIRECT_SERVICE.

Class Maps

In the previous section class maps were used to select which actions would occur for certain events. The following examples show these class-maps.

```
class-map type control match-any PASSTHROUGH
  match source-ip-address 10.10.62.0 255.255.254.0
  match source-ip-address 10.10.28.1 255.255.255.255
  match source-ip-address 10.10.0.111 255.255.255.255
?
class-map type control match-any TAL_IP_SUBSCRIBERS
  match source-ip-address 10.10.52.163 255.255.255.255
```

AAA

Authentication, authorization, and accounting (AAA) is a key part of ISG and ISG cannot operate without a minimum AAA configuration.

```
aaa new-model
!
aaa group server radius AAA_GROUP
  server 10.10.6.13 auth-port 1812 acct-port 1813

aaa authentication login AUTHEN_LIST group AAA_GROUP
aaa authorization network AUTHOR_LIST group AAA_GROUP
aaa authorization subscriber-service default local group AAA_GROUP
```

This command is required.

Typical server group definition

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

```
aaa accounting update periodic 30
aaa accounting network ACCNT_LIST start-stop group AAA_GROUP
```

- ISG aut con
- ISG aut con
- ISG sub ser con
- Per acc upo
- ISG acc con

ISG RADIUS Server

```
radius-server attribute 44 include-in-access-req
radius-server attribute 6 on-for-login-auth
radius-server attribute 8 include-in-access-req
radius-server attribute 32 include-in-access-req
radius-server attribute 32 include-in-accounting-req
radius-server attribute 55 include-in-acct-req
radius-server attribute 55 access-request include
radius-server attribute 25 access-request include
```

RADIUS extensions

RADIUS Server

```
radius-server host 10.10.7.14 auth-port 1812 acct-port 1813 retransmit 3 key 7 <removed>
radius-server retransmit 2
radius-server timeout 3
radius-server vsa send accounting
radius-server vsa send authentication
```

RADIUS server

Change of Authorization (CoA) Portal

```
aaa server radius dynamic-author
  client 10.10.80.130
  client 10.10.33.166
  server-key 7 <removed>
  auth-type any
  ignore session-key
  ignore server-key
```

Class of service (CoS) server

Services

Open Garden Service

The Open Garden service is a traffic class that is defined to only allow limited services prior to authentication. These services are typically Domain Name System (DNS), web portal, and any other services that are necessary to get the subscriber to a level where they can authenticate themselves. Examples of the service configuration are shown below.

```
ip access-list extended ACL_IN_OPENGARDEN
  permit ip any host 192.168.200.78
  permit ip any host 192.168.200.8
  permit ip any host 192.168.200.19
  ?
```

Define hosts reachable by subscribers.

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

```
ip access-list extended ACL_IN_OPENGARDEN
 permit ip any host 192.168.200.78
 permit ip any host 192.168.200.8
 permit ip any host 192.168.200.19
?
class-map type traffic match-any TC_OPENGARDEN
 match access-group input name ACL_IN_OPENGARDEN
 match access-group output name ACL_OUT_OPENGARDEN

policy-map type service OPENGARDEN_SERVICE
 10 class type traffic TC_OPENGARDEN
 !
 class type traffic default in-out
 drop
```

Define return path for client traffic.

Create class map based on the host ACLs.

Define the Open Garden service

- Match the traffic class
- Action upon matching the class
- Default action upon traffic not matching

Layer 4 Redirect Service

The L4 Redirect service is typically used to force subscribers to a web portal for authentication purposes.

Define traffic to be diverted

```
ip access-list extended ACL_REDIRECT
 deny tcp any host 10.10.6.16 eq www
 deny tcp any host 10.10.6.16 eq 8080
 permit tcp any any eq www
 permit tcp any any eq 8080

class-map type traffic match-any TC_L4_REDIRECT
 match access-group input name ACL_REDIRECT

policy-map type service L4_REDIRECT_SERVICE
 20 class type traffic TC_L4_REDIRECT
 redirect to group REDIRECT_GROUP

redirect server-group REDIRECT_GROUP
 server ip 10.16.6.16 port 8090
```

- Do not divert traffic going to the portal
- Divert all other web traffic

Create a class map for the diverted traffic.

Create L4 Redirect service

- Traffic that matches the class-map is sent to the redirect group

Define the redirect group

- Define the destination address and port

PBHK Service

```
access-list 110 permit ip any host 10.10.6.16
access-list 110 permit ip any host 10.10.6.28

ip portbundle
```

Apply PBHK to traffic to web portals.

Intelligent_Services_Gateway_(ISG)_--_WiMAX_Service_Provider_Network_Configuration_Example

```
match access-list 110
source Loopback100
source Loopback101

interface GigabitEthernet1/0/0.123
 encapsulation dot1Q 123
 <snip>
 ip portbundle outside

policy-map type service PBHK_SERVICE
 ip portbundle
```

Define port bundle

- ACL defining which traffic requires PBHK
- Interface for PBHK addressing
- Additional interface for PBHK addressing

Outgoing interface towards web portal.

Apply port bundle

Related Information

[Technical Support & Documentation - Cisco Systems](#)

- [Intelligent Services Gateway \(ISG\) -- Residential Access Using DHCP Sessions Configuration Example](#)
- [Intelligent Services Gateway Configuration Guide, Cisco IOS Release 15.1S](#)
- [Intelligent Services Gateway Configuration Guide, Cisco IOS XE Release 3S](#)