2.3.3 Redundancy

Multihoming is a technique used to increase the reliability of connectivity to the Internet by establishing more than one uplink. Time Warner Cable's primary method of multihoming requires the customer to advertise their IP space via BGP over two or more uplinks. Only one of these uplinks needs to connect to Time Warner Cable. If ALL uplinks connect to Time Warner Cable only, it will be called *dual-homed* uplink, and if more than one service provider involved, it will be called *multi-homed* uplink in this document. Below are some requirements for multihoming:

- Multi-homed (2+ Service Providers)
    - Requires customer provide an ARIN assigned Autonomous System Number (ASN)
    - All subnets (prefixes) advertised must be a /24 or larger.
- Dual-homed (1 Service Provider, multiple uplinks)
    - All customer owned subnets advertised must be /24 or larger.

2.3.4 BGP Communities

Customers can control their routing through a variety of methods. Some of these are special community-based controls implemented by TWC.

The responsibility for configuring and use of these remains with the customer and is provided as a value-add to the service. TWC expects the customer to have a clear and precise understanding of the routing impact when using such mechanisms.

1. Local Preference Communities:

These communities control TWC's local-preference of customer-announced routes within our network. Since local-preference is a non-transitive attribute, this affects TWC's route selection only, and not the route selection made by TWC peers and customers.

Since TWC has multiple ASNs, it gives our customers flexibility to influence routing for their pre-fixes on a regional or national level. Please keep in mind that setting local-pref at the national level does not automatically set the same local-pref at the regional level. If the customers wish to change the local-pref at a regional and national level they need to send us the communities for both.

The following table details these communities and the associated action.

Community	Action taken by TWC upon receipt of a route advertisement containing the community

TWC-ASN:50	Sets the LOCAL PREFERENCE attribute of the BGP route to 50 instead of the default 100 within TWC's local region AS.
TWC-ASN:90	Sets the LOCAL PREFERENCE attribute of the BGP route to 90 within TWC's local region AS.
TWC-ASN:110	Sets the LOCAL PREFERENCE attribute of the BGP route to 110 within TWC's local region AS.
7843:50	Sets the LOCAL PREFERENCE attribute of the BGP route to 50 within TWC's backbone region AS.
7843:90	Sets the LOCAL PREFERENCE attribute of the BGP route to 90 within TWC's backbone region AS.
7843:110	Sets the LOCAL PREFERENCE attribute of the BGP route to 110 within TWC's backbone region AS.

Time Warner Cable has regional ASN's that connect to a National Backbone ASN (7843), the above community strings allow the customer to influence routing behavior on both ASN's.

2. Route Suppression and AS-Path prepend communities:

Customers may set any of the following communities in order to have Time Warner suppress their route announcements or to have Time Warner Cable's ASN prepended to their routes to all Peers or to select specific peers as they leave AS7843.

Community	**Action taken by TWC upon receipt of a route advertisement containing the community**
65000:0	Suppress advertisement to all non-TWC ASes
65000:*ASN*	Suppress advertisement to *ASN*
65001:0	Prepend TWC AS (7843) one time to all Peer ASes
65001:*ASN*	Prepend TWC AS (7843) one time to the specified *ASN*
65002:0	Prepend TWC AS (7843) two times to all Peer ASes
65002:*ASN*	Prepend TWC AS (7843) two times to the specified *ASN*

65003:0	Prepend TWC AS (7843) three times to all peer AS's
65003:*ASN*	Prepend TWC AS (7843) three times to the specified TWC peer *ASN*
TWC-ASN:1	Prepend TWCs regional ASN one time.
TWC-ASN:2	Prepend TWCs regional ASN two times.
TWC-ASN:3	Prepend TWCs regional ASN three times.

The specific peers that are currently supported using this functionality are listed below. Time Warner Cable reserves the right to modify this list at any time without notice.

Level(3) Communications	AS3356
XO Communications	AS2828
Tata Communications	AS6453
Telia Sonera	AS1299
Cogent Communications	AS174
Global Crossing	AS3549
Zayo (formerly AboveNet)	AS6461

Example: In order to have Time Warner Cable suppress the advertisement of your routes to Level3 Communications, send us your routes with the community 65000:3356

3. Outbound Customer Communities:

For customers receiving full Internet routes from TWC, following communities will be sent to customers in order that they may influence their outbound traffic to TWC based on these route origins should they so choose.

7843:2000	Outbound TWC Internal
7843:2001	Outbound TWC Customer
7843:2002	Outbound TWC Peer

4. RTBH community:

TWC provides a mechanism allowing customers to trigger the TWC network to discard all traffic entering the TWC network from external sources destined for any routes specifically announced by a TWC BGP customer with a special community.

TWC customers can black-hole traffic for any customer-owned prefix with length equal to or longer than what TWC is currently accepting from them. For routes tagged with this black-hole community, TWC will accept advertisement of customer-owned pre-fixes smaller than a /24.

Example:

Normal allowed prefix length – 71.42.150.0/24

Allowed length for prefix tagged with black-hole community – 71.42.150.0 /24-32

Community	Action taken by TWC upon receipt of a route advertisement containing the community
7843:666	Black-hole traffic for customer-routes announced with this community.

2.3.5 BGP Multi Exit Discriminator

TWC currently accepts MED from customers, however since MED is a non-transitive attribute, it is only propagated to adjacent autonomous systems. When the customer sends MED to TWC, it is only propagated within the local region AS. Customers who have multiple connections to TWC, may choose to configure a higher MED to manipulate the "less-preffered" customer connection. TWC will prefer to send customer traffic on the connection with the lowest MED with default MED value being 0.

2.3.6 Customer Network IP Address Allocation

If the customer requires additional public IP addressing, as a separate subnet to address customer owned devices, TWC supports the following.

2.3.6.1 IPv4 Customer Address Allocation

The IPv4 options available for customers are listed below:

2.3.6.1.1 TWC Assigned Subnet

Where the customer does not already have an assignment, TWC can provide this up to a maximum single subnet size of /24. Subnet requests larger than /27 require the completion of an