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Registered Wide BGP Community Values
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Abstract

Communicating various routing policies via route tagging plays an important role in external BGP peering relations. The most common tool used today to attach various information about routes is realized with the use of BGP communities. Such information is important for the peering AS to perform some mutually agreed actions without the need to maintain a separate offline database for each pair of prefix and an associated with it requested set of action entries.

This document proposes to establish a new IANA maintained registry of most commonly used Wide BGP Communities by network operators. Such public registry will allow for easy refernece and clear interpretation of the actions associated with received community values.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on December 27, 2015.

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1. Introduction

RFC 1997 [RFC1997] defines a BGP Community Attribute to be used as a tool to contain in BGP update message various additional information about routes which may help to automate peering administration. As defined in RFC 1997 [RFC1997] BGP Communities attribute consists of one or more sets of four octet values, where each one of them

specifies a different community. Except two reserved ranges the encoding of community values mandates that first two octets are to contain the Autonomous System number followed by next two octets containing locally defined value.

This document lists the most commonly used today BGP communities as well as provides a new registry for future definitions.

2. Globally significant pre-defined values

2.1. Well Known Standard BGP Communities

According to RFC 1997 as well as to IANA's Well-Known BGP Communities registry today the following BGP communities are defined to have global significance:

0xFFFF0000	planned-shut	[draft-francois-bgp-gshut]
0xFFFFFF01	NO_EXPORT	[RFC1997]
0xFFFFFF02	NO_ADVERTISE	[RFC1997]
0xFFFFFF03	NO_EXPORT_SUBCONFED	[RFC1997]
0xFFFFFF04	NOPEER	[RFC3765]

This document recommends for simplicity as well as for avoidance of backward compatibility issues the continued use of BGP Standard Community Attribute type 8 as defined in RFC 1997 to distribute non Autonomous System specific Well-Known BGP Communities.

For the same reason the described registry does not intend to obsolete BGP Extended Community Attribute and any already defined and deployed extended communities. The new registry is to be used primarly for new community definitions in particular those which require to carry various new parameters or which should be propagated with a controled scope and radius.

2.2. Registered pre-defined Wide BGP Communities

It has been requested numerous times to have a globally unified way to express some particular Autonomous System based routing policies. When defining a new way to encode bgp communities we have an opportunity to define set of new registered routing policies and route markings which could be passed within and between Autonomous Systems resulting in their common interpretation.

This document will request IANA to define and maintain a new registry for pre-defined Wide BGP Community values. The allocation policy is on a first come first served basis.

It is recommended that an implementation supports by an explicit enabling defined below Registered Wide BGP Communities. Depending on the BGP implementation support it is recommended that an implementation would support Registered Wide BGP Communities without breaking static or dynamic peer/update groups. However it needs to be pointed out that support of all Registered Wide BGP Communities is not mandatory. It will be perfectly valid for any BGP implementation to support only subset of Wide BGP Communities.

It is strongly advised that each Autonomous System does an inbound verification of received Wide BGP Communities from all of its EBGP peers before accepting them and propagating within their own domain.

The document does not mandate nor enforces that given registered type value of Wide BGP Community would be of transitive or non-transitive type. It is for the operator to determine the propagation AS radius required for such community when appending it to routing information. However the document will provide a transitivity radius recommendation to defined communities.

The following Wide BGP Communities have global significance and their execution should be uniformly implemented by any BGP speaker supporting given set of Wide BGP Communities.

The defined below value of the community should be interpreted as registered value only if "R" - registered bit is set in the community Type 1 container as described in [draft-raszuk-wide-bgp-communities] Otherwise the value is local and it's actions is locally defined by the operator.

2.2.1. General Registered Wide BGP Community Values

The below set of communities will be defined to be carried in Wide BGP Community Type 1, with the container type values (Community Registered Value) as per Section 6.

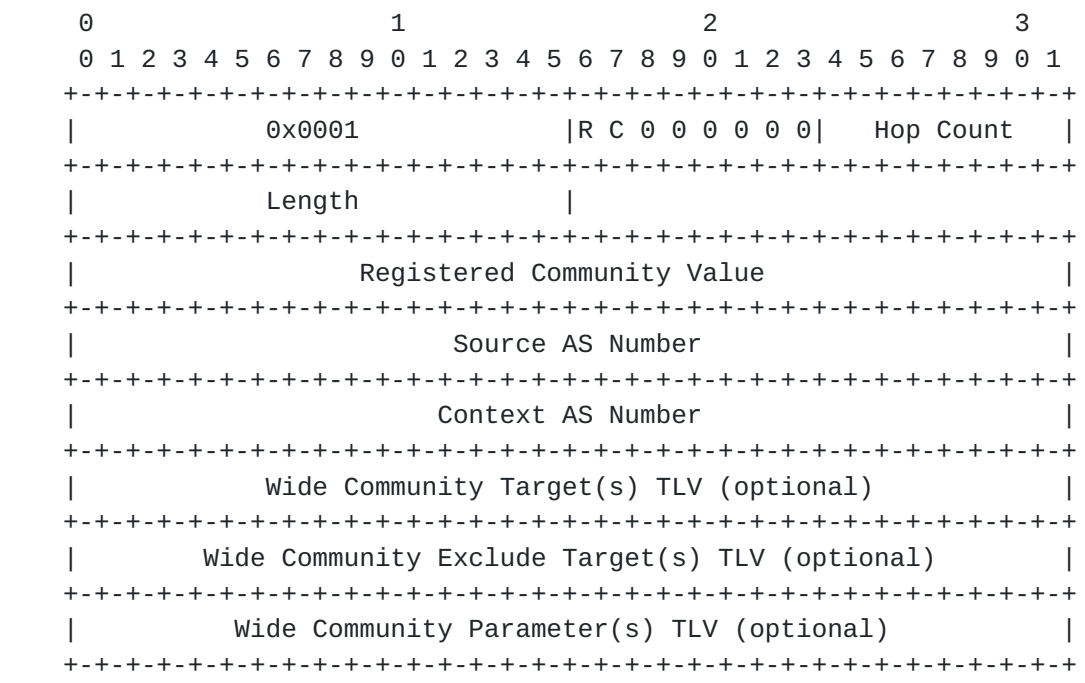


Figure 1: Wide BGP Community Type 1

Description format:

TYPE:
    0x0001 (constant for this registry)
FLAGS "F":
    R - Registered bit (Set to 1 for registered values)
    C - Confederation bit (Set when applicable)
HOP COUNT "H":
    Defines domain or sub-domain propagation radius
LENGTH "L":
    Length of the Container Type 1 in octets
REGISTERED COMMUNITY VALUE "R":
    Value of the community in registry
SOURCE AS "S":
    Originator AS of Wide BGP Community
CONTEXT AS "C":
    For registered communities carries predefined meaning
    or otherwise should be set to 0x00000000
TARGET TLV "T":
    Set of atoms containing targets for execution
EXCLUDE TARGET TLV "E":
    Set of atoms containing excluded targets for execution
PARAMETER TLV "P":
    Set of atoms containing optional parameters for execution

BLACKHOLE

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - All transit traffic to destinations for which advertised routes carry such community value should be dropped. It is recommended that specified Autonomous System number should be eligible and verified by BGP Origin Validation functionality to advertise given BGP destinations.

SOURCE FILTER

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - All transit traffic which source addresses have been tagged by such Wide BGP Community should be dropped.

SOURCE DO RPF

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - All transit traffic which source addresses have been tagged by such Wide BGP Community should be subject to Reverse Path Forwarding check when crossing Autonomous System boundaries. Source Autonomous System number specified in the body of this community should directly indicate the peering interfaces on which such RPF check should be performed.

HIGH PRIORITY PREFIX

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - BGP prefixes carrying such Wide BGP Community should be advertised to restarting peers before other prefixes received by given BGP speaker.

ATTACK TARGET

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - The ATTACK_TARGET Registered Wide BGP Community indicates that BGP prefixes carrying such community are receiving unusual amount of unwanted traffic most likely due to some form of network attack. Network devices capable of analyzing and mitigating such attacks can use such community as a hint on what destinations to focus the most.

2.2.2. Advertisement control Registered Wide BGP Communities

NO ADVERTISE TO AS

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = Type_1 (Peer_AS)
L = 25 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - All routes received which carry such Wide BGP Community containing this value MUST NOT be advertised to BGP peer which Autonomous System number has been listed in the TARGET TLV field of this community.

Semantically specifying the reserved Autonomous System value of 0xFFFFFFFF (ANY AS) would be an equivalent of using NO_ADVERTISE Well-Known Standard BGP Community Attribute.

ADVERTISE TO AS

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = Type_1 (Peer_AS)
L = 25 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - All routes received carrying such Wide BGP Community containing this value MUST ONLY be advertised to BGP peers which Autonomous System number is specified in the TARGET TLV field of this community.

Semantically specifying the reserved Autonomous System value of 0xFFFFFFFF (ANY AS) would be an equivalent of advertisement to all neighbors. Post execution this community MUST be removed.

ADVERTISE AND SET NO EXPORT

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = Operator's defined	T = Type_1 (Peer_AS)
L = 25 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - All routes received carrying such Wide BGP Community containing this value MUST be advertised to BGP peer which Autonomous System number is specified in the TARGET TLV field of this community with NO_EXPORT Standard BGP Community attached.

Semantically specifying in TARGET TLV the reserved Autonomous System value of 0xFFFFFFFF (ANY AS) would be an equivalent of advertisement to all neighbors with NO_EXPORT community being set. Post execution this community MUST be removed.

2.2.3. AS source marking Registered Wide BGP Communities

FROM PEER

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - Autonomous System may attach this community to routes received from their EBGP peers to later, when advertising them outside the domain, apply or relax local policies only on such group of destinations.

FROM CUSTOMER

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - Autonomous System may attach this community to routes received from their customers to later, when advertising them outside the domain, apply or relax local policies only on such group of destinations.

INTERNAL

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - Autonomous System may attach this community to routes originated in their own domain to later, when advertising them outside the domain, apply or relax local policies only on such group of destinations.

FROM UPSTREAM

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - Autonomous System may attach this community to routes received from their EBGP upstream peers to later, when advertising them outside the domain, apply or relax local policies only on such group of destinations.

FROM IX

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = none
L = 18 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - Autonomous System may attach this community to routes received from their EBGP peering sessions with the Internet Exchange peers or with Route Server to later, when advertising them outside the domain, apply or relax local policies only on such group of destinations.

LEARNED FROM AS

Type: 0x0001	S = src AS #
F = 0x80	C = 0x00000000
H = 0x00	T = Type_1 (Peer_AS)
L = 25 octets	E = none
R = IANA assigned	P = none

DESCRIPTION - Autonomous System may attach this community to routes received from their EBGP peer by explicitly tagging them with their peer's Autonomous System number as a value of the TARGET TLV field. If the AS number is a two octet number first two octest will be

filled with zero. It is possible to use this to also carry private AS number of customers.

2.2.4. Return path influencing Registered Wide BGP Communities

```
PATH HINT
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = Type_1 (AS#)
    L = 25 octets               E = none
    R = IANA assigned           P = none
```

DESCRIPTION - Autonomous System receiving such Wide BGP Community value should prefer for BGP prefixes received with such community (for example by increasing value of local preference on ingress), a BGP path which traverses Autonomous System number which has been specified in the TARGET TLV field of this community. Post execution this community SHOULD be kept.

```
NEGATIVE PATH HINT
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = Type_1 (AS#)
    L = 25 octets               E = none
    R = IANA assigned           P = none
```

DESCRIPTION - Autonomous System receiving such Wide BGP Community value should prefer for BGP prefixes received with such community (for example by increasing value of local preference on ingress), a BGP path which DOES NOT traverses Autonomous System number which has been specified in the TARGET TLV field of this community. Post execution this community SHOULD be kept.

2.2.5. AS_PATH modifying Registered Wide BGP Communities

```
PREPEND N TIMES BY AS
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = Type_1 (AS#)
    L = 29 octets               E = none
    R = IANA assigned           P = Type_4 (0xAA)
```

DESCRIPTION - The Autonomous System specified in the TARGET TLV field of such community should prepend N times (encoded as 0xAA) its own Autonomous System number when advertising routes tagged with this community to peers. Number of requested AS prepends is provided in the PARAMETERS TLV field value. Post execution this community MUST be removed.

```
PREPEND N TIMES TO AS
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = Type_1 (AS#)
    L = 29 octets               E = none
    R = IANA assigned           P = Type_4 (0xAA)
```

DESCRIPTION - The Autonomous System advertising routes externally should prepend N times (encoded as 0xAA) its own Autonomous System number when advertising routes tagged with this community to peer which AS number is defined by TARGET TLV field. Number of requested AS prepends is provided in the PARAMETERS TLV field. Post execution this community MUST be removed.

```
REPLACE BY
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = Type_1 (AS#)
    L = 25 octets               E = none
    R = IANA assigned           P = none
```

DESCRIPTION - All routes marked with such community advertised by an Autonomous System to all of its external peers should have any occurrence of an Autonomous System number specified in the TARGET TLV field replaced with advertising domain's local Autonomous System number. Post execution this community MUST be removed.

2.2.6. Local Preference Registered Community

```
LOCAL PREFERENCE
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = none
    L = 22 octets               E = none
    R = IANA assigned           P = Type_4 (ABBBBBBB)

    SEMANTICS of PARAMETERS TLV
        1 octet 1st bit indicates:
            0-increment, 1-decrement
            7 bits - value of local preference value 1..127
```

DESCRIPTION - Autonomous System may suggest to its EBGP neighbor the following adjustments to the value of local preference as specified by given domain's local policy. The values of requested increment or decrement of local preference value is carried in the PARAMETERS TLV field. Post execution this community MUST be removed.

2.2.7. AS_PATH TTL Registered Community

```
AS_PATH TTL MAX RADIUS
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = none
    L = 22 octets               E = none
    R = IANA assigned           P = Type_4 (0xAA) max AS_PATH radius
```

DESCRIPTION - Autonomous System may suggest to drop advertised prefix by any transit network if its AS_PATH attribute length would be equal or greater to encoded value both inbound or outbound of EBGP session. The value of max AS_PATH length allowed is specified in the PARAMETERS TLV field of the community. Post comparison this community MUST be kept.

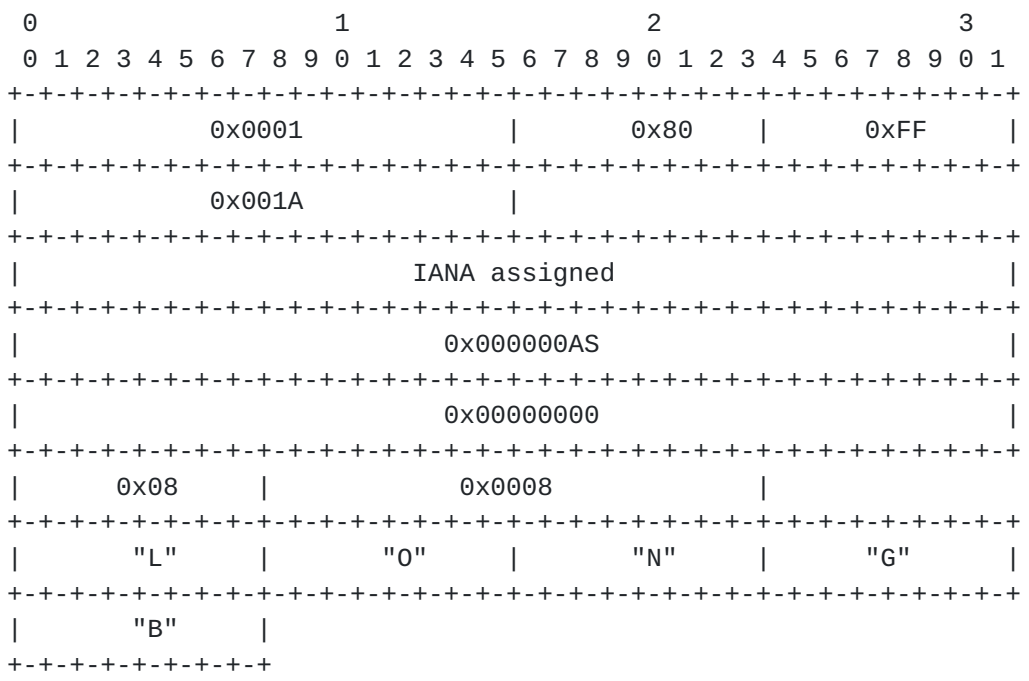
2.2.8. GEO-LOCATION Registered Community

```
GEOGRAPHIC LOCATION WHERE BGP ROUTE IS INTRODUCED TO AS
    Type: 0x0001                S = src AS #
    F = 0x80                    C = 0x00000000
    H = Operator's defined      T = none
    L = 26 octets               E = none
    R = IANA assigned           P = Type_8 (5 UTF-8 characters)
```

DESCRIPTION - Autonomous Systems may attach this community to routes received from EBGP neighbors or introduced to BGP by other routing protocols to identify the geographic location where the route was introduced to the AS. The "right-most" two octets of PARAMETERS TLV correspond to an ISO3166-1 alpha-2 country identifier, while the "left-most" three octets may express a more specific geographic location, such as a city or IXP encoded in 3 octets.

Example:

```
Wide BGP Community describing route learnt by the AS at London, GB
     HOP COUNT - operator defined
     LENGTH - 26
     PARAMETERS - 3 octets locality string + 2 octets country id.
```

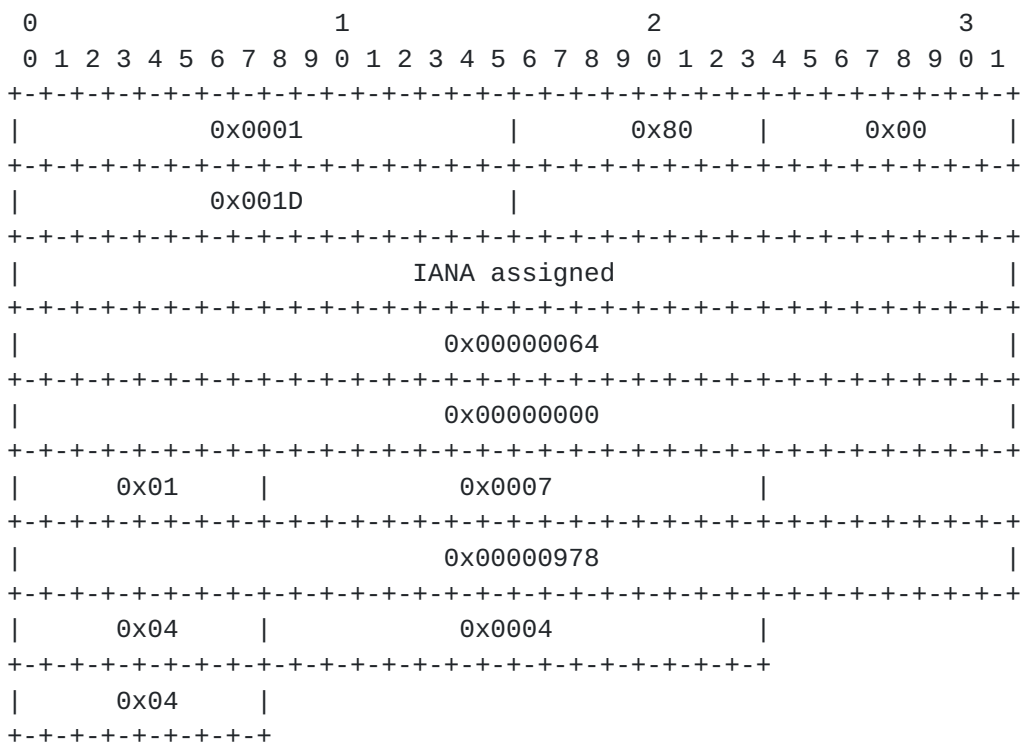


3. Example

Customer of the source AS number 100 requests to execute AS_PATH prepend 4 times when advertising the prefixes to AS number 2424. We will use the following community assigned on ingress or at the prefix origination.

PREPEND N TIMES TO AS

Type: 0x0001	S = 0x00000064 (dec 100)
F = 0x80	C = 0x00000000
H = 0x00	T = 0x00000978 (dec 2424)
L = 0x001D (dec 29 octets)	E = none
R = IANA assigned	P = 0x04 (dec 4)



4. ECMP Hint Registered Community

AS_PATH TTL MAX RADIUS

Type: 0x0001	S = src AS #
F = 0x80	C = publisher AS #
H = Operator's defined	T = none
L = 22 octets	E = none
R = IANA assigned	P = Type_4 (0xAA) max AS_PATH radius

DESCRIPTION - In multistage networks with large scale Equal Cost MultiPath (ECMP), it is often useful to separate flows towards a single destination among different paths along the parallel set at each stage. This wide community allows the operator to send a "hint" to the ingress router on how to set either the MPLS entropy label [RFC6790] or the IPv6 flow label [RFC3697] to achieve such flow separation. The Integer list given in the community can contain a label that is used by the receiver: Directly as an IPv6 flow label, Directly as an MPLS entropy label, As a seed used to calculate either a flow or entropy label

5. Security considerations

All the security considerations for BGP Communities as well as for BGP Extended Communities RFCs apply here.

6. IANA Considerations

This document requests IANA to define and maintain a new registry named: "Registered Wide BGP Communities Values". The reserved pool of 0x00000000-0xFFFFFFFF has been defined for its allocations. The allocation policy is on a first come first served basis.

This document makes the following assignments for the Registered Wide BGP Community values:

Name	Type Value
BLACKHOLE	1
SOURCE FILTER	2
SOURCE DO RPF	3
HIGH PRIORITY PREFIX	4
ATTACK TARGET	5
NO ADVERTISE TO AS	6
ADVERTISE TO AS	7
ADVERTISE AND SET NO EXPORT	8
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8. Acknowledgments

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9. References

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