                      BGP Communities Attribute

Status of This Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

Abstract

   Border Gateway Protocol [1] is an inter-autonomous system routing
   protocol designed for TCP/IP internets.

   This document describes an extension to BGP which may be used to pass
   additional information to both neighboring and remote BGP peers.

   The intention of the proposed technique is to aid in policy
   administration and reduce the management complexity of maintaining
   the Internet.

Introduction

   BGP supports transit policies via controlled distribution of routing
   information. Mechanisms for this are described in [1] and have been
   successfully used by transit service providers. However, control
   over the distribution of routing information is presently based on
   either IP address prefixes or on the value of the AS_PATH attribute
   (or part of it).

   To facilitate and simplify the control of routing information this
   document suggests a grouping of destinations so that the routing
   decision can also be based on the identity of a group. Such a scheme
   is expected to significantly simplify a BGP speaker's configuration
   that controls distribution of routing information.

Terms and Definitions

    Community
        A community is a group of destinations which share some common
        property.

        Each autonomous system administrator may define which communities
        a destination belongs to. By default, all destinations belong to
        the general Internet community.

Examples

    A property such as "NSFNET sponsored/AUP" could be added to all AUP
    compliant destinations advertised into the NSFNET. NSFNET operators
    could define a policy that would advertise all routes, tagged or not,
    to directly connected AUP compliant customers and only tagged routes
    to commercial or external sites. This would insure that at least one
    side of a given connection is AUP compliant as a way of enforcing NSF
    transit policy guidelines.

    In this example, we have just eliminated the primary motivation for a
    complex policy routing database that is used to generate huge prefix
    and AS path based filter rules. We have also eliminated the delays
    caused by the out-of-band maintenance of this database (mailing in
    NACRs, weekly configuration runs, etc.)

    A second example comes from experience with aggregation. It is often
    useful to advertise both an aggregate prefix and the component more-
    specific prefixes that were used to form the aggregate to optimize
    "next hop" routing. These component prefixes are only useful to the
    neighboring BGP peer or perhaps the autonomous system of the
    neighboring BGP peer, so it is desirable to filter this information.
    By specifying a community value that the neighboring peer or peers
    will match and filter on, these more specific routes may be
    advertised with the assurance that they will not propagate beyond
    their desired scope.

COMMUNITIES attribute

    This document creates the COMMUNITIES path attribute is an optional
    transitive attribute of variable length. The attribute consists of a
    set of four octet values, each of which specify a community. All
    routes with this attribute belong to the communities listed in the
    attribute.

    The COMMUNITIES attribute has Type Code 8.

Communities are treated as 32 bit values, however for administrative
assignment, the following presumptions may be made:

The community attribute values ranging from 0x0000000 through
0x0000FFFF and 0xFFFF0000 through 0xFFFFFFFF are hereby reserved.

The rest of the community attribute values shall be encoded using an
autonomous system number in the first two octets. The semantics of
the final two octets may be defined by the autonomous system (e.g. AS
690 may define research, educational and commercial community values
that may be used for policy routing as defined by the operators of
that AS using community attribute values 0x02B20000 through
0x02B2FFFF).

Well-known Communities

The following communities have global significance and their
operations shall be implemented in any community-attribute-aware BGP
speaker.

    NO_EXPORT (0xFFFFFF01)
        All routes received carrying a communities attribute
        containing this value MUST NOT be advertised outside a BGP
        confederation boundary (a stand-alone autonomous system that
        is not part of a confederation should be considered a
        confederation itself).
    NO_ADVERTISE (0xFFFFFF02)
        All routes received carrying a communities attribute
        containing this value MUST NOT be advertised to other BGP
        peers.
    NO_EXPORT_SUBCONFED (0xFFFFFF03)
        All routes received carrying a communities attribute
        containing this value MUST NOT be advertised to external BGP
        peers (this includes peers in other members autonomous
        systems inside a BGP confederation).

Operation

A BGP speaker may use this attribute to control which routing
information it accepts, prefers or distributes to other neighbors.

A BGP speaker receiving a route that does not have the COMMUNITIES
path attribute may append this attribute to the route when
propagating it to its peers.

A BGP speaker receiving a route with the COMMUNITIES path attribute
may modify this attribute according to the local policy.

Aggregation

   If a range of routes is to be aggregated and the resultant aggregates
   attribute section does not carry the ATOMIC_AGGREGATE attribute, then
   the resulting aggregate should have a COMMUNITIES path attribute
   which contains all communities from all of the aggregated routes.

Applicability

   The COMMUNITIES path attribute may be used with BGP version 2 and all
   subsequent versions of BGP unless specifically noted otherwise.

Security Considerations

   Security issues are not discussed in this memo.

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   communities attribute will help solve. We'd also like to thank Yakov
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References

   [1] RFC 1771
       Rekhter, Y., and T. Li, "A Border Gateway Protocol 4 (BGP-4)",
       March 1995.

   [2] RFC 1965
       Traina, P., "Autonomous System Confederations for BGP", June 1996.