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**BGP Link Bandwidth Extended Community**  
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Abstract

This document describes an application of BGP extended communities that allows a router to perform unequal cost load balancing.

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## **1. Introduction**

When a BGP speaker receives multiple paths from its internal peers, it could select more than one path to send traffic to. In doing so, it might be useful to provide the speaker with information that would help it distribute the traffic based on the bandwidth of the external (DMZ) link. This document suggests that the external link bandwidth be carried in the network using a new extended community [[RFC4360](#)] - the link bandwidth extended community.

### **1.1. Requirements Language**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

## **2. Link Bandwidth Extended Community**

When a BGP speaker receives a route from an external neighbor and advertises this route (via IBGP) to internal neighbors, as part of this advertisement the router may carry the cost to reach the external neighbor. The cost can be either configured per neighbor or derived from the bandwidth of the link that connects the router to a directly connected external neighbor. This value is carried in the Link Bandwidth Extended Community. No more than one link bandwidth extended community SHALL be attached to a route. Additionally, if a route is received with link bandwidth extended community and the BGP speaker sets itself as next-hop while announcing that route to other peers, the link bandwidth extended community should be removed.

The extended community is optional non-transitive. The value of the high-order octet of the extended Type Field is 0x40. The value of the low-order octet of the extended type field for this community is 0x04. The value of the Global Administrator subfield in the Value Field SHOULD represent the Autonomous System of the router that attaches the Link Bandwidth Community. If four octet AS numbering scheme is used [[RFC6793](#)], AS\_TRANS should be used in the Global Administrator subfield. The bandwidth of the link is expressed as 4 octets in IEEE floating point format, units being bytes (not bits!) per second. It is carried in the Local Administrator subfield of the Value Field.

## **3. Deployment Considerations**

The usage of this community is restricted to the cases where BGP multipath can be safely deployed. If the path between the load



sharing router and the exit point is not tunneled, then the IGP distance between the load balancing router and the exit points should be the same.

If the path between the load sharing router and the exit point is tunneled, then the choice to use this community is a purely local matter to the load sharing router.

In the context of BGP/MPLS VPNs [[RFC4364](#)], link bandwidth community could be used to support inbound load balancing for multihomed sites, as follows. Consider a site that is connected to PE1 and PE2. Both PE1 and PE2 would advertise VPN-IP routes associated with the destinations within the site. One way to enable other PEs to receive all these routes is to require the RD of the routes advertised by PE1 to be different from the RD of the routes advertised by PE2. The VPN-IP routes advertised by PE1 should carry the link bandwidth community; likewise for the VPN-IP routes advertised by PE2. The bandwidth value carried in the community could be locally determined by PE1 and PE2. Alternatively CEs of the site, when advertising IP routes to PE1 and PE2, could add the link bandwidth community to these advertisements, in which case PE1 and PE2, when originating VPN-IP routes, would use the bandwidth value from the IP routes they received from the CEs to construct the link bandwidth community carried by these VPN-IP routes.

An ingress PE, when sending traffic to destinations within the site, can use the bandwidth value carried in the community of the routes advertised by PE1 and PE2 to perform load sharing, where some of the traffic would go via PE1, while other traffic would go via PE2.

If there are multiple paths to reach a destination and if only some of them have link bandwidth community, the load sharing router should not perform unequal cost load balancing based on link bandwidths.

#### **4. Acknowledgments**

The authors would like to thank Yakov Rekhter, Srihari Sangli and Dan Tappan for proposing unequal cost load balancing as one possible application of the extended community attribute.

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## 5. IANA Considerations

This document defines a specific application of the two-octet AS specific extended community. IANA is requested to assign a sub-type value of 0x04 for the link bandwidth extended community.

Name	Value
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non-transitive Link Bandwidth Ext. Community	0x4004

## 6. Security Considerations

There are no additional security risks introduced by this design.

## 7. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC4360] Sangli, S., Tappan, D., and Y. Rekhter, "BGP Extended Communities Attribute", [RFC 4360](#), February 2006.
- [RFC4364] Rosen, E. and Y. Rekhter, "BGP/MPLS IP Virtual Private Networks (VPNs)", [RFC 4364](#), February 2006.
- [RFC6793] Vohra, Q. and E. Chen, "BGP Support for Four-Octet Autonomous System (AS) Number Space", [RFC 6793](#), December 2012.

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