

Network Working Group  
Internet-Draft  
Intended status: Informational  
Expires: March 23, 2011

W. Kumari  
Google, Inc.  
September 19, 2010

**Deprecation of BGP AS\_SET, AS\_CONFED\_SET.  
draft-wkumari-deprecate-as-sets-01**

Abstract

This document deprecates the use of the AS\_SET and AS\_CONFED\_SET types of the AS\_PATH in BGPv4. This is done to simplify the design and implementation of the BGP protocol and to make the semantics of the originator of a route more clear.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on March 23, 2011.

Copyright Notice

Copyright (c) 2010 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">3</a>
<a href="#">2.</a>	Requirements notation . . . . .	<a href="#">4</a>
<a href="#">3.</a>	Terminology . . . . .	<a href="#">5</a>
<a href="#">4.</a>	Deployment and modification of behavior . . . . .	<a href="#">6</a>
<a href="#">5.</a>	IANA Considerations . . . . .	<a href="#">7</a>
<a href="#">6.</a>	Security Considerations . . . . .	<a href="#">8</a>
<a href="#">7.</a>	Acknowledgements . . . . .	<a href="#">9</a>
<a href="#">8.</a>	Normative References . . . . .	<a href="#">10</a>
	Author's Address . . . . .	<a href="#">11</a>

Kumari

Expires March 23, 2011

[Page 2]

## 1. Introduction

The AS\_SET path segment type of the AS\_PATH attribute ([\[RFC4271\]](#), [Section 4.3](#)) is created by a router that is performing route aggregation and contains an unordered set of ASs that the update has traversed. The AS\_CONFED\_SET path segment type ([\[RFC5065\]](#)) of the AS\_PATH attribute is created by a router that is performing route aggregation and contains an unordered set of Member AS Numbers in the local confederation that the update has traversed (AS\_CONFED\_SETs are very similar to AS\_SETs, but are used within a confederation).

By performing aggregation, a router is, in essence, combining multiple routes into a new route. This type of aggregation blurs the semantics of what it means to originate a route. These can cause operational issues that include reachability problems and traffic engineering issues.

From analysis of past Internet routing data it is apparent that aggregation that involves AS\_SETs is very seldom used in practice on the public network and, when it is, often contains reserved AS numbers ([\[RFC1930\]](#)) and / or only a single AS in the AS\_SET. The reductions in table size provided by the aggregation is outweighed by additional complexity in the BGP protocol and confusion regarding what exactly is meant by originating a route.



## **2. Requirements notation**

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 [[RFC2119](#)].

### **3. Terminology**

Deprecate: To mark (a component of a software standard) as obsolete to warn against its use in the future so that it may be phased out.

#### **4. Deployment and modification of behavior**

It is expected that initially AS\_SETs / AS\_CONFED\_SETs will be deprecated by the few operators that are currently generating them, and operator policy changed to filter them. Operators should take note that new technologies (such as those that make use of the RPKI) MAY not support routes with AS\_SETs / AS\_CONFED\_SETs in them, and MAY treat as infeasible routes containing them.



## **5. IANA Considerations**

This document contains no IANA considerations.

## **6. Security Considerations**

By removing support for the AS\_SET path segment type of the AS\_PATH attribute future BGP implementations can be simplified.. This will also simplify the design and implementation of the RPKI and systems that will rely on it. By removing corner cases we remove complexity and code that is not exercised very often, which decreases the attack surface.

## **7. Acknowledgements**

The author would like to thank Tony Li, Randy Bush, John Scudder, Chris Morrow, Danny McPherson, Douglas Montgomery, Enke Chen, Florian Weimer, Ilya Varlashkin, Jakob Heitz, John Leslie, Keyur Patel, Paul Jakma, Rob Austein, Russ Housley, Sandra Murphy, Sriram Kotikalapudi, Steve Bellovin, Steve Kent, Steve Padgett, Alfred Hones, Tom Petch, and everyone else who provided input.

Apologies to those who I may have missed, it was not intentional.

## **8. Normative References**

[I-D.ietf-sidr-arch]

Lepinski, M. and S. Kent, "An Infrastructure to Support Secure Internet Routing", [draft-ietf-sidr-arch-09](#) (work in progress), October 2009.

[RFC1930] Hawkinson, J. and T. Bates, "Guidelines for creation, selection, and registration of an Autonomous System (AS)", [BCP 6](#), [RFC 1930](#), March 1996.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

[RFC4271] Rekhter, Y., Li, T., and S. Hares, "A Border Gateway Protocol 4 (BGP-4)", [RFC 4271](#), January 2006.

[RFC5065] Traina, P., McPherson, D., and J. Scudder, "Autonomous System Confederations for BGP", [RFC 5065](#), August 2007.



Author's Address

Warren Kumari  
Google, Inc.  
1600 Amphitheatre Parkway  
Mountain View, CA 94043  
US

Phone: +1 571 748 4373  
Email: warren@kumari.net