Cisco IOS BGP 4-Byte ASN Support

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Border Gateway Protocol (BGP) is an Internet Engineering Task Force (IETF) standard, and is the most scalable of all routing protocols. BGP is the routing protocol of the global Internet, as well as for Service Provider private networks. BGP has expanded upon its original purpose of carrying Internet reachability information, and can now carry routes for Multicast, IPv6, VPNs, and a variety of other data. Cisco supports all IETF BGP standards, as well as most or all Internet Drafts for BGP. In addition, Cisco is an active participant in the IDR working groups at the IETF and a frequent contributor of new BGP extensions.

Cisco IOS Software now supports BGP 4-Byte Autonomous System Numbers (ASNs).

During the early time of BGP development and standardization, it was assumed that availability of a 16 bit binary number to identify the Autonomous System (AS) within BGP would have been more than sufficient. The 16 bit AS number, also known as the 2-byte AS number, provides a pool of 65536 unique Autonomous System numbers. The IANA manages the available BGP Autonomous System Numbers (ASN) pool, with the assignments being carried out by the Regional Registries.

The current consumption rate of the publicly available AS numbers suggests that the entire public 2-byte ASN pool will be fully depleted by early to middle 2011. A solution to this depletion is the expansion of the existing 2-byte AS number to a 4-byte AS number, which provides a theoretical 4,294,967,296 unique AS numbers. ARIN has made the following policy changes in conjunction with the adoption of the solution.

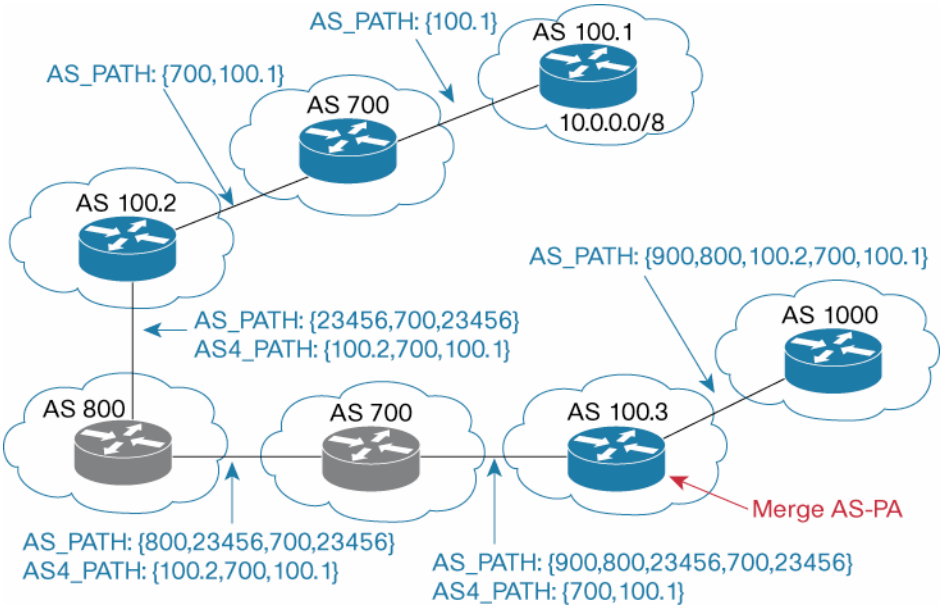
As of January 1, 2009, all new Autonomous System Numbers (ASNs) issued will be 4-byte by default, unless otherwise requested. *"Following a globally coordinated policy, ARIN and all the Regional Internet Registries began allocating four-byte ASNs by request in January 2007; January 2009 marks the transition to allocating four-byte ASNs by default (https://www.arin.net/announcements/2008/07242008.html)".*

The Cisco IOS BGP "4-byte ASN" feature allows BGP to carry a Autonomous System Number (ASN) encoded as a 4-byte entity. The addition of this feature allows an operator to use an expanded 4-byte AS number granted by IANA.

As shown in Figure 1, backward compatibility between the 4-byte AS number and 2-byte AS number is provided as BGP and Multiprotocol BGP are widely deployed in ISP and MPLS VPN SP environments. Specifically, advertisement via standard based BGP capability code, two new "optional transitive" attributes: AS4_AGGREGATOR and AS4_PATH, and a newly reserved AS TRANS# 23456 for interoperability between 4-byte ASN capable and non-capable BGP speakers, are introduced to smooth migration from a 2-byte to a 4-byte ASN environment.

The implementation is compliant with IETF RFC 5396 and RFC 4893 standards.

Figure 1. A use case with both 4-byte capable and 2-byte ASN BGP speakers



Benefits

- Cisco IOS "4-byte ASN" feature allows BGP to carry Autonomous System Number (ASN) encoded as a 4-byte entity. The addition of this feature allows an operator to use an expanded 4-byte AS number granted by IANA as the existing 2-byte ASN pool is close to exhaustion.
- The implementation includes the following enhancements to ensure a smooth migration from a 2-byte to a 4-byte ASN environment
  - Advertisement via standard based BGP capability code
  - Two new "optional transitive" attributes: **AS4_AGGREGATOR** and **AS4_PATH**
  - A newly reserved **AS TRANS**# 23456 for interoperability between 4-byte ASN capable and non-capable BGP speakers
- To further reduce the operation change requirement when an operator is migrating from a 2-byte to a 4-byte ASN environment, the implementation provides a default "**asplain**" and an optional "**asdot**" AS output format
- The initial release supports all existing BGP features including IPv4, IPv6, VPNv4, and VPNv6 address and sub-address families, with the exception of "IOS NetFlow"

Feature Availability

Software Release	Hardware Platform
Cisco IOS Software Release 12.4(24)T	Cisco 1800, 2800, 3800 Series
Releases 12.0(32)S11, 12.0(33)S, 12.0(32)SY	Cisco 7200 Series
Releases 12.0(32)S11, 12.0(33)S, 12.0(32)SY	Cisco 12000 Series
RLS3	Cisco ASR 1000 Series
Release 12.2(33)SXI1	Catalyst 6500 Series

Additional Information

Border Gateway Protocol (BGP) on Cisco.com:
http://www.cisco.com/en/US/products/ps6636/products_ios_protocol_option_home.html

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