ARIN Review
A resource for Internet number resource users

2006
First Quarter

In This Issue

About Review

Review is produced for the ARIN membership and Internet community. Articles and contributions dealing with Internet number resources are welcome from all sources.

If you have an idea about an article or just a suggestion, please contact webmaster@arin.net.

ARIN XVII to focus on IPv6 and Routing Certification

From April 9-12, the ARIN community will join together in Montréal, Québec for the ARIN XVII Public Policy and Members Meetings, as well as workshops, tutorials, and other events. In addition to an interesting panel discussion about X.509 resource and routing certificates, eight policy proposals are on the agenda. All ARIN XVII meeting information is available at **http://www.arin.net/ARIN-XVII/**.

For those unable to attend the meeting in person, a webcast will be available for the Public Policy and Members Meetings. By pre-registering through the "Register for ARIN XVII" link available from the URL above, you can participate remotely by submitting questions and comments to be read at the meeting.

ARIN's meetings are a great chance for the entire community to benefit from the technical and operational expertise of their colleagues, keep up on all the latest technical issues facing the network operator community, and contribute to Internet number resource policy discussions and development. An archive of the webcast, presentations, and a summary of meeting discussions from this meeting will be posted on the ARIN website by Friday, April 21.

The Transition to 4-byte AS Numbers

by Geoff Huston, Internet Research Scientist, APNIC

Editor's Note: This article is reprinted courtesy of APNIC and Geoff Huston. It is part of a series of articles on AS number exhaustion published in APNIC's newsletter *Apster*. Readers may access the complete version of this article at **http://potaroo.net/ispcol/2005-08/as.html**.

As discussed in previous articles, current experience suggests that the unallocated 2-byte AS number pool could become exhausted by late 2010. Working backward from this date to the necessary steps that could ensure smooth transition to a new AS number pool, it would appear that we should start the transition in the coming months rather than in the coming years.

We'll now look at the current proposal for a larger AS number pool within the BGP protocol and examine the implications of an associated transition plan.

The approach proposed in "draft-ietf-idr-as4bytes-10.txt" is to expand the size of the AS number pool space from 16 to 32 bits, expanding the number space from a pool of 65,536 to 4,294,967,296 billion numbers. In terms of the current use of AS numbers, the current scaling properties of the BGP routing protocol, and the use of ASs in the context of inter-domain routing, a pool of 4.4 billion numbers would easily encompass a network environment of significantly greater levels of domains and inter-domain interconnection density. Such a pool size would exceed some current guesses of the scaling capabilities of the BGP protocol by up to a further two orders of magnitude.

Its also proposed to preserve the first block of 4-byte AS numbers to align with the allocations of the 2-byte numbers.

We can use a new form of terminology here for 4-byte AS number values, where the first 65,536 AS numbers use the form "0:0" through to "0:65535". The second set of 65,536 numbers would be written as 1:0 through to 1:65535, and so on. So we'll be using a number format of <upper16 bits>:<lower 16 bits>.

So, what is the inventory of issues that need to be specifically addressed here?

See **4-byte**, Page 5

Future Internet Community Meetings

RIPE 52
April 24-28
Istanbul, Turkey

AfNOG
May 7-12
Nairobi, Kenya

AfriNIC 4
May 16-17
Nairobi, Kenya

LACNIC IX
May 22-26
Guatemala City, Guatemala

ICANN
June 26-30
Marrakesh, Morocco

66th IETF
July 9-14
Montréal, Canada

SANOG 8
July 27 - August 4
Karachi, Pakistan

Updates to this calendar can be found at:

http://www.arin.net/meetings/calendar.html

Internet Community Meeting Reports

ESCC/Internet2 Joint Techs Workshop
February 5-8
Albuquerque, New Mexico

The Winter 2006 ESCC/Internet2 Joint Techs Workshop was held in Albuquerque, New Mexico from February 5-8, 2006. The meeting was hosted by The University of New Mexico. The workshop offered a combination of tutorials, plenary presentations, in-depth subject discussions, and BoFs.

ARIN staff attended the workshop and presented an ARIN status report during one of the plenary sessions. The report focused on the status of the Internet number resource pool, current policies and policy proposals. Workshop attendees were encouraged to participate both through the upcoming ARIN meeting and on the Public Policy Mailing List.

http://jointtechs.es.net/newmexico2006/

NANOG 36
February 12-15
Dallas, Texas

ARIN staff attended the winter 2006 NANOG meeting, which was held February 12-15, 2006 in Dallas, Texas. This meeting featured a modified agenda based on community input, the general session took place in the morning and tutorials and BoFs were held in the afternoons.

Topics of presentations included DNS cache poisoning, DNS infrastructure distribution, prefix hijacking, and the impacts of Hurricane Katrina. Tutorial topics included troubleshooting BGP, Layer 2 Virtual Private Networks (L2VPN), and Quality-of-Service (QoS) for Packet-based IP and MPLS Networks.

http://www.nanog.org/mtg-0602/

APNIC 21
February 27 - March 3
Perth, Australia

APNIC 21 was held in Perth, Australia from February 27 to March 3, 2006, in conjunction with APRICOT 2006. A total of nearly 400 delegates attended APRICOT 2006, including many APNIC members. Delegates and speakers also attended from the other Internet organizations, including other RIRs, NIRs, ICANN, and various ISOC Chapters.

The APNIC Annual Member Meeting on March 3rd was also well attended, with 164 delegates representing 32 economies and 52 APNIC member organizations. The following candidates were re-elected to the Executive Council: Che-Hoo Cheng, Akinori Maemura, and Vinh Ngo.

At the Policy SIG of the Open Policy Meeting, there was consensus to move forward with the proposal “prop-032-v002: 4-byte AS number policy proposal”. This proposal was subsequently approved at the APNIC Member Meeting, and sent to “last call” for comments.

http://www.apnic.net/meetings/21/

65th IETF
March 19-24
Dallas, Texas

ARIN staff attended the 65th IETF, which took place in Dallas, Texas from March 19-24, 2006. The meeting was hosted by Nokia.

The IEPG at IETF65 focused on analysis of last year’s BGP data, IPv6 deployments around the world, and anycast node requirements. George Michaelson also presented on behalf

of the RIRs to detail the December 2005 allocation data. The meeting concluded with a discussion about methods to draw more operators into the regular IEPG meetings.

At the Root Server Advisory group, there was a discussion on the pending June 1, 2006 shutdown of ip6.int. One of the most relevant discussions in the Applications Area was the JPNIC presentation proposing an IRR CRISP solution. There was objection to moving forward with this predominately from APNIC and RIPE, as the proposed solution uses numeric hierarchy and the existing IRR system follows aggregation.

The DNSEXT working group solicited RIR community input on ongoing development in the DNSSEC protocol. The IDR working group advanced the 4-byte AS draft. ARIN staff also attended the second SIDR (Secure Inter Domain Routing) BoF. Discussion at the BoF centered on a proposal for IP resource certification presented by Steve Kent, followed by a description of some initial trials conducted in the APNIC region, presented by Geoff Huston.

http://www.ietf.org/meetings/past.meetings.html

Additional Multi-homing Requirements

On February 12, 2006, the ARIN Board of Trustees ratified policy proposal 2005-7 "Rationalize Multi-Homing Definition and Requirement." This adopted policy changed Sections 4.2.2.2 and 4.3.2.2 of the Number Resource Policy Manual (NRPM).

In order to implement this policy, ARIN's Registration Services Department will now be requiring additional information for any IPv4 request that is submitted under the multi-homing policy. In addition, to normalize the requirements regarding multi-homing, this additional information will also be required to validate Autonomous System Number (ASN) requests that are submitted under the multi-homing clause of the ASN policy.

The additional information required includes, but is not limited to, copies of agreements with transit providers and/or peers to validate the intention to multi-home. This additional information, as well as all other information used to justify resource requests, will be kept confidential.

ARIN Board of Trustees Actions

The ARIN Board of Trustees met on January 5 and February 12, 2006.

The following are highlights of Board actions and discussions at these meetings:

- Elected John Curran as Chairman, Scott Bradner as Secretary, and Lee Howard as Treasurer
- Ratified Proposal 2005-4: AfriNIC Recognition Policy; Proposal 2005-5: IPv6 HD Ratio; Proposal 2005-7: Rationalize Multi-Homing Definition and Requirement
- Appointed Lee Howard, Scott Bradner, and Bill Manning to the Finance Committee
- Extended the waiver of IPv6 fees as currently in place and expiring on December 31, 2006, to expire on December 31, 2007
- Approved a modification to the fee schedule for IPv6
- Updated IRPEP to change the period for the initial review of policy proposals by the ARIN Advisory Council
- Approved modifications to the ARIN Bylaws

Minutes for all Board of Trustees meetings are available at http://www.arin.net/meetings/minutes/bot/

Advisory Council Actions

The ARIN Advisory Council met on January 26 and February 16, 2006.

The following are highlights of the actions and discussions at these meetings:

- Submitted proposal "Residential Customer Privacy" was accepted as Proposal 2006-1.
- Submitted proposal "Micro-Allocations for Internal Infrastructure" was accepted as Proposal 2006-2.
- Submitted proposal "Capturing Originations in Templates" was accepted as Proposal 2006-3.
- Submitted proposal "IPv6 Direct PI Assignments for End Sites" was accepted as Proposal 2006-4.
- Submitted proposal "IPv4 Micro-allocations for anycast services (temporary)" was accepted as Proposal 2006-5.

Minutes for all Advisory Council meetings are available at: http://www.arin.net/meetings/minutes/ac/

Deprecation of ip6.int Scheduled for June 1, 2006

In August 2005, RFC 4159 Deprecation of ip6.int was published as Best Current Practice. This RFC noted that maintenance of ip6.int is no longer required and that the Regional Internet Registries adopt a schedule for cessation of ip6.int. All the RIRs have agreed to deprecate ip6.int on June 1, 2006. Further note that ARIN no longer modifies any of the zones it administers under ip6.int effective December 7, 2005.

ARIN 2005 Annual Report Now Available

ARIN's 2005 Annual Report is now available. Attendees of ARIN XVII in Montréal will receive a copy in their meeting materials, and a copy is available online at:

http://www.arin.net/about_us/corp_docs/annual_rprt.html

The audited financial statement for 2005 will be published separately in mid-2006.

NRPM version 2006.1 - New Policy Implementations

On February 12, 2006, the ARIN Board of Trustees, based on the recommendations of the Advisory Council and noting that the Internet Resource Policy Evaluation Process had been followed, adopted the policy proposals listed below. These policy proposals took effect February 17, 2006.

- 2005-4: AfriNIC Recognition Policy
- 2005-5: IPv6 HD ratio
- 2005-7: Rationalize Multi-Homing Definition and Requirement

Version 2006.1 of the ARIN Number Resource Policy Manual (NRPM) became effective February 17, 2006. This version supersedes all previous versions. See Appendix A of the NRPM for information regarding changes to the manual.

The NRPM can be found at
http://www.arin.net/policy/nrpm.html

Active Policy Proposals for Discussion at ARIN XVII

Policy discussions at this meeting will focus on policy proposals recently introduced to the Public Policy Mailing List (PPML), and those carried over from the previous Public Policy Meeting.

Policy Proposals Recently Introduced on PPML

- 2005-9: 4-Byte AS Number
- 2006-1: Residential Customer Privacy
- 2006-2: Micro-allocations for Internal Infrastructure
- 2006-3: Capturing Originations in Templates
- 2006-4: IPv6 Direct PI Assignments for End Sites
- 2006-5: IPv4 Micro-allocations for anycast services (temporary)

Policy Proposals Carried Over from the Previous Public Policy Meeting

- 2005-1: Provider-independent IPv6 Assignments for End Sites
- 2005-8: Proposal to amend ARIN IPv6 assignment and utilisation requirement

Policy proposals are open for discussion on PPML. Each of the policy proposals has been previously posted to PPML as an independent thread to facilitate discussion.

A summary of the active policy proposals under discussion can be found at:

http://www.arin.net/policy/proposal_archive.html

The entire Internet community is invited and encouraged to participate in these policy discussions. Your active participation in these discussions is vital to the process and will help to form policies that are beneficial to all.

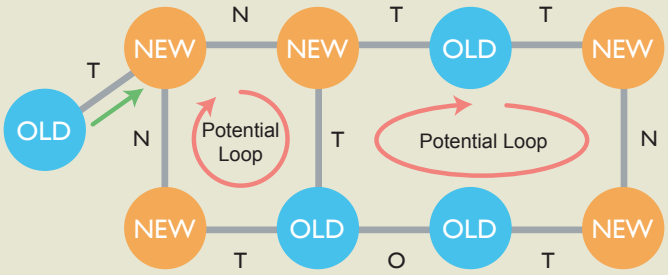
Mailing list subscription information can be found at:

http://www.arin.net/mailing_lists/

4-byte, from Page 1

Obviously there is a need for some changes to the routing protocol and this change needs to be able to accommodate a number of situations. It would be unrealistic to expect an ordered inter-domain transition. A more realistic expectation is the piecemeal transition of domains, where individual domains will shift to supporting 4-byte ASs in their own time. Domains that are currently using 2-byte ASs may have less reason to undergo an early transition to 4-byte AS support, while those domains which are assigned a non-mappable 4-byte AS number will find that they have to support 4-byte AS numbers from the outset.

A piecemeal transition raises the potential of loops between "OLD" and "NEW" domains (see Figure 1). Any proposed solution should be able to detect such loops without having to alter the behavior of the old BGP speakers.



T- Transitional BGP session NEW / OLD boundary
O - OLD BGP peering session
N - NEW BGP peering session

Figure 1 - BGP transition cases

Changes to the BGP protocol

BGP has two major parts within its protocol: opening a BGP conversation with a peer BGP speaker, then transferring protocol objects that describe reachability of address prefixes and associated attributes of these address prefixes. Both parts include AS number components and, in considering changes to the current protocol, both parts of the protocol require some change. The message objects that need to be considered are the BGP OPEN message and the BGP UPDATE message.

The changes to the BGP protocol create a new BGP implementation that is capable of supporting a 4-byte AS number environment. The essential task of the changes is to define mechanisms that all NEW BGP speakers use to speak to each other and pass AS number values in 4-byte fields. However the Internet is way too large to set up a "flag day", for all BGP speakers to switch from OLD BGP to NEW BGP. Accordingly, its also necessary to define protocol interactions in NEW BGP where the transition in the Internet will be gradual and essentially uncoordinated. NEW BGP speakers will have to set up sessions with OLD BGP speakers and, of course, OLD BGP speakers will also be peering with other OLD BGP speakers. The information associated with 4-byte AS paths must be passed across sections of the network that normally support only 2-byte AS paths. In other words, 4-Byte AS information needs to be passed to OLD BGP speakers and between OLD BGP speakers.

Opening a BGP session

BGP carries its own AS number in the "My Autonomous System" field of the BGP OPEN message.

The proposed approach is to initiate a NEW BGP session in a mode that is compatible with the OLD BGP protocol and also inform the remote peer of its capability to conduct a NEW BGP conversation if the remote peer is also a NEW BGP speaker. This capability advertisement is part of OLD BGP – OLD BGP speakers which open a peer session with a NEW BGP speaker will simply ignore the NEW capability and operate in OLD mode. A NEW BGP peer will respond positively to the NEW capability, and the BGP session can then operate in NEW mode.

The BGP OPEN message includes a fixed length 2-byte "My AS field" (as shown in Figure 2) as well as potentially containing a capability query as part of the Optional Parameters section. In order to ensure that NEW and OLD speakers can communicate, this 2-byte MyAS field needs to be preserved in NEW BGP even when the Optional Parameters section encompasses the capability to undertake a NEW peering session. This may appear contradictory in the first instance, as the OPEN message then contains both a 2-byte Autonomous System number and a 4-byte AS Capabilities Query.

The mechanism proposed for the OPEN Message varies according to whether the NEW speaker is using a mappable AS number drawn from the original pool (that is, with a My AS number in the range 0:0 through to 0:65535), or its using a number drawn from a higher-numbered 4-byte number block. In the first case the OPEN message would use the 2-byte mapped value in the My AS field (dropping out the zero-valued high order 16 bits of the AS value), while in the second case the BGP speaker would use for My AS a special 2-byte value that is reserved for this purpose (AS 23456). In both cases, the Optional Parameter section would include a capability code to indicate that the local BGP speaker can support 4-byte AS numbers (Capability Code 65).

The side effect is that in the OLD BGP domains AS 23456 may appear to be connected to the 2-byte BGP realm in many different locations, and advertising a collection of different address prefixes in different locations. From the OLD BGP realm this does not present a protocol problem; however, as always, there is the potential that this repeated use of AS 23456 as a 4-byte AS substitution token may create a somewhat confusing BGP-view of the Internet from the perspective of the OLD BGP world!

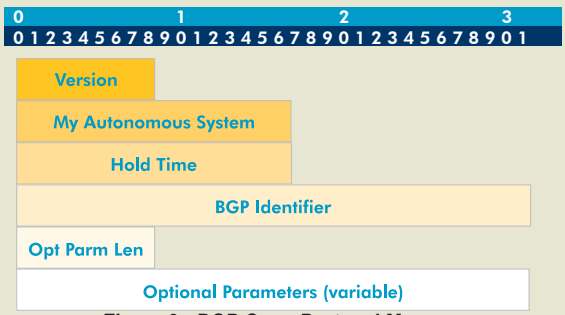


Figure 2 - BGP Open Protocol Message
–Adapted from "draft-ietf-idr-bgp4-26.txt"

The capability exchange uses a protocol described in RFC3392. The NEW BGP speaker adds an optional capability field to the OPEN message. The 4-byte AS capability code 65 carries as its capability value the local 4-byte local AS number value. For a NEW peer this capability value is to be interpreted as the actual AS of the remote side, on the basis that the MyAS field in the body of the OPEN is either a truncation of the local 4-byte AS value (in the case of mappable 4-byte AS values), or the special value of AS 23456.

One response from the remote BGP speaker is to accept the capabilities announcement with a comparable OPEN message – in which case the remote side is also a NEW BGP speaker – and the session may proceed using 4-byte AS values.

If the session is opened with an OLD BGP peer, the OLD BGP peer may respond with a NOTIFICATION message indicating that the 4-byte capability is an Unsupported Optional Capability parameter. In response to this unsupported notification the NEW BGP speaker will re-establish the connection by resending the OPEN message, and this time drop the 4-byte capability option from the message. The NEW BGP speaker will then assume that it is peering with an OLD BGP peer.

The "Unsupported" response to a capabilities parameter was not included in the original specification. Older versions of BGP allowed a BGP speaker to optionally send a NOTIFICATION message and terminate the peer session. If the NEW BGP speaker sees a session termination in response to its OPEN message it may need to re-open the TCP session, this time omitting the 4-byte capability advertisement in the initial BGP OPEN message. Once again, the NEW BGP speaker will then assume that it is peering with an OLD BGP peer.

In general, however, a BGP implementation should not send a NOTIFICATION when a capability parameter is unrecognized because the Capabilities Optional Parameter is still optional. With such general implementations, the OLD speaker would just pick up the 2-byte AS (23456) in the OPEN received form the NEW speaker. As the OLD speaker does not advertise the 4-byte AS Capability in its OPEN, the NEW speaker has to use the 2-byte AS it advertised in the OPEN (that is, the AS_TRAN - 23456) for peering. A NOTIFICATION is not involved in this scenario.

The BGP UPDATE Message

For a NEW BGP session (4-byte peering with 4-byte) the changes to the protocol are the use of 4-byte AS numbers in the AS_PATH attribute of UPDATE messages. All 2-byte AS values are padded with a zero high order 16 bits. If the AGGREGATOR attribute is used it is similarly carried as a 4-byte value. So in the 4-byte peering, all 2-byte information is carried in mapped 4-byte AS numbers (see Figure 3).

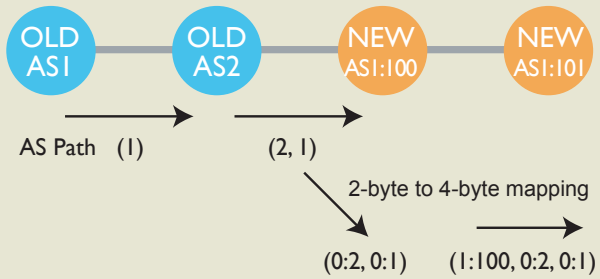


Figure 3 - OLD to NEW BGP AS path Mapping

In this way, AS path length is preserved without change when translating 2-byte AS information into the 4-byte domain.

The next case is where an OLD BGP peers with a NEW BGP. We've already seen the simple case where the information is coming from a 2-byte path and there is no additional 4-byte information, and in this case the 2-byte values are simply mapped into 4-byte values. What about the reverse case where 4-byte information is being passed back into the 2-byte world?

There are two parts to this case: first creating an equivalent 2-byte AS path and second packing up the 4-byte AS path information in such a way that it transits across the 2-byte domain in such a way that it can be reassembled in any subsequent transition into a 4-byte domain. In the first case, the equivalent path information is constructed by either stripping the high order 2-bytes from the AS value, as long as this part is all zeros. Where this is not possible, the transition AS number, 23456, is substituted in its place. This is indicated in Figure 4.

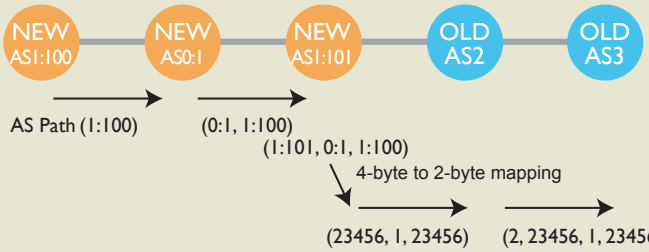


Figure 4 - NEW to OLD BGP AS path mapping

In this way, the AS path length metric is preserved, and the prevention of count-to-infinity loops in the 2-byte domain is avoided.

The second part to this case is packaging up the 4-byte path into the OLD BGP session in such a way that it can be unpacked at any subsequent boundary into a 4-byte realm. Here the proposal calls for new transitive community attributes to be supported for OLD BGP. These attributes are defined as transitive attributes, and should be passed through the OLD BGP peering sessions without alteration. It should be noted that this is not a protocol change, per se, but it does require the explicit support within OLD BGP implementations of this attribute as a transitive community.

The proposed mechanism is an extended community attribute called "NEW_AS_PATH". When a NEW BGP speaker is speaking to an OLD

BGP, the NEW BGP prepends its own AS value to the AS path and copies this information into the NEW_AS_PATH. It then translates the 4-byte AS path into a 2-byte equivalent AS path. The translation is straightforward, in that where the 4-byte AS has all zeros in the high order 2 bytes, the translation truncates the AS value to a 2-byte value, and where the high order 2-bytes are non-zero the translation substitutes the reserved 2-byte value AS 23456 in its place (see Figure 5).

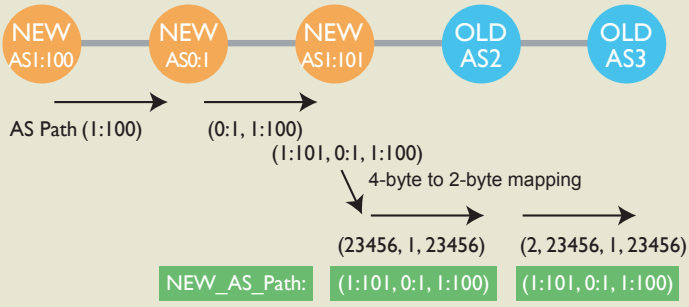


Figure 5 – NEW to OLD BGP AS path mapping

The transit across the OLD BGP domains leaves the NEW_AS_PATH untouched, and prepends 2-byte AS values to the AS_PATH.

The next transition is one from the OLD to the NEW domain, as shown by a continuation of the previous example (see Figure 6).

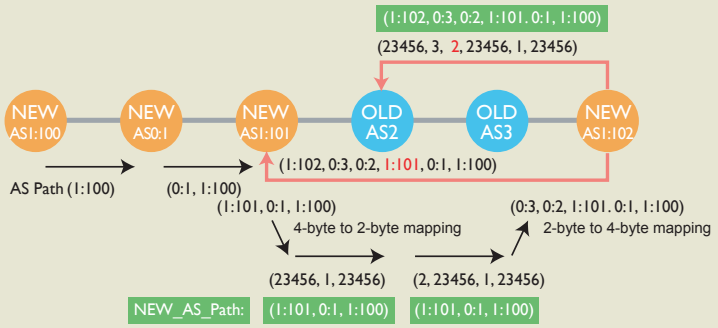


Figure 6 – NEW to OLD to NEW transition with potential routing loops

Figure 6 shows a further OLD to NEW transition. In this case the NEW BGP speaker takes the AS Path as presented by the OLD BGP speaker and converts the 2-byte values to 4-byte values by adding 2-bytes of zero padding to each entry, and then overwrites the trailing entries with the values specified by the NEW_AS_PATH attribute. The net result is that the 4-byte path that entered the 2-byte sequence is prepended with the 2-byte transit AS sequence. The NEW_AS_PATH is then removed, leaving an intact 4-byte path as the AS_PATH attribute.

This ensures that the resultant BGP environment can detect loops in both the NEW 4-byte and OLD 2-byte realms.

Further extending this example, we can construct a potential loop in the 4-byte world by adding a path back to AS 1:101. Restoring the original 4-byte AS path at the OLD-to-NEW transition ensures that the potential loop is discarded even when the loop needs to traverse one or more 2-byte OLD BGP ASs. A similar form of loop can be constructed for a 2-byte OLD BGP AS, that traverses a 4-byte NEW BGP AS. Again the transition mapping ensures that the potential routing loop is detected by BGP.

The ability to perform AS Path Prepending is also unaltered in this mixed NEW and OLD BGP environment. The AS simply prepends its local AS value to the AS_PATH as normal. In the case of prepending on a NEW-to-OLD boundary the prepended AS Path is mapped into the NEW_AS_Path attribute as described above.

In a less common use of AS PATH poisoning, the prepending uses a different AS number value in order to ensure that the particular advertisement is not learned by a remote AS. For NEW BGP speakers there is no change to this capability. For OLD BGP speakers the AS Path poisoning can only be directed towards 2-byte ASs, as the OLD BGP speaker has no knowledge of the structure or content of the NEW AS PATH attribute. From the perspective of the OLD BGP speaker, the NEW_AS_PATH attribute is an opaque data block.

The same translation technique applies to the AGGREGATOR attribute. In a NEW-to-OLD transition the AGGREGATOR may be a mappable AS number, in which case the value is truncated to 2-bytes and no further action is required. Otherwise, the 4-byte AGGREGATOR value is rewritten to the NEW_AGGREGATOR attribute and the transition 2-byte value, AS 2356 is placed into the AGGREGATOR attribute. On an OLD-to-NEW transition the NEW_AGGREGATOR attribute is copied back into the AGGREGATOR attribute, if defined, otherwise the AGGREGATOR is padded out with leading zeros.

The general approach adopted for transition is to preserve AS Path length information across the OLD and NEW BGP boundaries, while recognizing that some 4-byte AS information cannot be cleanly mapped into a 2-byte AS Path. In order to preserve 4-byte information, which is necessary to prevent loop formation for 4-byte ASs, the 4-byte information is preserved across OLD transit paths and restored upon re-entry into NEW BGP realms.

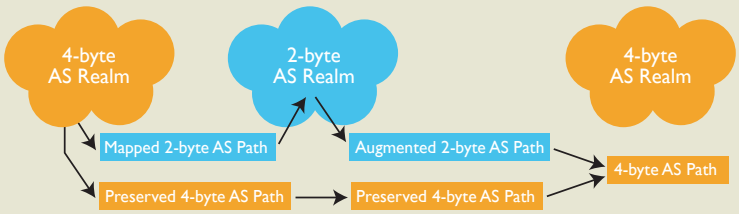


Figure 7 – 2-byte and 4-byte AS Realms

BGP communities

BGP communities require some additional consideration. If the high order 16 bits of the community attribute are neither all zeros or all ones, then it is assumed to contain a 2-byte AS value. Where it is necessary to specify a 4-byte AS number in the community attribute it is necessary to turn to the extended community attribute to support this.

This extended communities feature is documented in the Internet draft “draft-ramachandra-bgp-ext-communities-10.txt”, now on the RFC publication track as a Proposed Standard.

Transition

Transition in this environment is relatively straightforward. NEW BGP speakers can be deployed within the network in a piecemeal fashion without any major concerns. The size of BGP UPDATE messages is slightly longer due to the extended length of the AS PATH attribute in NEW BGP and the NEW_AS_PATH attribute that has been added in the OLD BGP environment, but it should not prove to be a major factor.

BGP loop prevention appears to be adequately addressed in all commonly encountered situations and there appear to be no other significant transition considerations.

There does appear to be one precondition for the use of 4-byte AS numbers, and that is for a routing domain to actually be numbered with a non-mappable 4-byte AS number, all the BGP speakers in the domain should be NEW BGP speakers. Aside from that consideration there do not appear to be any further constraints associated with this transition.

We are certainly running out of the 2-byte AS number pool, and an industry of this size needs to have a considerable period of advance warning of change in order to be able to integrate such changes into various operational cycles of testing and transitional deployment prior to integration into production environments.

The 4-byte transition appears to offer flexibility, orderly transition and minimal disruptions to existing operational practices.

The first steps that need to happen are the completion of the technical specification of this approach in the form of an IETF Standard and the subsequent production and distribution of NEW BGP implementations from the existing sources of BGP implementations. It would be preferable to get this underway now, while there is still time to complete this transition well before we exhaust the current 2-byte AS number space.

Acknowledgement

Thanks to Enke Chen, one of the authors of the 4-Byte AS working document, for some clarification regarding the OPEN behavior between OLD and NEW BGP implementations.

About the Author

GEOFF HUSTON holds a B.Sc. and a M.Sc. from the Australian National University. He has been closely involved with the development of the Internet for the past decade, particularly within Australia, where he was responsible for the initial build of the Internet within the Australian academic and research sector. He has been the Executive Director of the Internet Architecture Board, and a member of the Board of the Public Interest Registry. He was an inaugural Trustee of the Internet Society, and served as Secretary of the Board of Trustees from 1993 until 2001, and as chair of the Board of Trustees in 1999 and 2000. He is author of a number of Internet-related books. He is the Senior Internet Research Scientist at the Asia Pacific Network Information Centre (APNIC), the Regional Internet Registry serving the Asia Pacific region.

ARIN is very pleased to announce that ARIN XVIII will take place October 11-13, 2006 in St. Louis, Missouri. ARIN's fourth quarter meeting offers a great opportunity for the community, as we will be holding it back-to-back with NANOG 38. Savvis has committed to sponsor the meeting's network connectivity and will be co-hosting the NANOG meeting with Washington University in St. Louis.

Sponsorship Opportunities Still Available!

For more details, see:
http://www.arin.net/ARIN-XVIII/

ARIN Review

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