

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
Type	FRR	FRR	FRR	FRR	FRR	FRR	FRR	FRR	FRR	FRR	FRR	FRR
Commit ID	ab0c954	ab0c954	16e3267	16e3267	5753eb9	5753eb9	821cf0d	821cf0d	1a664f5	1a664f5	3e71b5d	3e71b5d
Commit Date	2017-01-16	2017-01-16	2017-01-19	2017-01-19	2017-02-23	2017-02-23	2017-02-24	2017-02-24	2017-03-07	2017-03-07	2017-04-02	2017-04-02
ANVL-BGP4-1.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	ANVL, setup verification											
	ANVL, Setup Verification DUT Listens on TCP port 179 for BGP4 Connection											
ANVL-BGP4-1.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	ANVL, setup verification											
	ANVL, Setup Verification Establish BGP4 connection to the DUT and transit to Established state											
ANVL-BGP4-1.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	ANVL, setup verification											
	ANVL, Setup Verification Router adds routes contained in the newly received Update Message to its routing table											
ANVL-BGP4-1.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	ANVL, setup verification											
	ANVL, Setup Verification Router forwards new Update routes											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-2.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4, p 11, Message Formats											
	Message Formats The maximum message size is 4096 octets. All implementations are required to support this maximum message size.											
ANVL-BGP4-3.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect.4.2, page 13, OPEN message format											
	OPEN Message Format After a TCP connection is established, the first message sent by each side is an OPEN message.											
ANVL-BGP4-3.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect.4.2, page 13, OPEN message format											
	OPEN Message Format If the OPEN message is acceptable, a KEEPALIVE message confirming the OPEN is sent back.											
ANVL-BGP4-3.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 4.2, p 13, OPEN Message Format											
	OPEN Message Format Upon receipt of an OPEN message, a BGP speaker MUST calculate the value of the Hold Timer by using the smaller of its configured Hold Time and the Hold Time received in the OPEN message.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4-3.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.2, p 13, OPEN Message Format											
	OPEN Message Format The Hold Time MUST be either zero or at least three seconds. (Note: Here we test the Hold Time value with 0 or 3 seconds)											
ANVL- BGP4-3.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 4.2, p 13, OPEN Message Format RFC4271, Sect. 6.2, p 32, OPEN message error handling											
	OPEN Message Format The Hold Time MUST be either zero or at least three seconds. If the Hold Time field of the OPEN message is unacceptable, then the Error Subcode MUST be set to Unacceptable Hold Time. An implementation MUST reject Hold Time values of one or two seconds. (Note: Here we test the Hold Time value with 1 second and 2 seconds)											
ANVL- BGP4-3.6	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 4.2, p 14, OPEN Message Format											
	OPEN Message Format The calculated value for Hold Time indicates the maximum number of seconds that may elapse between the receipt of successive KEEPALIVE, and/or UPDATE messages by the sender. (Note: Here, we test that the DUT sends a NOTIFICATION message due to not receiving successive UPDATE/KEEPALIVE messages within Hold Time Period)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-3.7 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 4.2, p 14, OPEN Message Format											
	OPEN Message Format The calculated value for Hold Time indicates the maximum number of seconds that may elapse between the receipt of successive KEEPALIVE, and/or UPDATE messages by the sender. (Note: Here, we test that the DUT sends a NOTIFICATION message due to not receiving successive KEEPALIVE messages within Hold Time Period)											
ANVL-BGP4-4.1 <b>MAY</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 4.3, p 15, UPDATE Message Format											
	UPDATE Message Format An UPDATE message MAY simultaneously advertise a feasible route and withdraw multiple unfeasible routes from service.											
ANVL-BGP4-4.2 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes, the Transitive bit must be set to 1. (Note: Here we test with the path attribute type ORIGIN)											
ANVL-BGP4-4.3 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes, the Transitive bit must be set to 1. (Note: Here we test with the path attribute type AS_PATH)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-4.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes, the Transitive bit must be set to 1. (Note: Here we test with the path attribute type NEXT_HOP)											
ANVL-BGP4-4.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes, the Transitive bit must be set to 1. (Note: Here we test with the path attribute type LOCAL_PREF)											
ANVL-BGP4-4.6	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes, the Transitive bit must be set to 1. (Note: Here we test with the path attribute type ATOMIC_AGGREGATE)											
ANVL-BGP4-4.7	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes and for optional non-transitive attributes the Partial bit MUST be set to 0. (Note: Here we test with the path attribute type ORIGIN)											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-4.8	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes and for optional non-transitive attributes the Partial bit MUST be set to 0. (Note: Here we test with the path attribute type AS_PATH)											
ANVL-BGP4-4.9	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes and for optional non-transitive attributes the Partial bit MUST be set to 0. (Note: Here we test with the path attribute type NEXT_HOP)											
ANVL-BGP4-4.10	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes and for optional non-transitive attributes the Partial bit MUST be set to 0. (Note: Here we test with the path attribute type LOCAL_PREF)											
ANVL-BGP4-4.11	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes and for optional non-transitive attributes the Partial bit MUST be set to 0. (Note: Here we test with the path attribute type ATOMIC_AGGREGATE)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-4.12	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format For well-known attributes and for optional non-transitive attributes the Partial bit MUST be set to 0. (Note: Here we test with the path attribute type MULTI_EXIT_DISC)											
ANVL-BGP4-4.13	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format The lower-order four bits of the Attribute Flags octet are unused. They MUST be zero when sent and MUST be ignored when received. (Note: Here we test that DUT sends UPDATE message with lower-order four bits of the ORIGIN Attribute Flags octets set to 0)											
ANVL-BGP4-4.14	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 17, UPDATE Message Format											
	UPDATE Message Format The lower-order four bits of the Attribute Flags octet are unused. They MUST be zero when sent and MUST be ignored when received. (Note: Here we test that DUT ignores lower-order four bits of the ORIGIN Attribute Flag after receiving an UPDATE Message)											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-4.15	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 18, UPDATE Message Format											
	UPDATE Message Format ORIGIN is a well-known mandatory attribute that defines the origin of the path information. The data octet can assume the following value: 2 INCOMPLETE - Network Layer Reachability Information learned by some other means.											
ANVL-BGP4-4.16	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 19, UPDATE Message Format											
	UPDATE Message Format ATOMIC_AGGREGATE is a well-known discretionary attribute of length 0.											
ANVL-BGP4-4.17	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 4.3, p 19, UPDATE Message Format											
	UPDATE Message Format AGGREGATOR is an optional transitive attribute of length 6.											
ANVL-BGP4-4.18	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MAY</b>	RFC4271, Sect.5.1.7 p.30, AGGREGATOR											
	UPDATE Message Format A BGP speaker which performs route aggregation MAY add the AGGREGATOR attribute which SHALL contain its own AS number and IP address											





	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3	
ANVL-BGP4-5.1  <b>MUST</b>	pass	pass	pass	pass	unpredict	pass	pass	pass	pass	pass	unpredict	pass	pass
	RFC4271, Sect. 4.4, p 21, KEEPALIVE Message Format												
	KeepAlive Message Format KEEPALIVE messages MUST NOT be sent more frequently than one per second. The Hold Time MUST be either zero or at least three seconds.												
ANVL-BGP4-6.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 5, p 24, Path Attributes												
	Path Attributes BGP implementations MUST recognize all well-known attributes (Note : This test checks for External Peer)												
ANVL-BGP4-6.2  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 5, p 24, Path Attributes												
	Path Attributes BGP implementations MUST recognize all well-known attributes (Note : This test checks for Internal Peer)												
ANVL-BGP4-6.3  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 5, p 24, Path Attributes												
	Path Attributes Some of the well-known attributes are mandatory and must be included in every UPDATE message that contains NLRI.												



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4-6.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes Some of the well-known attributes are mandatory and must be included in every UPDATE message that contains NLRI. This test checks for EBGp											
ANVL- BGP4-6.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes Some of the well-known attributes are mandatory and must be included in every UPDATE message that contains NLRI. This test checks for IBGP											
ANVL- BGP4-6.6	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes Once a BGP peer has updated any well-known attributes, it MUST pass these attributes to its peers in any updates it transmits. (Note: This test verifies AS_PATH as well-known attribute)											
ANVL- BGP4-6.7	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes Paths with unrecognized transitive optional attributes SHOULD be accepted.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4-6.8	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes If a path with unrecognized transitive optional attribute is accepted and passed along to other BGP peers, then the unrecognized transitive optional attribute of that path MUST be passed along with the path to other BGP peers											
ANVL- BGP4-6.9	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes If a path with unrecognized transitive optional attribute is accepted and passed along to other BGP peers, then the unrecognized transitive optional attribute of that path MUST be passed along with the path to other BGP peers with the Partial bit in the Attribute Flags octet set to 1.											
ANVL- BGP4-6.10	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes Unrecognized non-transitive optional attributes must be quietly ignored											
ANVL- BGP4-6.11	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes Unrecognized non-transitive optional attributes must not be passed along to other BGP peers.											

	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-6.12  <b>MAY</b>	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
	RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes New transitive optional attributes may be attached to the path by the originator or by any other AS (BGP Speaker) in the path. (Note: This test checks the case when originator attaches the transitive optional attribute AGGREGATOR)											
ANVL-BGP4-6.14  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes The sender of an UPDATE message should order path attributes within the UPDATE message in ascending order of attribute type. The receiver of an UPDATE message MUST be prepared to handle path attributes within the UPDATE message that are out of order.											
ANVL-BGP4-6.15  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 5, p 24, Path Attributes											
	Path Attributes The same attribute (attribute with the same type) can not appear more than once within the path Attributes field of a particular UPDATE message.											
ANVL-BGP4-7.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 5.1.2, p 25, AS_PATH											
	AS_PATH When a given BGP speaker advertises the route to an internal peer, the advertising speaker SHALL not modify the AS_PATH attribute associated with the route.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-7.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.2, p 25-26, AS_PATH											
	AS_PATH When a given BGP speaker advertises the route to an external peer, then the advertising speaker updates the AS_PATH attribute as follows If the first path segment of the AS_PATH is of type AS_SEQUENCE, the local system shall prepend its own AS number as the last element of the sequence.											
ANVL-BGP4-7.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.2, p 26, AS_PATH											
	AS_PATH If the first path segment of the AS_PATH of the route to be Updated is of type AS_SET, the local system shall prepend a new path segment of type AS_SEQUENCE to the AS_PATH, including its own AS number in that segment.											
ANVL-BGP4-7.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.2, p 26, AS_PATH											
	AS_PATH When a BGP speaker originates a route then the originating speaker shall include an empty AS_PATH attribute in all UPDATE messages sent to internal peers.											
ANVL-BGP4-7.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.2, p 26, AS_PATH											
	AS_PATH When a BGP speaker originates a route then the originating speaker shall include its own AS number in a path segment of type AS_SEQUENCE in the AS_PATH attribute of all UPDATE messages sent to an external peer.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4-8.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
MAY	RFC4271, Sect5.1.3, p 26, NEXT_HOP											
	NEXT_HOP When sending a message to an internal peer, if the route is not locally originated the BGP speaker SHOULD NOT modify the NEXT_HOP attribute, unless it has been explicitly configured to announce its own IP address as the NEXT_HOP.											
ANVL- BGP4-8.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
MAY	RFC4271, Sect. 5.1.3, p 27, NEXT_HOP											
	NEXT_HOP When sending a message to an external peer X, and the peer is one IP hop away from the speaker: ... the BGP speaker can use for the NEXT_HOP attribute an interface address of the internal peer router (or the internal router) through which the announced network is reachable for the speaker for the NEXT_HOP attribute, provided that peer X shares a common subnet with this address.											
ANVL- BGP4-8.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
SHOULD	RFC4271, Sect. 5.1.3, p 27, NEXT_HOP											
	NEXT_HOP - Otherwise, if the route being announced was learned from an external peer, the speaker can use in the NEXT_HOP attribute an IP address of any adjacent router (known from the received NEXT_HOP attribute) that the speaker itself uses for local route calculation, provided that peer X shares a common subnet with this address. This is a second form of "third party" NEXT_HOP attribute.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4-8.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect 5.1.3, p 28, NEXT_HOP											
	NEXT_HOP A route originated by a BGP speaker SHALL NOT be advertised to a peer using an address of that peer as NEXT_HOP. (Note : Here we test that DUT does not accept an Update Message advertising a route with next hop set to an interface address of DUT which is in the same subnet as the peer sending the Update)											
ANVL- BGP4-8.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MAY</b>	NEGATIVE RFC4271, Sect 5.1.3, p 28, NEXT_HOP											
	NEXT_HOP A route originated by a BGP speaker SHALL NOT be advertised to a peer using an address of that peer as NEXT_HOP. (Note : Here we test that DUT does not accept an Update Message advertising a route with next hop set to an interface address of DUT which is not in the same subnet as the peer sending the Update)											
ANVL- BGP4-9.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 5.1.4, p 28, MULTI_EXIT_DISC											
	MULTI_EXIT_DISC All other factors being equal, the exit or entry points with lower metric SHOULD be preferred.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-9.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MAY</b>	RFC4271, Sect. 5.1.4, p 28, MULTI_EXIT_DISC											
	MULTI_EXIT_DISC If received over EBGp, the MULTI_EXIT_DISC attribute MAY be propagated over IBGP to other BGP speakers within the same AS											
ANVL-BGP4-9.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.4, p 28, MULTI_EXIT_DISC											
	MULTI_EXIT_DISC The MULTI_EXIT_DISC attribute received from a neighboring AS MUST NOT be propagated to other neighboring ASs.											
ANVL-BGP4-9.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.4, p 28-29, MULTI_EXIT_DISC											
	MULTI_EXIT_DISC A BGP speaker MUST IMPLEMENT a mechanism based on local configuration which allows the MULTI_EXIT_DISC attribute to be removed from a route. If a BGP speaker is configured to remove the MULTI_EXIT_DISC attribute from a route, then this removal MUST be done prior to determining the degree of preference of the route and performing route selection (Note : In this test, we test if DUT removes MED on configuration and treats the update as having lowest MED)											
ANVL-BGP4-9.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MAY</b>	RFC4271, Sect. 5.1.4, p 29, MULTI_EXIT_DISC											
	MULTI_EXIT_DISC An implementation MAY also (based on local configuration) alter the value of the MULTI_EXIT_DISC attribute received over EBGp.											



## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-10.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.5, p 29, LOCAL_PREF											
	LOCAL_PREF LOCAL_PREF is a well-known attribute that SHALL be included in all UPDATE messages that a given BGP speaker sends to the other internal peers.											
ANVL-BGP4-10.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.5, p 29, LOCAL_PREF											
	LOCAL_PREF A BGP speaker SHALL calculate the degree of preference for each external route based on the locally configured policy, and include the degree of preference when advertising a route to its internal peers.											
ANVL-BGP4-10.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.5, p 29, LOCAL_PREF											
	LOCAL_PREF The higher degree of preference MUST be preferred.											
ANVL-BGP4-10.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 5.1.5, p 29, LOCAL_PREF											
	LOCAL_PREF A BGP speaker MUST NOT include the LOCAL_PREF attribute in UPDATE messages that it sends to external peers.											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-10.5  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 5.1.5, p 29, LOCAL_PREF											
	LOCAL_PREF If the LOCAL_PREF attribute in an UPDATE message is received from an external peer, then this attribute MUST be ignored by the receiving speaker.											
ANVL-BGP4-11.1  <b>SHOULD</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 5.1.6, p 30 ATOMIC_AGGREGATE											
	ATOMIC_AGGREGATE A BGP speaker that receives a route with the ATOMIC_AGGREGATE attribute SHOULD NOT remove the attribute from the route when propagating it to other speakers.											
ANVL-BGP4-12.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 4.5, p 21, NOTIFICATION message format											
	BGP Error Handling The BGP4 Connection is closed immediately after sending a NOTIFICATION message.											
ANVL-BGP4-12.2  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6, p 30, BGP Error Handling											
	BGP Error Handling If no Error Subcode is specified in an Error message, then a zero must be used.											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-12.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 6, p 30, BGP Error Handling											
	BGP Error Handling The phrase "the BGP4 Connection is closed" means that the transport protocol connection has been closed.											
ANVL-BGP4-12.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 6, p 30, BGP Error Handling											
	BGP Error Handling When "the BGP4 Connection is closed" then before the invalid routes are deleted from the system, it advertises, to its peers, either withdraws for the routes marked as invalid, or the new best routes before the invalid routes are deleted from the system.											
ANVL-BGP4-12.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 6, p 30, BGP Error Handling											
	BGP Error Handling Unless specified explicitly, the Data field of the NOTIFICATION message that is sent to indicate an error is empty.											
ANVL-BGP4-13.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 6.1, p 31, Message Header error handling											
	Message Header Error Handling If the Marker field of the message header is not as expected, then a synchronization error has occurred and the Error Subcode is set to Connection Not Synchronized.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-13.2 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.1, p 31, Message Header error handling											
	Message Header Error Handling If the Length field of the message header is less than 19 or greater than 4096 then the Error Subcode MUST be set to Bad Message Length. The Data field MUST contain the erroneous Length field.											
ANVL-BGP4-13.3 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.1, p 31, Message Header error handling											
	Message Header Error Handling If the Length field of an OPEN message is less than the minimum length of the OPEN message, then the Error Subcode MUST be set to Bad Message Length. The Data field MUST contain the erroneous Length field.											
ANVL-BGP4-13.4 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.1, p 31, Message Header error handling											
	Message Header Error Handling If the Length field of an UPDATE message is less than the minimum length of the UPDATE message, then the Error Subcode MUST be set to Bad Message Length. The Data field MUST contain the erroneous Length field.											
ANVL-BGP4-13.5 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.1, p 31, Message Header error handling											
	Message Header Error Handling If the Length field of a KEEPALIVE message is not equal to 19 then the Error Subcode MUST be set to Bad Message Length. The Data field MUST contain the erroneous Length field.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-13.6 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.1, p 31, Message Header error handling											
	Message Header Error Handling If the Type field of the message header is not recognized, then the Error Subcode MUST be set to Bad Message Type. The Data field MUST contain the erroneous Type field.											
ANVL-BGP4-14.1 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.2, p 32, OPEN message error handling											
	Open Message Error Handling If the Autonomous System field of the OPEN message is unacceptable, then the Error Subcode MUST be set to Bad Peer AS.											
ANVL-BGP4-14.2 <b>MAY</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.2, p 32, OPEN message error handling											
	Open Message Error Handling If the Hold Time field of the OPEN message is Unacceptable, then the Error Subcode MUST be set to Unacceptable Hold Time. An implementation MAY reject any proposed Hold Time.											
ANVL-BGP4-14.3 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.2, p 32, OPEN message error handling											
	Open Message Error Handling If the BGP Identifier field of the OPEN message is syntactically incorrect, then the Error Subcode MUST be set to Bad BGP Identifier. Syntactic correctness means that the BGP Identifier field represents a valid unicast IP host address.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-14.4 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.2, p 32, OPEN message error handling											
	Open Message Error Handling If one of the Optional Parameters in the OPEN message is not recognized, then the Error Subcode MUST be set to Unsupported Optional Parameters.											
ANVL-BGP4-15.1 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If the Withdrawn Routes Length or Total Attribute Length is too large (i.e., if Withdrawn Routes Length + Total Attribute Length + 23 exceeds the message Length), then the Error Subcode MUST be set to Malformed Attribute List.											
ANVL-BGP4-15.2 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks for mandatory well-known attributes, Optional Bit and External Peer)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.3 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks for mandatory well-known attributes, Optional Bit and Internal Peer)											
ANVL-BGP4-15.4 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (Note : This test checks for mandatory well-known attributes, Transitive Bit and External Peer)											
ANVL-BGP4-15.5 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (Note : This test checks for mandatory well-known attributes, Transitive Bit and Internal Peer)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.6 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Error Data field MUST contain the erroneous attribute (type, length and value). (Note : This test checks for mandatory well-known attributes, Partial Bit and External Peer)											
ANVL-BGP4-15.7 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (Note : This test checks for mandatory well-known attributes, Partial Bit and Internal Peer)											
ANVL-BGP4-15.8 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute. (type, length and value). (Note : This test checks for MULTI_EXIT_DISC (optional non-transitive) attribute and for Optional Bit)											





	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.9 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling.											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks for MULTI_EXIT_DISC (optional non-transitive) attribute and for Transitive Bit)											
ANVL-BGP4-15.10 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (Note : This test checks for MULTI_EXIT_DISC (optional non-transitive) attribute and for Partial Bit)											
ANVL-BGP4-15.11 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (Note : This test checks for ATOMIC_AGGREGATE (well-known discretionary) attribute, and Optional Bit)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.12 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks for ATOMIC_AGGREGATE (well-known discretionary) attribute, and Transitive Bit)											
ANVL-BGP4-15.13 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks for ATOMIC_AGGREGATE (well-known discretionary) attribute, Partial Bit)											
ANVL-BGP4-15.14 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Flags that conflict with the Attribute Type Code, then the Error Subcode MUST be set to Attribute Flags Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks for AGGREGATOR (optional transitive) attribute, and Optional Bit)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.15 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Length that conflicts with the expected length (based on the attribute type code), then the Error Subcode MUST be set to Attribute Length Error. The Error Data field MUST contain the erroneous attribute (type, length and value). (Note: This test checks by sending incorrect length for ORIGIN attribute)											
ANVL-BGP4-15.16 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Length that conflicts with the expected length (based on the attribute type code), then the Error Subcode MUST be set to Attribute Length Error. The Error Data field MUST contain the erroneous attribute (type, length and value). (Note: This test checks by sending incorrect length for NEXT_HOP attribute)											
ANVL-BGP4-15.17 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Length that conflicts with the expected length (based on the attribute type code), then the Error Subcode MUST be set to Attribute Length Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks by sending incorrect length for MULTI_EXIT_DISC attribute)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.18 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Length that conflicts with the expected length (based on the attribute type code), then the Error Subcode MUST be set to Attribute Length Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks by sending incorrect length for LOCAL_PREF attribute)											
ANVL-BGP4-15.19 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Length that conflicts with the expected length (based on the attribute type code), then the Error Subcode MUST be set to Attribute Length Error. The Error Data field MUST contain the erroneous attribute (type, length and value). (This test checks by sending incorrect length for ATOMIC_AGGREGATE attribute)											
ANVL-BGP4-15.20 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If any recognized attribute has Attribute Length that conflicts with the expected length (based on the attribute type code), then the Error Subcode MUST be set to Attribute Length Error. The Data field MUST contain the erroneous attribute (type, length and value). (This test checks by sending incorrect length for AGGREGATOR attribute)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.21 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 33, UPDATE message error handling											
	Update Message Error Handling If any of the well-known mandatory attributes are not present, then the Error Subcode MUST be set to Missing Well-known Attribute. The Data field MUST contain the Attribute Type Code of the missing, well-known attribute. (This test checks for IBGP)											
ANVL-BGP4-15.22 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 33, UPDATE message error handling											
	Update Message Error Handling If any of the mandatory well-known attributes are not present, then the Error Subcode MUST be set to Missing Well-known Attribute. The Data field MUST contain the Attribute Type Code of the missing well-known attribute. (This test checks for EBGp)											
ANVL-BGP4-15.23 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 33, UPDATE message error handling											
	Update Message Error Handling If any of the mandatory well-known attributes are not recognized, then the Error Subcode MUST be set to Unrecognized Well-known Attribute. The Data field MUST contain the unrecognized attribute (type, length and value).											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.24 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 32, UPDATE message error handling											
	Update Message Error Handling If the ORIGIN attribute has an undefined value, then the Error Subcode MUST be set to Invalid Origin Attribute. The Data field MUST contain the unrecognized attribute (type, length and field).											
ANVL-BGP4-15.25 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 33, UPDATE message error handling											
	Update Message Error Handling If the NEXT_HOP attribute field is syntactically incorrect, then the Error Subcode MUST be set to Invalid NEXT_HOP Attribute. The Data field MUST contain the incorrect attribute (type, length and value).											
ANVL-BGP4-15.26 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect.6.3, page 33, UPDATE message error handling.											
	Update Message Error Handling If the NEXT_HOP attribute is semantically incorrect, the error SHOULD be logged, and the route SHOULD be ignored. In this case, a NOTIFICATION message SHOULD not be sent.											
ANVL-BGP4-15.27 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 33, UPDATE message error handling											
	Update Message Error Handling If the AS_PATH attribute is syntactically incorrect, then the Error Subcode MUST be set to Malformed AS_PATH.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.28 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.3, p 34, UPDATE message error handling											
	Update Message Error Handling If an optional attribute is recognized, then the value of this attribute MUST be checked. If an error is detected, the attribute MUST be discarded, and the Error Subcode MUST be set to Optional Attribute Error. The Data field MUST contain the attribute (type, length and value). (This test checks for AGGREGATOR attribute)											
ANVL-BGP4-15.29 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 35, UPDATE message error handling											
	Update Message Error Handling If any attribute appears more than once in the UPDATE message, then the Error Subcode MUST be set to Malformed Attribute List. (This test checks for EBGp)											
ANVL-BGP4-15.30 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.3, p 34, UPDATE message error handling											
	Update Message Error Handling If any attribute appears more than once in the UPDATE message, then the Error Subcode MUST be set to Malformed Attribute List. (This test checks for IBGP)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-15.31	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 6.3, p 34, UPDATE message error handling											
	Update Message Error Handling The NLRI field in the UPDATE message is checked for syntactic validity. If the field is syntactically incorrect, then the Error Subcode MUST be set to Invalid Network Field.											
ANVL-BGP4-15.32	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 6.3, p 34, UPDATE message error handling											
	Update Message Error Handling An UPDATE message that contains correct path attributes, but no NLRI, SHALL be treated as a valid UPDATE message. (This test checks for EBGp)											
ANVL-BGP4-16.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	NEGATIVE RFC4271, Sect. 6.4, p 34, NOTIFICATION message error handling											
	Notification Message Error Handling If a peer sends a NOTIFICATION message, and the receiver of the message detects an error in that message, .... Any such error (e.g., an unrecognized Error Code or Error Subcode) SHOULD be noticed, logged locally, and brought to the attention of the administration of the peer.											





	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-17.1 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.5, p 34, OPEN Message Format											
	Hold Timer Error Handling If a system does not receive successive KEEPALIVE and/or UPDATE and/or NOTIFICATION messages within the period specified in the Hold Time field of the OPEN message, then the NOTIFICATION message with Hold Timer Expired Error Code is sent and the BGP connection is closed.											
ANVL-BGP4-18.1 <b>MAY</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 6.7, p 35, Cease											
	Error Code Cease In absence of any fatal errors (that are indicated in this section), a BGP peer MAY choose at any given time, to close its BGP Connection by sending the NOTIFICATION message with Error Code Cease.											
ANVL-BGP4-18.2 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.7, p 35, Cease											
	Error Code Cease The Cease NOTIFICATION message MUST NOT be used when a fatal error indicated by this section does exist. (Note : This test checks the case when the error is in message Header)											
ANVL-BGP4-18.3 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.7, p 35, Cease											
	Error Code Cease The Cease NOTIFICATION message MUST NOT be used when a fatal error indicated by this section does exist. (Note : This test checks the case when the error is in OPEN message)											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-18.4 <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	NEGATIVE RFC4271, Sect. 6.7, p 35, Cease  Error Code Cease The Cease NOTIFICATION message MUST NOT be used when a fatal error indicated by this section does exist. (This test checks the case when the error is in UPDATE Message fields)											
ANVL-BGP4-19.1 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 6.8, p 36, Connection collision detection  Connection Collision Detection In case when a connection collision is detected, if the value of the local BGP Identifier is less than the remote one, the local system closes BGP Connection that already exists (the one that is already in the OpenConfirm state), and accepts BGP4 Connection initiated by the remote system.											
ANVL-BGP4-19.2 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 6.8, p 36, Connection collision detection  Connection Collision Detection In case when a connection collision is detected, if the value of the local BGP Identifier is greater than the remote one, the local system closes newly created BGP4 Connection (the one associated with the newly received OPEN message), and continues to use the existing one (the one that is already in the OpenConfirm state).											
ANVL-BGP4-19.3 <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 6.8, p 36, Connection collision detection  Connection Collision Detection Unless allowed via configuration, a connection collision with an existing BGP4 Connection that is in Established state causes closing of the newly created connection.											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-19.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 6.8, p 36, Connection collision detection											
	Connection Collision Detection Note that a connection collision cannot be detected with connections that are in Idle, or Connect, or Active states. (Note: This test is for Connect state)											
ANVL-BGP4-19.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 6.8, p 36, Connection collision detection											
	Connection Collision Detection Note that a connection collision cannot be detected with connections that are in Idle, or Connect, or Active states. (This test is for Active State)											
ANVL-BGP4-19.6	pass	pass	pass	pass	unpredict	pass	pass	pass	pass	unpredict	unpredict	pass
<b>MUST</b>	RFC4271, Sect. 6.8, p 36, Connection collision detection											
	Connection Collision Detection Closing the BGP4 Connection (that results from the collision resolution procedure) is accomplished by sending the NOTIFICATION message with the Error Code Cease.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4- 20.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 6.2, p 31, OPEN message error handling RFC4271, Sect. 7, p 36, BGP Version Negotiation											
	BGP Version Negotiation If the version number contained in the Version field of the received OPEN message is not supported, then the Error Subcode MUST be set to Unsupported Version Number. The Data field is a 2-octet unsigned integer, which indicates the largest, locally supported version number less than the version the remote BGP peer bid (as indicated in the received OPEN message) If an open attempt fails with an Error Code OPEN Message Error, and an Error Subcode Unsupported Version Number..... If the two peers do support one or more common versions, then they will rapidly determine the highest common version.											
ANVL- BGP4- 21.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 8.2.2, p 53, BGP Finite State machine											
	BGP Finite State Machine At Idle state in response to the Manual Start event the local system initiates a TCP connection to other BGP peer.											
ANVL- BGP4- 21.2  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 8.2.2, p 53, BGP Finite State machine											
	BGP Finite State Machine At idle state in response to the Manual Start event the local system listens for a connection that may be initiated by the remote BGP peer											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4- 21.3  <b>MAY</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	FAIL	pass
RFC4271, Sect. 8.2.2, p 59, BGP Finite State machine												
BGP Finite State Machine While in Active state in response to the ConnectRetry timer expired event : - continues to listen for TCP connection that may be initiated by a remote BGP peer												
ANVL- BGP4- 21.4  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
RFC4271, Sect. 8.2.2, p 63, BGP Finite State machine												
BGP Finite State Machine Start event is ignored in the OpenSent state.												
ANVL- BGP4- 21.5  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
NEGATIVE RFC4271, Sect. 8.2.2, p 64, BGP Finite State machine												
BGP Finite State Machine In state OpenSent if the Hold Timer expires, the local system sends NOTIFICATION message with Error Code Hold Timer Expired.												
ANVL- BGP4- 21.6  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
RFC4271, Sect. 8.2.2, p 64, BGP Finite State machine												
BGP Finite State Machine In OpenSent state if a TcpConnectionFails event is received, the local system: - closes the BGP4 Connection												



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-21.7	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
MAY	RFC4271, Sect. 8.2.2, p 64, BGP Finite State machine											
	BGP Finite State Machine In OpenSent state if a TcpConnectionFails event (Event18) is received, the local system: - continues to listen for a connection that may be initiated by the remote BGP peer											
ANVL-BGP4-21.8	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
MUST	RFC4271, Sect. 8.2.2, p 65, BGP Finite State machine											
	BGP Finite State Machine At OpenSent state if there are no errors in the OPEN message, the local system: - sends a KEEPALIVE message, and - sets a KeepaliveTimer											
ANVL-BGP4-21.9	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
MUST	RFC4271, Sect. 8.2.2, p 67, BGP Finite State machine											
	BGP Finite State Machine Any start event is ignored in the OpenConfirm state.											
ANVL-BGP4-21.10	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
MUST	RFC4271, Sect. 8.2.2, p 67, BGP Finite State machine											
	BGP Finite State Machine In OpenConfirm state in response to a ManualStop event initiated by the operator, the local system: - sends the NOTIFICATION message with Cease											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-21.11	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 8.2.2, p 67, BGP Finite State machine											
	BGP Finite State Machine In OpenConfirm state in response to a ManualStop event initiated by the operator, the local system: - changes its state to Idle.											
ANVL-BGP4-21.12	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 8.2.2, p 71, BGP Finite State machine											
	BGP Finite State Machine Any start event is ignored in the Established state.											
ANVL-BGP4-21.13	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 8.2.2, p 72, BGP Finite State machine											
	BGP Finite State Machine In the Established state, if the KeepaliveTimer_Expires event occurs the local system: - sends a KEEPALIVE message, and - restarts its KeepaliveTimer unless the negotiated HoldTime value is zero.											
ANVL-BGP4-21.14	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 8.2.2, p 74, BGP Finite State machine											
	BGP Finite State Machine In the Established state, if the local system receives an UPDATE or KEEPALIVE message, it restarts its Hold Timer, if the negotiated Hold Time value is non-zero.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4- 22.1  <b>MAY</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
NEGATIVE RFC4271, Sect. 9, p 75, UPDATE Message Handling												
Update Message Handling An UPDATE message may be received only in the Established state. (Note : This test checks by sending Update Message immediately after TCP connection is established)												
ANVL- BGP4- 22.2  <b>MAY</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
NEGATIVE RFC4271, Sect. 9, p 75, UPDATE Message Handling												
Update Message Handling An UPDATE message may be received only in the Established state. (This test checks by sending Update Message in OpenConfirm state)												
ANVL- BGP4- 22.3  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
RFC4271, Sect.9 p.75, UPDATE Message Handling												
Update Message Handling If the UPDATE message contains a non-empty WITHDRAWN ROUTES field, the previously advertised routes whose destinations (expressed as IP prefixes) are contained in this field SHALL be removed from the Adj-RIB-In.												
ANVL- BGP4- 23.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
RFC4271, Sect.9.1, page 76, Decision Process												
Calculation of Degree of Preference Phase 1 is responsible for calculating the degree of preference for each route received from an external peer												





	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-23.2  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC 4271, Sect.9.1.1, p.77, Phase 1: Calculation of Degree of Preference											
	Calculation of Degree of Preference If the route is learned from an internal peer, the value of LOCAL_PREF attribute shall be taken as the degree of preference.											
ANVL-BGP4-24.1  <b>SHOULD</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 9.1.2, p 78 Phase 2: Route Selection											
	Phase 2: Route Selection If the AS_PATH attribute of a BGP route contains an AS loop, the BGP route should be excluded from the Phase 2 decision function.											
ANVL-BGP4-24.2  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 9.1.2, p 79 Phase 2: Route Selection											
	Phase 2: Route Selection Notice that even though BGP routes do not have to be installed in the Routing Table with the immediate next hop(s, implementations MUST take care that before any packets are forwarded along a BGP route, its associated NEXT_HOP address is resolved to the immediate (directly connected) next-hop address and this address (or multiple addresses) is finally used for actual packet forwarding.											
ANVL-BGP4-24.3  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 9.1.2, p 78, Phase 2: Route Selection											
	Phase 2: Route Selection The local speaker MUST determine the immediate next-hop address from the NEXT_HOP attribute of the selected route (see Section 5.1.3). If either the immediate next hop or the IGP cost to the NEXT_HOP (where the NEXT_HOP is resolved through an IGP route) changes, Phase 2 Route Selection MUST be performed again.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-24.4	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2, p 78, Phase 2: Route Selection  Phase 2: Route Selection The local speaker MUST determine the immediate next-hop address from the NEXT_HOP attribute of the selected route (see Section 5.1.3). If either the immediate next hop or the IGP cost to the NEXT_HOP (where the NEXT_HOP is resolved through an IGP route) changes, Phase 2 Route Selection MUST be performed again.											
ANVL-BGP4-24.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 9.1.2, p 79, Phase 2: Route Selection  Phase 2: Route Selection Unresolvable routes SHALL be removed from the Loc-RIB and the routing table. However, corresponding unresolvable routes SHOULD be kept in the Adj-RIBs-In (in case they become resolvable).											
ANVL-BGP4-24.6	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect.9.1.2 p.78, Phase 2: Route Selection  Phase 2: Route Selection If the NEXT_HOP attribute of a BGP route depicts an address that is not resolvable, or it would become unresolvable if the route was installed in the routing table the BGP route MUST be excluded from the Phase 2 decision function.											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL- BGP4- 25.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	NEGATIVE RFC4271, Sect. 9.1.2.1, p 79, Route Resolvability Condition RFC4271, Sect. 9.1.2.1, p 79-80, Route Resolvability Condition RFC4271, Sect. 9.1.2, p 79, Phase 2: Route Selection											
	Route Resolvability Condition 1. A route Rtel, referencing only the intermediate network address, is considered resolvable if the Routing Table contains at least one resolvable route Rte2 that matches Rtel's intermediate network address and is not recursively resolved (directly or indi- rectly) through Rtel. Mutually recursive routes (routes resolving each other or themselves), also fail the resolvability check. It is also important that implementations do not consider feasible routes that would become unresolvable if they were installed in the Routing Table even if their NEXT_HOPs are resolvable using the cur- rent contents of the Routing Table (an example of such routes would be mutually recursive routes). AND Unresolved routes SHALL be removed from the Loc-RIB and the routing table.											
ANVL- BGP4- 26.1  <b>MUST</b>	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
	RFC4271, Sect. 9.1.2.2, p 80, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) a) Remove from consideration all routes which are not tied for having the smallest number of AS numbers present in their AS_PATH attributes. Note, that when counting this number, an AS_SET counts as 1, no matter how many ASS are in the set.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-26.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 80, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) b) Remove from consideration all routes which are not tied for having the lowest Origin number in their Origin attribute.											
ANVL-BGP4-26.3	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 81, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) Remove from consideration routes with less-preferred MULTI_EXIT_DISC attributes.											
ANVL-BGP4-26.4	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 80, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) MULTI_EXIT_DISC is only comparable between routes learned from the same neighboring AS. (This test checks the case when two routes are received from two different ASs, having different MULTI_EXIT_DISC values)											
ANVL-BGP4-26.5	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 80 Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) MULTI_EXIT_DISC is only comparable between routes learned from the same neighboring AS. (This test checks the case when two routes are received from same AS, having different MULTI_EXIT_DISC values)											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-26.6	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 80, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) Routes which do not have the MULTI_EXIT_DISC attribute are considered to have the lowest possible MULTI_EXIT_DISC value.											
ANVL-BGP4-26.7	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 82, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) d) If at least one of the candidate routes was received via EBGp, remove from consideration all routes which were received via IBGP.											
ANVL-BGP4-26.8	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 82, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) e) Remove from consideration any routes with less-preferred interior cost. The interior cost of a route is determined by calculating the metric to the NEXT_HOP for the route using the Routing Table.											
ANVL-BGP4-26.9	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 82, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) f) Remove from consideration all routes other than the route that was advertised by the BGP speaker whose BGP Identifier has the lowest value.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-26.10	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
<b>MUST</b>	RFC4271, Sect. 9.1.2.2, p 82, Breaking Ties (Phase 2)											
	Breaking Ties (Phase 2) g) Prefer the route received from the lowest peer address.											
ANVL-BGP4-27.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 9.1.4, p 83, Overlapping Routes											
	Overlapping Routes If a more specific route is later withdrawn, the set of destinations described by the overlap will still be reachable using the less specific route.											
ANVL-BGP4-27.2	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.1.4, p 83-84, Overlapping Routes											
	Overlapping Routes If both a less and a more specific route are accepted, then the Decision Process MUST install, in Loc-RIB, either both the less and the more specific routes or aggregate the two routes and install, in Loc-RIB, the aggregated route, provided that both routes have the same value of the NEXT_HOP attribute.											
ANVL-BGP4-28.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.2, p 84, Update-Send Process											
	Update-Send Process When a BGP speaker receives an UPDATE message from an internal peer, the receiving BGP speaker SHALL NOT re-distribute the routing information contained in that UPDATE message to other internal peers											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-29.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.2.1.1, p 85, Frequency of Route Advertisement,  Frequency of Route Advertisement If new routes are selected multiple times while awaiting the expiration of MinRouteAdvertisementInterval, the last route selected SHALL be advertised at the end of MinRouteAdvertisementIntervalTimer.											
ANVL-BGP4-30.1	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
<b>MUST</b>	RFC4271, Sect. 9.2.1.1, p 85 Frequency of Route Advertisement RFC4271, Sect. 10, p 90 BGP Timers  Frequency of Route Origination The parameter MinRouteAdvertisementIntervalTimer determines the minimum amount of time that must elapse between an advertisement and/or withdrawal of routes to a particular destination by a BGP speaker to a peer. The suggested default value for the MinRouteAdvertisementIntervalTimer- Timer is 30 seconds for EBGp.											
ANVL-BGP4-30.2	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
<b>MUST</b>	RFC4271, Sect. 9.2.1.2, p 85 Frequency of Route Origination RFC4271, Sect. 10, p 90 BGP Timers  Frequency of Route Origination The parameter MinASOriginationIntervalTimer determines the minimum amount of time that must elapse between successive advertisements of UPDATE messages that report changes within the advertising BGP speaker's own autonomous systems. The suggested default value for the MinASOriginationIntervalTimer- Timer on IBGP4 Connections is 15 seconds.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-31.1	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	pass	pass	FAIL	FAIL	FAIL	FAIL
SHOULD	RFC4271, Sect. 9.2.2.2, p 87, Aggregating Routing Information											
	Aggregating Routing Information Routes that have different MULTI_EXIT_DISC attribute SHALL NOT be aggregated											
ANVL-BGP4-31.2	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
SHOULD	RFC4271, Sect. 9.2.2.2, p 87, Aggregating Routing Information											
	Aggregating Routing Information If the aggregated route has an AS_SET as the first element in its AS_PATH attribute, then the router that originates the route SHOULD NOT advertise the MULTI_EXIT_DISC attribute with this route.											
ANVL-BGP4-31.3	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
MAY	RFC4271, Sect.9.2.2.2, p 87 Aggregating Routing Information											
	Aggregating Routing Information Path attributes that have different type codes can not be aggregated together. (Here we test that the DUT has aggregated two routes having the same type code and all the mandatory attributes are present)											
ANVL-BGP4-31.4	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
MUST	RFC4271, 9.2.2.2, p 87, Aggregating Routing Information											
	Aggregating Routing Information When aggregating routes that have different NEXT_HOP attribute, the NEXT_HOP attribute of the aggregated route SHALL identify an interface on the BGP speaker that performs the aggregation.											





	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-31.5  <b>MUST</b>	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
	RFC4271, Sect. 9.2.2.2, p 87, Aggregating Routing Information,  Aggregating Routing Information If at least one route among routes that are aggregated has ORIGIN with the value INCOMPLETE, then the aggregated route must have the ORIGIN attribute with the value INCOMPLETE.											
ANVL-BGP4-31.6  <b>MUST</b>	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
	RFC4271, Sect. 9.2.2.2, p 87, Aggregating Routing Information,  Aggregating Routing Information If at least one route among routes that are aggregated has ORIGIN with the value EGP, then the aggregated route must have the ORIGIN attribute with the value EGP.											
ANVL-BGP4-31.7  <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	RFC4271, Sect. 9.2.2.2, p 87, Aggregating Routing Information  Aggregating Routing Information If routes to be aggregated have identical AS_PATH attributes, then the aggregated route has the same AS_PATH attribute as each individual route.											
ANVL-BGP4-31.8  <b>MUST</b>	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	RFC4271, Sect. 9.2.2.2, p 88, Aggregating Routing Information  Aggregating Routing Information - all tuples of type AS_SEQUENCE in the aggregated AS_PATH SHALL appear in all of the AS_PATH in the initial set of routes to be aggregated.											



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-31.9	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
<b>MUST</b>	RFC4271, Sect. 9.2.2.2, p 88, Aggregating Routing Information											
	Aggregating Routing Information - all tuples of type AS_SET in the aggregated AS_PATH SHALL appear in at least one of the AS_PATH in the initial set (they may appear as either AS_SET or AS_SEQUENCE types).											
ANVL-BGP4-31.10	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
<b>MUST</b>	RFC4271, Sect. 9.2.2.2, p 88, Aggregating Routing Information											
	Aggregating Routing Information - for any tuple X of type AS_SEQUENCE in the aggregated AS_PATH which precedes tuple Y in the aggregated AS_PATH, X precedes Y in each AS_PATH in the initial set which contains Y, regardless of the type of Y.											
ANVL-BGP4-31.11	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MUST</b>	NEGATIVE RFC4271, Sect. 9.2.2.2, p 88, Aggregating Routing Information											
	Aggregating Routing Information - No tuple of type AS_SET with the same value SHALL appear more than once in the aggregated AS_PATH. An implementation may choose any algorithm which conforms to these rules. At a minimum a conformant implementation SHALL be able to perform the following algorithm that meets all of the above conditions:											
ANVL-BGP4-31.12	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. 9.2.2.2, p 89, Aggregating Routing Information,											
	Aggregating Routing Information If at least one of the routes to be aggregated has ATOMIC_AGGREGATE path attribute, then the aggregated route shall have this attribute as well.											

## BGP4 Results



	Master 2017-01-16 --- Ubuntu 16.04	Master 2017-01-16 --- FreeBSD 10.3	Stable 2.0-rc1 --- FreeBSD 10.3	Stable 2.0-rc1 --- Ubuntu 16.04	Stable 2.0-rc2 --- Ubuntu 16.04	Stable 2.0-rc2 --- FreeBSD 10.3	Master 2017-02-24 --- Ubuntu 16.04	Master 2017-02-24 --- FreeBSD 10.3	Master 2017-03-07 --- FreeBSD 10.3	Master 2017-03-07 --- Ubuntu 16.04	Release 2.0 --- Ubuntu 16.04	Release 2.0 --- FreeBSD 10.3
ANVL-BGP4-31.13	pass	pass	pass	pass	pass	pass	FAIL	FAIL	pass	pass	pass	pass
<b>MUST</b>	RFC4271, Sect. 9.2.2.2, p 89, Aggregating Routing Information											
	Aggregating Routing Information Any AGGREGATOR attributes from the routes to be aggregated MUST NOT be included in the aggregated route. The BGP speaker performing the route aggregation MAY attach a new AGGREGATOR attribute (see Section 5.1.7).											
ANVL-BGP4-32.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>MUST</b>	RFC4271, 9.3, p 89, Route Selection Criteria											
	Route Selection Criteria - If the local AS appears in the AS path of the new route being considered, then that new route can not be viewed as better than any other route (provided that the speaker is configured to accept such routes). If such a route were ever used, a routing loop could result.											
ANVL-BGP4-33.1	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
<b>SHOULD</b>	RFC4271, Sect. Appendix - F.1, p 95, Multiple Networks Per Message,											
	Multiple Networks per Message The BGP protocol allows multiple address prefixes with the same Path attributes to be specified in one message											