

## 6.1. Maintaining Sequence Numbers in AODV

Every route table entry at every node **MUST** include the latest information available about the sequence number for the IP address of the destination node for which the route table entry is maintained. This sequence number is called the "destination sequence number". It is updated whenever a node receives new (i.e., not stale) information about the sequence number from RREQ, RREP, or RERR messages that may be received related to that destination. AODV depends on each node in the network to own and maintain its destination sequence number to guarantee the loop-freedom of all routes towards that node. **A destination node increments its own sequence number in two circumstances:**

- **Immediately before a node originates a route discovery, it MUST increment its own sequence number. This prevents conflicts with previously established reverse routes towards the originator of a RREQ.**
- **Immediately before a destination node originates a RREP in response to a RREQ, it MUST update its own sequence number to the maximum of its current sequence number and the destination sequence number in the RREQ packet.**

When the destination increments its sequence number, it **MUST** do so by treating the sequence number value as if it were an unsigned number. To accomplish sequence number rollover, if the sequence number has already been assigned to be the largest possible number representable as a 32-bit unsigned integer (i.e., 4294967295), then when it is incremented it will then have a value of zero (0). On the other hand, if the sequence number currently has the value 2147483647, which is the largest possible positive integer if 2's complement arithmetic is in use with 32-bit integers, the next value will be 2147483648, which is the most negative possible integer in the same numbering system. The representation of negative numbers is not relevant to the increment of AODV sequence numbers. This is in contrast to the manner in which the result of comparing two AODV sequence numbers is to be treated (see below).

In order to ascertain that information about a destination is not stale, the node compares its current numerical value for the sequence number with that obtained from the incoming AODV message. This comparison **MUST** be done using signed 32-bit arithmetic, this is necessary to accomplish sequence number rollover. **If the result of subtracting the currently stored sequence number from the value of the incoming sequence number is less than zero, then the information related to that destination in the AODV message MUST be discarded, since that information is stale compared to the node's currently stored information.**

The only other circumstance in which a node may change the destination sequence number in one of its route table entries is in response to a lost or expired link to the next hop towards that destination. The node determines which destinations use a particular next hop by consulting its routing table. In this case, for each destination that uses the next hop, the node increments the sequence number and marks the route as invalid (see also sections 6.11, 6.12). Whenever any fresh enough (i.e., containing a sequence number at least equal to the recorded sequence number) routing information for an affected destination is received by a node that has marked that route table entry as invalid, the node **SHOULD** update its route table information according to the information contained in the update.

**A node may change the sequence number in the routing table entry of a destination only if:**

- it is itself the destination node, and offers a new route to itself, or
- it receives an AODV message with new information about the sequence number for a destination node, or
- the path towards the destination node expires or breaks.