Title: Bug in IDRP Tie-breaking Procedure

Source: USA

Reference: SC6 N7196 ″Proposed Text for ISO/IEC DIS 10747″

During its review of the proposed text contained in SC6 N7196, the USA discovered a bug in the tie-breaking procedure (clause 8.15.2.1) that can result in NPDU looping. To illustrate the problem, consider the following simple topology:

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A-----B=======C-----D
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where:

- A, B, C, and D are BISs
- B and C belong to the same RD,
- A and D belong to different RDs.

Assume that the numerical values of the corresponding NETs are ordered as follows:

NET-A > NET-D > NET-B > NET-C

Assume that the routes advertised by both A and D have the same destinations and the same degree of preference. The Phase 1 decision process requires BIS-B to advertise BIS-A′s route to BIS-C; likewise, BIS-C will advertise BIS-D′s route to BIS-B. In the Phase 2 decision process, the tie will need to be resolved.

According to 8.15.2.1 item c, BIS-C must select the route advertised by BIS-B, because the NET of B is less than NET of D. Likewise, B selects the route advertised by C because the NET of A is greater than NET of C. Consequently, if an NPDU is sent to B, then B will forward it to C; but C will send it back to B, thus resulting in the NPDU looping.

This potential problem occurs when there are two or more BISs in a routeing domain, and the local BIS receives some candidate routes from BISs in its own RD and others from BISs in adjacent RDs. Note that according to the Phase 1 Decision Process and the associated internal update procedures, any candidate route that was learned from a BIS in an adjacent RD will be advertised to all other BISs in the local RD by the receiving BIS. Note also that if a routeing domain contains only one BIS with links to adjacent routeing domains, then any ties will be broken during the Phase 1 decision process using the methods of 8.16.1.1—that is, in such a case there can be no tie during the Phase 2 Decision Process.

Therefore, the problem can be resolved by adding the italicized words to the existing text of item c in clause 8.15.2.1 to say:

> ...select the route that was advertised by the BIS *(which can include the local BIS)* whose NET has the lowest value *among those BISs in the local routeing domain that had selected the candidate routes as a result of their Phase 1 decision processes.*

Applying the revised text to the example given above, we see that:

1. BIS-C must choose between the route originally received from BIS-D (which it has already advertised as part of Phase 1) and the route received from BIS-B (that is, BIS-B has advertised it as part of Phase 1). Since the NET of C is lower than that of B, BIS-C will choose the candidate route that it had advertised: namely, the route originally learned from BIS-D.
2. BIS-B must choose between the route originally received from BIS-A (which it has already advertised as part of Phase 1) and the route received from BIS-C (that is, BIS-C has advertised it as part of Phase 1). Since the NET of C is lower than that of B, BIS-C will choose the route that it received from BIS-C—which is in fact the same as the one chosen by BIS-C itself.
3. Assume we expand the example to include a 3rd BIS, BIS-E, in the routeing domain, and assume that BIS-E has no direct links to adjacent routeing domains. BIS-E will have received routes from BISs B and C during the Phase 1 Decision Process. Hence, it too will break the tie in favor of the route advertised by BIS-C.

Thus, by restricting the tie-breaking choice to those candidate routes advertised by BISs in the local RD during the Phase 1 internal update procedure, the bug has been eliminated.