Title: Disposition of Comments on CD 10747

Source: Project Editor (C. A. Kunzinger, USA)

References: 1. CD 10747: *Information Processing Systems - Telecommunications and Information Exchange between Systems - Protocol for the Exchange of Inter-domain Routeing Information among Intermediate Systems to Support Forwarding of ISO 8473 PDUs*

2. SC6 N7089: *Summary of Voting on CD 10747...*

3. SC6 N7196: *Editor's Revised Text for CD 10747*

In accordance with SC6 N7089, the Project Editor has prepared the attached Disposition of Comments report for CD 10747. Comments received from the United Kingdom and the United States accompanied votes of DISAPPROVAL; comments received from Belgium, Canada, and Japan accompanied votes of APPROVAL. The other 10 national bodies that responded voted YES with no comments. One national body abstained, and three did not return their ballots by the closing date.

In the following report, clause numbers refer to the revised text (SC6 N7196) rather than the base text of CD 10747, unless otherwise noted. Member body comment numbers from SC6 N7069 are prefixed with their ISO 3166 Alpha-2 code in this report. I have used the following characters as change bars in the revised text in order to identify the national body whose comment was the proximate cause of the change:

1 = United States (US)
2 = United Kingdom (GB)
3 = Belgium (BE)
4 = Canada (CA)
5 = Japan (JP)

The major comments upon which the two NO votes were based are the following: US 1, US 2, GB 1.1, GB 1.2, GB 1.3, GB 1.4, and GB 1.5. With the exception of GB 1.5 (on the aggregation of information in the presence of routeing domain confederations), the editor believes that all comments have been successfully resolved.

With respect to GB 1.4, the editor has worked with the UK expert who originated this comment in order to develop suitable text that would implement the approach outlined in GB 1.5. This text is contained in the Appendix of this report: new encodings of the RD_PATH attribute are shown, as are new usage rules and new aggregation rules. While the proposed changes are believed to be technically correct, the proposed method has become complex. Because of the complexity, the editor did not incorporate changes into the revised text. Instead, he asks national bodies to review the changes detailed in the Appendix, and to be prepared to discuss them at the July SC6/WG2 meetings.

Resolution of US Comments

1. (US 1) The suggested new normative text has been included in 8.1.2.2 and in 9.4.
2. (US 2) This comment asks for new text to specify how IDRP will handle overlapping routes. In addition to the text suggested by the USA, the editor has made other changes which will also serve to clarify this topic:
   - The text suggested by the US for ″Route Replacement″ has been modified slightly, and now appears in the description of the Update-Receive Process (8.14, item d-2-i).
   - The material suggested by the US for ″Overlapping Routes″ appears as a new clause, 8.15.3.1.
   - Actions to be taken by the Update-Receive Process upon receipt of overlapping routes are described in 8.14, item d-2-ii & iii.
3. (US 3) In resolving other comments, the editor found it useful to describe the Decision Process with a 3-phase model, thus requiring editorial rearrangement of existing clauses. Thus, the material suggested by the US for ″Breaking Ties in the Internal Update Process″ actually appears in 8.16.1.1, while the material suggested for ″Breaking Ties among Routes with Equal Degrees of Preference″ actually appears in 8.15.2.1 with the new heading ″Breaking Ties (Phase 2).
4. (US 4) The suggested changes appear in 8.15. For consistency with the remainder of the document, the editor has changed ″path selection″ to ″route selection″ in several places.
5. (US 5) The deletions suggested by the US have been made.
6. (US 6) The material asked to be removed by the US no longer appears in 8.16.2.
7. (US 7) The suggested warning appears in 8.15.2.
8. (US 8) The suggested changes appear in the description in 7.2 of the OPEN PDU′s ″Maximum PDU Size″ field, along with further clarifying material about the BISPDU types to which ″Maximum PDU Size″ will apply. The editor also added text to note that as a minimum, a BIS should be able to handle BISPDUs with lengths up to at least 1024 octets.
9. (US 9) This comment has been answered by the incorporation of the new flow control text suggested by the UK in comment GB 1.2.
10. (US 10) The suggested text appears in 8.16.3.1.
11. (US 11) The MinRouteAdvertisementInterval has been deleted from Table 6, and a new minRouteAdvertisementTimer is described in the GDMO. .
12. (US 12) Text to make the field Error Subcode a mandatory part of the IDRP ERROR PDU has been added to 7.4. Throughout the document, the editor has changed NOTIFICATION PDU to IDRP ERROR PDU in all places where he found the outdated term still in use.
13. (US 13) The text in 8.1.2.1 has been deleted as suggested. However, the editor found it necessary to add new text (marked with change bars) in order to satisfactorily implement the change requested by the USA. In particular, the new text restricts the granularity to semi-octets for those DSPs that have decimal abstract syntax.

    Support of bit-level granularity of prefixes also needed to be brought in line with the convention that fields of BISPDUs must end on octet boundaries: if the prefix length is not an integral number of octets, trailing 0s are now appended to the field as padding.
14. (US 14) The suggested text has been added to 8.11.2, with minor rewording for clarity. The editor also added text to note that the the Empty Distinguishing Attribute is also permissible.

15. (US 15) This concern is satisfied by the new FSM table and the revised descriptions of the FSM states in clause 8.6ff.
16. (US 16) Suggested changes were made in 6.6.
17. (US 17) Suggested change appears in 8.7.
18. (US 18) The editor believes that this comment should have referenced clause 8.12.2 of CD 10747, rather than 8.12.3. This comment therefore is addressed by the editor′s response to US 14.
19. (US 19) The editor has removed all ″CO/CL″ references that he has found within the text.
20. (US 20) Old Annex L (CD 10757) has been deleted, and the suggested note appears in 6.9.2.
21. (US 21) The material has been rearranged for clarity of presentation. The editor has chosen to present the Decision Process as having three phases, and has arranged the order of presentation to follow the order with which routeing updates are processed. It is believed that this order of presentation is easier to understand than the order of presentation in CD 10747. This material now appears in clause 8.15 and its subclauses.
22. (US 22) A new clause 8.17 (Efficient Organization of Routeing Information) has been created, which includes the material from clauses 8.17.4 through 8.17.5.6 of CD 10747, as requested.
23. (US 23) The requested table appears as Table 1. Entries for *Route-ID* were added by the editor as a result of the resolution of comment GB 1.1.
24. (US 24) References to MD4 have been updated, as suggested.
25. (US 25) Numbering of attributes has been made consistent throughout the standard.
26. (US 26) The corrections suggested in regard to length units have been made--units of octets are used consistently. The term ″RDI prefix″ has been replaced with ″RDI″ wherever it occurred.
27. (US 27) Header length has been corrected throughout the document.
28. (US 28) In resolving this comment, the editor has drawn from the US input, and from the Canadian input contained in SC6 N7069Addendum. The consolidated text was checked as follows:
    a. A separate check of the GDMO had two syntax errors which the editor was unable to resolve. The syntax checker notes errors in the PARAMETERS line of the startEvent and the stopEvent actions in clause 12.5.
    b. A separate check of the ASN.1 syntax showed no errors .
    c. A check of the combined ASN.1 and GDMO showed only the same 2 syntax errors noted above.

    Editor′s Note

    National body are asked to review the revised GDMO and ASN.1 descriptions, and to comment as necessary.
29. (US 29) The requested information appears as a new note at the very end of 8.9.
30. (US 30, 31, 32,33,34,35,36) This block of comments all dealt with deficiencies in the description of the IDRP FSM and/or the associated error handling procedures. In reviewing the suggested text, the editor found that there were still many holes in the FSM descriptions.

As a result, rather than incorporate the US comments as written, the editor generated an exhaustive tabular description of the IDRP FSM, which appears as Table 2. Then, he edited the text of 8.6 and its subclauses as necessary to match the new table.

As a byproduct of these changes, Figure 6 of CD 10747 has been deleted, and Annex L (Pseudocode) was also deleted. A revised figure would have been too cluttered to convey meaningful information, and informative Annex L was no longer consistent with the revised text that describes the FSM.

The addition of an ″FSM Error″ to the IDRP ERROR PDU has been included. In reviewing the error handling procedures for RIB REFRESH PDUs, the editor found that it was also necessary to add new fields to the IDRP ERROR PDU description in order to bring the PDU in line with the error procedures: namely, RIB REFRESH PDU error and RIB_REFRESH_PDU_Error Subcode fields were added.

Editor′s Note

The creation of an exhaustive IDRP FSM table and the updating of the associated text will resolve related concerns that were expressed in the comments from UK, Canada, and Belgium. In reviewing the revised document, NBs attention is therefore drawn especially to the new Table 2, the revised clause 8.6 and its subclauses, and the new clauses 8.20.6 through 8.20.8. Although no National Body classified this as a major comment, the editor believes that it is very significant, and therefore requests National Bodies to review the new material for both correctness and consistency.

31. (US 37) All miscellaneous changes were accommodated.

Resolution of United Kingdom Comments

1. (GB 1.1) This comment deals with the overhead involved in route replacement. The editor has incorporated the features desired by the UK into the revised text, but not in the exact form asked for in this comment. In particular, the editor has opted to include new *fields* in the UPDATE PDU to list routes to be withdrawn, rather than creating a new WITHDRAW PDU. This will allow a single UPDATE PDU to both advertise a new route and to withdraw previously advertised routes.

   The new UNREACHABLE field has been dropped, and the new fields *Unfeasible Route Count* and *Withdrawn Routes* have been added to the UPDATE PDU. A new path attribute, ROUTE-ID, has also been added, and its usage is described in 8.12.1.

   The editor believes that the function intended for the suggested ROUTE_REPLACES attribute has been incorporated by the resolution of US 2, which provides for implicit route replacement. Hence, the ROUTE_REPLACES attribute was not added to the UPDATE PDU.

   New text to clarify how to handle an aggregated route when one or more of its constituent routes becomes unfeasible has been added to 8.17.2.1.

   The UK concern about clause 8.11 of CD 10747 has become moot, since this clause has been deleted in response to US 5.

2. (GB 1.2) The approach to flow control outlined in this comment has been incorporated in 8.5.3. This new text is a complete replacement for clauses 8.5.3, 8.5.4, and 8.5.5 of CD 10747.

3. (GB 1.3) This concern has been satisfied by deleting clause 6.12 of CD 10747, and then renaming clause 8 of the revision ″Elements of Procedure″. Since IDRP runs directly over ISO 8473, which it uses as a SNICP, there appears to be no need to develop a solution which is artificially partitioned into ″network dependent″ and ″network independent″ parts, when in fact IDRP will be run only in . conjunction with ISO 8473.

4. (GB 1.4) The suggested text changes were made, and appear in clause 10 and Table 2.

   The editor did not delete CD10747′s clause 8.18.1 in its entirety: to have done so would have deleted all reference to the SPI for IDRP, as well as material on packet bombs. This material was moved to 8.19, and the remainder of CD 10747′s 8.18.1 was then deleted.

5. (GB 1.5) Text has been developed which can be inserted into CD 10747. As noted on the cover sheet, the editor felt that because of its complexity, this text should be reviewed in the July 1992 SC6/WG2 meetings before being incorporated into IDRP. National bodies are asked to review the proposed text contained in the appendix.

6. (GB 2.1) This comment appears to be based on the notion that RDIs are expressed as prefixes within the distribution lists. In fact, the text of CD 10747 was in error, because RDIs should not be expressed as prefixes—this error was also noted in comment US 25.

   The editor has amended the description of the UPDATE PDU to show that RDIs are not encoded as prefixes. Having made this change, the editor believes that GB 2.1 is then made moot.

7. (GB 2.2) New text has been added to 8.12.5 and 8.12.6 to clarify the semantics of an RDI that appears in a distribution list.

   The editor has retained the HIERARCHICAL ATTRIBUTE in the revised text, because the transitivity constraints that can be enforced with HIERARCHICAL RECORDING are not the same as those that can be enforced with distribution lists. For example, constraints imposed by HIERARCHICAL RECORDING are set by the originator of the attribute, and can not be modified by a BIS that receives it. In contrast, a recipient BIS can modify the transitivity constraints carried in a distribution list: that is, the recipient can always impose tighter constraints if it desires to do so.

8. (GB 2.3) The editor has taken no action on this comment. It is true that Globally Unique Security is an option for ISO 8473, but ISO 8473 is very vague about its usage—for example, ISO 8473 does not include a section equivalent to its discussion of Globally Unique QoS (see ISO 8473, clause 7.6.5.3). Hence, although it would be possible to accommodate this parameter in IDRP, the editor would like national body discussion on the advisability of so doing before incorporating it into the text.

   The editor therefore defers this comment to discussion at the July 1992 SC6/WG2 meeting.

9. (GB 2.4, 2.5) The editor does not understand the point that these comments are trying to make. Is it simply a request is for a ″name change″ of the SS QOS and DS QOS attributes, or is there more behind this coment?

   The editor defers action on this comment, pending discussion at the July 1992 SC6/WG2 meeting.

10. (GB 2.6) Although it may seem strange to define high capacity values as indicating lower traffic handling capability than lower values, this is exactly the way things are defined in IS 10589 (see its clause 7.2.2a). To maintain consistency with the Intra-domain routeing protocol, the editor has let the text of CD 10747 stand as written.

11. (GB 3.1) The editor has added text to address the topic of FIB maintenance in new clause 8.18. In reviewing this material, the editor also noticed that nowhere in CD 10747 was there any text to address the updating of the Adj-RIB-Out. Thus, the editor added appropriate text to 8.15.3, 8.16.1, and 8.16.2.

12. (GB 3.2) The editor amended the text of 6.5 to make it clear that confederation members are either individual RDs or confederations. The last sentence of 6.5 in CD 10747 was deleted, as part of the editor′s response to GB 3.32.

13. (GB 3.3) The SPI of X′83″ has been secured for IDRP. Based on precedent, it appears proper to list it as an architectural constant since this is the approach taken for the protocol identifier in IS 10589.

14. (GB 3.4) The suggested text now appears in clause 7.

15. (GB 3.5) The editor is somewhat confused by this comment--in fact, the text of CD 10747′s 8.1.2.1 is taken almost verbatim from clause 7.1.6a of IS 10589--where it apparently has been considered to be correct!

16. (GB 3.7) As in 3.6, the offending text is taken almost verbatim from IS 10589 (see its clause 7.1.7). Hence, the editor has taken no action on this comment, and defers discussion of it to the July 1992 SC6/WG2 meeting.

17. (GB 3.8) The editor sees no harm in retaining the first and third bulleted items of 8.2.1, but does agree that the second item is superfluous. The revised text no longer contains the 2nd item on TRDs, and the heading of the section heading has been given a new name.

    The text of 8.2.2 was reworded for clarity, making use of the definition of ″route origin″ suggested in GB 6.2.

    The editor agrees that item ″b″ and the third paragraph are informative, but notes that the entire clause itself is informative. Hence, he sees no need either to delete item ″b″ or to demote the last paragraph to a note.

In the absence of a specific reason to do so, and in view of the fact that IS 10589 contains a clause addressing similar issues within the bounds of intra-domain routeing (see IS 10589, clause 7.1.4), the editor has retained clause 8.2 in the revised text.

18. (GB 3.9) ″Tear down″ has been changed to ″close″.

19. (GB 3.10) The CloseWaitDelay timer does take into account the lifetime of BISPDUs originated by the local BIS. Since BISPDUs are encapsulated within 8473 NPDUs, and the maximum lifetime of an 8473 NPDU is 128 seconds, the value of 150 seconds guarantees that any of its outstanding BISPDUs′ lifetimes will have expired before the new sequence numbers are used.

    The lifetime of responses to BISPDUs originated by the local BIS is accommodated by the new FSM state table and accompanying descriptions--a BIS cannot leave the CLOSE-WAIT state until allowing sufficient time for the lifetimes of BISPDUs received from its peer BIS to have expired, nor can it transit into the CLOSED state except from the CLOSE-WAIT state. The editor believes that any exceptional cases are now adequately described by the new FSM state table--that is, the response of an FSM to all input BISPDUs is now unambiguously defined.

20. (GB 3.11) The size of an OPEN PDU has been addressed in the response to US 8.

21. (GB 3.12) This comment is no longer relevant, since 8.5.4 of CD 10747 has been replaced by the new UK-suggested text on Flow Control.

22. (GB 3.13) The last two sentences of the first paragraph of 7.2 have deleted. The contents of the Acknowledgement field of the OPEN PDU are now specified in the description of the FSM (see 8.6.1.1, 8.6.1.2, and 8.6.1.3), which covers the cases noted in this comments.

23. (GB 3.14, 3.15) These concerns are covered by the new FSM table and the revised descriptions of the FSM states.

24. (GB 3.16) The material in 7.6 about waiting for a CEASE PDU to be acknowledged has been deleted. The behavior upon receipt of an IDRP ERROR PDU has been expanded in the new FSM table, and the FSM state descriptions have been amended accordingly.

25. (GB 3.17) The offending values have been changed in resolving US 11. The editor has taken no action to specify values in an OPEN PDU, deferring this for discussion at the July 1992 SC6/WG2 meeting.

26. (GB 3.18) The requirement that a routeing protocol should periodically check the integrity of its RIBs is within the scope of the standard, and has not been removed from the revised text. Note, for example, that a similar clause (7.3.18 of IS 10589) is normative text in the intra-domain routeing standard.

    Finally, the editor notes that GB 3.31 contradicts comment 3.18, since GB 3.31 recommends retaining the text of 8.10.2, but relocating it elsewhere.

27. (GB 3.19) The changes suggested in this comment appear in 8.12.2, the description of the RD_PATH attribute.

28. (GB 3.20) New material appears in 8.12.4 to clarify that a BIS can only advertise to a peer BIS those SNPAs that are associated with the subnetwork to which the local BIS and the peer BIS are attached.

29. (GB 3.21) Text has been added to the third paragraph of both 8.12.5 and 8.12.6 to recognize that a BIS may originate a distribution list and append it to an UPDATE PDU that was received without containing such a list.

30. (GB 3.22, 3.23, 3.24) The last paragraph of 8.12.19 has been changed to indicate that the higher value of priority should be used. A similar change was made in 8.17.2.3 in regard to aggregation of the PRIORITY attribute. The editor believes that his change will make comments GB 3.23 and GB 3.24 no longer valid concerns.
31. (GB 3.25) The selection of a route for subsequent advertisement is determined by local policy. Without knowledge of a BIS′s policies, one can not state ″a priori″ that a given route will or will not be preferred over another. In the example given for the Denial of Service attack, for example, it may well be that the local BIS will have a policy that rejects routes that have an empty distribution list.

    Since policies are not exchanged within the framework of IDRP, it appears that there is nothing that can be done with respect to this comment.
32. (GB 3.26) Clearly, clause 8.17.6 of CD 10747 is informative in nature. The editor notes that it is modelled after clause 7.3.20.1 of IS 10589, which is also informative in nature. Given that this generic type of information is included in IS 10589, the editor does not feel it prudent to delete it without review by other National Bodies. Hence, it remains in the revised text as clause 8.15.4.
33. (GB 3.27) ″Version″ has been moved from the fixed header to the OPEN PDU.
34. (GB 3.28) The length of the authentication data can be determined by subtracting the lengths of the preceding fields from the total length of the OPEN PDU, as contained in the BISPDU Length field of the fixed header. Hence, no fields beyond the Authentication Data field are considered to be part of the OPEN PDU.

    The editor sees no specific actions that need to be taken to satisfy this comment, and also notes that protocol extensions can be handled via IDRP′s version negotiation methods.
35. (GB 3.29) The editor has taken no action on this comment, pending review at the July SC6/WG2 meeting of national bodies′ responses to SC6 N6818, *Security Services in Support of Routeing Protocols*.
36. (GB 3.30) The introductory text for the Update-Receive Process now notes that this process is active only while the BIS is in the ESTABLISHED state. The text in clause 6 now notes that the Update-Receive process is a subset of the Receive process.
37. (GB 3.31) Receipt of a RIB REFRESH PDU has been described included in the description of the Update-Receive process (see item ″a″ in 8.14), and references to the CHECKSUM PDU have been deleted.
38. (GB 3.32) Clause 8.13, 2nd paragraph, has been amended as suggested.
39. (GB 3.33) The editor has taken no action on this comment, deferring it to discussion in the July meeting of SC6/WG2.
40. (GB 3.34) Clause 8.3(a) has been retained. The fact that it is ″static″ information is not sufficient reason to delete it. Just as IS 10589 makes provision for ″static inter-domain routeing″ for sending NPDUs out of a routeing domain, so also does CD 10747 support static methods for sending an NPDU into a routeing domain.
41. (GB 3.35) 8.3 d is not concerned with how the information in **INTERNAL-SYSTEMS** was gathered, and hence does not preclude acquiring it through a local interface with an intra-domain routeing protocol, for example. Hence, the editor has taken no action, since use of a managed object does not limit the methods by which the information can be acquired.
42. (GB 4.1) A PICS question on size of incoming OPEN PDU has been added to Table A.4.7.

43. (GB 4.2) A PICS question of maximum size of UPDATE, RIB REFRESH, and IDRP ERROR PDUs has been added to Table A.4.7.
44. (GB 4.3) Timers appear in the GDMO descriptions. Timer-related questions were already present in the PICS of CD 10747: see Table A.4.4, items RTSEL and RTORG. It is believed that the CloseWaitDelay timer is already included under Table A.4.3, question FSM.
45. (GB 5.1, 5.2) Both the USA and Canada have submitted revised GDMO and ASN.1 text, which the editor has incorporated, See response to US 28.
46. (GB 6.1) The material is clause 8.20 deals with errors that occur for given types of BISPDUs, not with errors that occur in given FSM states. Hence, the editor has not incorporated this text directly into the textual descriptions of the FSM.

    However, the revised FSM table and descriptions now cross-reference the PDU error conditions, and define the effect that they will have on the FSM: that is, the error conditions are now presented in the FSM table as inputs. The editor feels that this approach satisfies the concern expressed in this comment.
47. (GB 6.2) The suggested definition now appears in 4.6.
48. (GB 6.3) The editor has corrected those misuses of UPDATE PDU/route that he has found.
49. (GB 7) All minor editorial comments were accommodated.

Resolution of Belgian Comments

1. (BE 1) Accepted
2. (BE 2) Accepted
3. (BE 3) The referenced clause (6.3 of CD 10747) has only one paragraph. Therefore, it appears that the clause reference in this comment is not correct. The editor has therefore taken no action.
4. (BE 4) The type code 5 was previously assigned to a CHECKSUM PDU, which was deleted when the CD-text was produced. The editor agrees that consecutive numbering is preferable, and has adjusted the numbering of BISPDU types accordingly.
5. (BE 5) Consecutive path attribute numbering has been provided (see response to US 25).
6. (BE 6, 7, 8) These comments are handled as part of the new FSM state table and its associated text.
7. (BE 9) The note appears to be superfluous, and has been removed from the revised text.
8. (BE 10) See response to UK 1.4, which the editor believes will satisfy Belgium's concern.

Resolution of Japanese Comments

1. (JP I.1) The editor has taken no action on this comment, pending review at the July SC6/WG2 meeting of national bodies' responses to SC6 N6818, *Security Services in Support of Routeing Protocols*.
2. (JP I.2) The editor has obtained the identifier X'83' (see response to GB 3.3).
3. (JP I.3) The editor has rewritten 8.1.2.1 in order to accommodate the US request for bit-level granularity of prefixes (see US 13). Japan is asked to review this new text, and to comment appropriately. Since JP I.3 did not cite specific pieces of unclear text, the editor is not sure if the Japanese concern has been satisfied.
4. (JP I.4) The editor has added additional text to 8.1.2.2 to clarify that "NSAP" is actually the destination NSAP address that is carried in an ISO 8473 NPDU.
5. (JP I.5) The editor has made no changes in response to this comment. Since CD 10747 does not require the use of any particular intra-domain routeing protocol, he believes it proper to leave the reference to IS 10589 in clause 3.0. The editor also notes that he divided the the references into two clauses in response to guidance received in Berlin during a session run for project editors by a representative of the ITTF.
6. (JP II) The editor agrees with the need for material to describe routeing information exchange between IS 10589 and CD 10747. However, no such text has been provided by any national body. Since such text would be informative only, the editor has taken no action.

   National bodies are encourages to submit contributions on this topic as appropriate.

   The editor notes that CD 10747 still carries Annex H, and includes an open question on this topic—namely, where should such material should be placed: in CD 10747, in IS 10589, in both, in a TR, etc.? This topic is left as an item for discussion in the July 1992 SC6/WG2 meeting.
7. (JP II.1 and II.2) This is a bug in the word processor that the editor is using. If the editor were to correct it now, all the cross-references in the document would no longer be accurate. The editor proposes to do nothing right now, in expectation that the word-processing bug will be resolved by the time it is necessary to produce final IS text.
8. (JP III.3) The offending sentence was rewritten and moved to 8.1.2.2, as noted in the response to comment JP 1.3.

Resolution of Canadian Comments

1. (CA 1.1) A revised definition for "inter-domain link" appears in 4.6.
2. (CA 1.2) The correct value for MinBISPDU length has been used throughout the text.
3. (CA 1.3) In the absence of a strong case for moving the authentication field elsewhere, the editor has left it in its present location.
4. (CA 1.4)

   The checksum function is mandatory because correct operation of the protocol is dependent upon receiving BISPDUs whose data is received without error. Note that this approach is common in routeing algorithms: for example, IS 10589 employs a mandatory checksum in its protocol LSPs.

   Figure 6 has been corrected as suggested.
5. (CA 1.5) Expanded description of the use of CloseWaitDelay is provided by the new FSM Table and the revised FSM descriptions.
6. (CA 1.6) The new FSM table and associated descriptive text is believed to satisfy this concern.
7. (CA 2) Accepted.

   The revised GDMO mentioned in CA 2.16 appeared in SC6 N7089 Add, and has been merged with the US-provided GDMO revision.

Appendix: Replacement Text Consistent with Comment GB 1.5

The text shows the changes that would be implement GB 1.5. This text was developed cooperatively by the editor and a UK expert, and is believed to be technically correct.

1. *Text for encoding RD_PATH in the UPDATE PDU:*

   The RD_PATH attribute is composed of a series of RD path segments. Each RD path segment is represented by a triple <path segment type, path segment length, path segment value>.

   The path segment type is a 1-octet long field, with the following values defined:

Segment Type	**Value**
RD_SET	1
RD_SEQUENCE	2
CONF_SEQ	3
CONF_SET	4

   An RD_SEQUENCE and a CONF_SEQ provide an ordered list of RDIs, for routeing domains or for confederations respectively, that the UPDATE PDU has traversed. An RD_SET and a CONF_SET provide an unordered list of RDIs, for routeing domains or for confederations respectively, that the UPDATE PDU has traversed.

   The path segment length is a two octet field containing the length in octets of the path segment value field.

   The contents of the path segment value field differ, depending upon the path segment type, as follows:

   a. For an RD_SET or an RD_SEQ, the value field contains one or more 2-tuples <length, RDI>. *Length* is a one octet long field that contains the length of the RDI in octets; *RDI* itself is encoded according to 8.1.

   b. For a CONF_SEQ or a CONF_SET, the value field contains a four octet long *size* field, a variable length *confeds* field, and a variable length *domains* field:

      - The first two octets of the *size* field contain a positive integer whose value give the total length in octets of the following *confeds* field; the next two octets contain a positive integer whose value gives the length in octets of the following *domains* field.
      - The *confeds* field contains one or more 2-tuples <length, RDI>. *Length* is a one octet field that contains the length in octets of the following RDI field. The RDI field is encoded according to clause 8.1. .
      - The *domains* field contains one or more 2-tuples <length, RDI>. *Length* is a one octet field that contains the length in octets of the following RDI field. The RDI field is encoded according to clause 8.1.

   Usage of this attribute is defined in clause 8.12.3.

2. *Text for RD_PATH Usage Rules (8.12.3ff):*

   8.12.3 RD_PATH

   RD_PATH is a well-known mandatory attribute. It shall be present in every UPDATE PDU, and shall be recognized upon receipt by all BISs. This attribute identifies the RDs and RDCs through which this UPDATE PDU has passed. The components of the list can be RD_SETs, RD_SEQUENCEs, CONF_SEQs, or CONF_SETs.

8.12.3.1 Generating an RD_PATH Attribute

When a BIS advertises a route whose destinations are located within its own RD, it shall create an RD_PATH attribute as described below. The RDIs of all confederations to which the local BIS's RD belongs shall be listed in the RD_PATH attribute.

a. If the RD of the originating BIS is not a member of any routeing domain confederations, then the RD_PATH attribute shall contain a single path segment of type RD_SEQUENCE, and the path segment value field shall contain the RDI of the local routeing domain.
b. If the RD of the originating BIS is a member of one or more routeing domain confederations, then the path segment shall consist of one or more path segments of type CONF_SEQ. The RD_PATH attribute is constructed as follows:

   1) ***Confeds* Field for Overlapping Confederations:** If several confederations overlap, then the RDIs of each of them shall be listed in the *confeds* field of a single path segment of type CONF_SEQ.

   2) ***Confeds* Field for Nested Confederations:** If several confederations are nested, then the RDI of each of them shall be listed in the *confeds* field of a separate CONF_SEQ segment.

   3) ***Domains* Field:** The *domains* field of each CONF_SEQ path segment, except for the last one, shall be empty. The *domains* field of the last CONF_SEQ segment shall contain the RDI of ther routeing domain in which the local BIS is located.

   4) **Ordering:** The order in which the CONF_SEQ path segments appear shall preserve the nesting relationships that exist among the confederations: that is, when a confederation, RDC-A, is nested within another confederation, RDC-B, then the CONF_SEQ for RDC-B shall precede the CONF_SEQ for RDC-A.

8.12.3.2 Updating a Received RD_PATH Attribute

When a BIS receives a route advertised by an adjacent BIS, it is necessary for the local BIS to update the RD_PATH attribute of the received route.

If the UPDATE PDU that advertised the route was transmitted by another BIS located in the same routeing domain as the local BIS, then the local BIS shall not modify the RD_PATH attribute.

If the UPDATE PDU that advertised the route was received from a BIS located in a different routeing domain from that of the local BIS, then the local BIS shall use the methods of 8.13.3 to determine if the UPDATE PDU has entered one or more confederations:

a. If the incoming UPDATE PDU has entered one or more confederations, the local BIS shall update the RD_PATH attribute by appending one or more CONF_SEQ path segments to RD_PATH attribute of the received route. Based on the confederations which the UPDATE PDU has entered, the local BIS shall append one or more CONF_SEQ path segments, which shall be constructed as follows:

   1) ***Confeds* Field for Overlapping Confederations:** If several overlapping confederations have been entered, then the RDIs of each of them shall be listed in the *confeds* field of a single path segment of type CONF_SEQ.

2) ***Confeds* Field for Nested Confederations:** If several nested confederations have been entered, then the RDI of each of them shall be listed in the *confeds* field of a separate CONF_SEQ segment.

3) ***Domains* Field:** The *domains* field of each appended CONF_SEQ path segment, except for the last one, shall be empty. The *domains* field of the last CONF_SEQ segment shall contain the RDI of the routeing domain in which the local BIS is located.

4) **Ordering:** The order in which the CONF_SEQ path segments appear shall preserve the nesting relationships that exist among the confederations: that is, If a confederation, RDC-A, is nested within another confederation, RDC-B, then the CONF_SEQ for RDC-B shall precede the CONF_SEQ for RDC-A.

b. If the incoming UPDATE PDU has not entered a confederation, the local BIS shall inspect the last path segment in the RD_PATH of the received route, and shall then update the RD_PATH attribute as follows:

1) If the final path segment is of type RD_SEQUENCE, the local BIS shall append the RDI of its own routeing domain to that segment.
2) If the final path segment is of type RD_SET, the local BIS shall append a new RD_SEQUENCE path segment, containing the RDI of the local BIS's routeing domain.
3) If the final path segment is of type CONF_SEQ, the local BIS shall append the RDI of its routeing domain to the *domains* field of that segment.
4) If the final path segment is of type CONF_SET, the local BIS shall append a new RD_SEQUENCE path segment, containing the RDI of the local BIS's routeing domain.

8.12.3.3 Advertising a Route Received from Another BIS

After receiving a route, a BIS will have modified its RD_PATH attribute in accordance with 8.12.3.2; and when a route is generated locally, the BIS will have created an RD_PATH attribute in accordance with 8.12.3.1. When such routes are selected for subsequent advertisement by the local BIS, additional modifications to the RD_PATH shall be made as follows:

a. If the adjacent BIS to which the route will be advertised can be reached without exiting any confederations, then no modification to the RD_PATH atrribute shall be made.

b. If the adjacent BIS to which the route will be advertised can not be reached without exiting one or more confederations, then the local BIS shall check the RD_PATH attribute for the presence of CONF_SEQ or CONF_SET path segments, starting with the last path segment.

If the RDI of one or more exited confederations is found in the *confeds* field of a path segment, then the RDI shall be removed from the *confeds* field of that path segment. If the removal of the RDI of the exited confederation causes the *confeds* field of the path segment to become empty, then the local BIS shall then further amend the RD_PATH attribute as follows, depending on the type of the immediately preceding path segment:

1) If the preceding segment is an RD_SEQUENCE, the local BIS shall append the RDI of each exited confederation to the RD_SEQUENCE

2) If the preceding segment is a CONF_SEQ, the local BIS shall append the RDI of each exited confederation to the *domains* field of the CONF_SEQ

3) When the path segment that contained the RDI of the exited confederation is of type CONF_SEQ, if the preceding segment is an RD_SET, or if there is no preceding segment, the BIS shall append a new path segment of type RD_SEQUENCE. The RD_SEQUENCE shall contain the RDI of each exited confederation.

4) When the path segment that contained the RDI of the exited confederation is of type CONF_SET, if the preceding path segment is an RD_SET or a CONF_SET, the BIS shall append the RDI of each exited confederation to the end of the preceding path segment.

5) When the path segment that contained the RDI of the exited confederation is of type CONF_SET, if there is no preceding path segment, then the BIS shall create a path segment of type RD_SET, containing the RDIs of the exited confederations.

If, after applying these procedures, the *confeds* field of any segment of type CONF_SEQ or CONF_SET is empty, then that path segment shall be deleted, together with any subsequent RD_SEQ path segments that immediately follow it.

If the *confeds* fields of CONF_SET or CONF_SEQ path segments are identical, they shall be merged to form a single CONF_SET or CONF_SEQ, respectively. For the merged CONF_SEQ, the order of RDIs in the *domains* preserves the order of the component path segments.

If the RDI of an exited confederation is not found in the *confeds* of at least one path segment, then the route is in error. The local BIS shall send an IDRP ERROR PDU to the BIS that advertised the route, reporting a Misconfigured_RDCs error.

3. *Text Deletions:* Clauses 8.13.3 (Detecting Confederaton Boundaries), 8.13.4 (Entry Marker), and 8.13.5(Generating RD_PATH Information) of SC6 N7196 would be deleted, as these topics are addressed in the suggested UK replacement text for 8.12.3ff.

4. *Text for RD_PATH Aggregation:*

   The folowing replacement text would be palced into 8.17.2.3, and the existing text would be deleted:

   RD_PATH attributes: If If routes to be aggregated have identical RD_PATH attributes, then the aggregated route has the same RD_PATH attribute as each individual route.

   The following procedures shall be used to aggregate several RD_PATH attributes (from different routes) into a single RD_PATH attribute:

   a. First each individual route shall be operated upon separately, as follows:

      1) If the leading path segment is of type RD_SEQ, it shall be changed into an RD_SET

      2) Starting from the last path segment, examine the RD_PATH for the presence of an RD_SEQUENCE. If the path segment immediately preceding the RD_SEQUENCE is of type CONF_SET or RD_SET, then remove the RD_SEQUENCE from and append its list of RDIs to that of the preceding path segment.

   b. The following procedures are applied to the complete set of RD_PATH attributes to be aggregated (after the previous step has been applied separately to each of them):

      1) Merge all the RD_SETs that appear in all RD_PATH segments to be aggregated into a single RD_SET, with no RDI listed more than once. This RD_SET shall form the first path segment of the aggregated RD_PATH.

      2) Locate all the CONF_SET path segments in the set of RD_PATHs that have an identical *confeds* field. Append a path segment of type CONF_SET to the aggregated route, using the common *confeds* field and having a *domains* field that contains the union of the individual *domains* fields of the path segments.

   c. Examine the path segments of the aggregated RD_PATH attribute. In a case where no RDI listed in the *confeds* of a given CONF_SET path segment is present in the *confeds* field of a preceding CONF_SET, and the two path segments were both present in a single RD_PATH (that was an input to the aggregation process), then the path segments shall be listed in the same order in which they appeared input RD_PATH segment.