5.7 Pipe And Session Failure Logic

As mentioned above, CP-SVR pipes will actually consist of two CPSVRMGR sessions between the DLUR and DLUS CPs. The SSCP-PU and SSCP-LU sessions will be encapsulated on the two CPSVRMGR sessions such that flows from the SSCP to the PU/LU will flow on the conwinner session from DLUS to DLUR node, and flows from the PU/LU to the SSCP will flow on the conwinner session from DLUR to DLUS node. Moreover, each node (DLUR and DLUS) will compute the session route independently. It is, therefore, possible that the two CPSVRMGR sessions will not traverse the same physical path. Consequently, one direction of the SSCP-PU and SSCP-LU sessions may fail and not the other. Even if the same physical path is used, it is still possible for one session to fail and not the other. This will necessitate special handling on the part of DLUS and DLUR nodes.

5.7.1 CPSVRMGR Session Recovery

If a CPSVRMGR session fails, it is the responsibility of both the DLUS and the DLUR to bring down its conwinner and conloser sessions with non-retryable sense data. At this point, either or both nodes may attempt to reinstate the CP-SVR pipe and recover the SSCP-PU/LU sessions.

The DLUR node may chose to attempt to reactivate its dependent LUs by activating a CP-SVR pipe (and subsequent SSCP-PU and SSCP-LU sessions) with the same or some other DLUS node. The DLUR node may only attempt this after both the conwinner and conloser sessions have been successfully deactivated. Otherwise, the DLUR node may activate a conwinner session with one DLUS node while a conloser session exists with some other DLUS node. Alternative DLUS nodes may be either dynamically discovered (as described in 5.3.2.2, “Dynamic DLUS Node Determination” on page 5-5) or predefined (as described in 5.3.2.1, “Predefined DLUS Node Determination” on page 5-4).

As previously described in 5.6.2.1, “UNBIND-Initiated CP-SVR Pipe Deactivation” on page 5-30, the DLUR may reactivate immediately after completion of the CP-SVR pipe deactivation, with one exception (receipt of X′08A0 000A′ sense data with UNBIND requires the DLUR to wait for a DLUS to activate the CP-SVR pipe; DLUR can wait indefinitely or set a timeout, after which the DLUR can activate a CP-SVR pipe with the same or a different DLUS).

The DLUR should never become ″dead″ but should be able to access a DLUS whenever one becomes avail-
able. It is recommended that all DLUR implementations incorporate the key concepts of:

• alternating retry attempts between different DLUSs

• increasing the time between retries later on

• never giving up attempting to acquire a DLUS

For example, a DLUR could attempt to acquire a DLUS until successful using the following retry proce-
dure:

1. Immediately retry to the same DLUS

2. After some time t, retry to same DLUS again

3. After some time t, try the backup DLUS

4. Toggle between primary and backup up to m times

5. If still no success, toggle back and forth between primary and backup at t+n intervals forever.

It is also possible that the DLUS node may try to re-activate the dependent LUs by re-establishing a CP-SVR pipe to the DLUR node as described in 5.4, "DLUS-Initiated CP-SVR Pipe Activation" on page 5-6.

5.7.2 SSCP-PU And SSCP-LU Session Recovery

When both of the CPSVRMGR sessions are lost, the DLUS and DLUR nodes must recognize this situation. Ongoing LU-LU sessions may remain active but will not be able to obtain SSCP services when required. This is functionally equivalent to existing subarea operation. The SSCP-PU and SSCP-LU sessions can be recovered through SSCP takeover (i.e., DLUS takeover) flows which reset the SSCP-PU and SSCP-LU sessions as described in 10.2.2, "SSCP Takeover and Giveback Flows" on page 10-11. When the DLUR attempts to reactivate the SSCP-PU and SSCP-LU sessions, it can choose the same or another DLUS node. If the reason for session deactivation was the DLUR receiving a DACTPU with a "giveback" reason code, the DLUR should try to get in session with a new DLUS.

5.7.3 Pipe And Session Activation/Recovery Race Conditions

5.7.3.1 Multi-DLUS Race Conditions

Race conditions can exist where more than one DLUS may be involved in CP-SVR pipe activation for the same dependent LU. For example:

- ***initial CP-SVR pipe activation*** - a pipe is being activated and an activation request for a second pipe is received
- ***CP-SVR pipe override*** - a pipe to a backup DLUS is active and the predefined DLUS requests activation of a pipe
- ***CP-SVR pipe recovery*** - a pipe to a backup DLUS is being activated and the predefined DLUS requests activation of a pipe

In these situations, the DLUR node is responsible for deciding with which DLUS it will establish the CP-SVR pipe for a given PU. In doing so, the DLUR will use the following rules:

- If the DLUR has a choice between an active pipe and a request to activate a pipe, it should choose the DLUS with the active pipe.
- If the DLUR has a choice between two requests for activation, the implementing product can decide on its DLUS selection criteria:
  - "known" (predefined) vs. "determined" (found) - select "known"
  - "determined" vs. "determined" - product option to choose one

Once the race condition is resolved, the DLUR node is responsible for rejecting the CP-SVR pipe with one of the two DLUS nodes. This is done by sending -RSP to one of the ACTPU messages. The DLUS receiving the -RSP(ACTPU) will then decide whether to take down the CP-SVR pipe using the same criteria as normal CP-SVR pipe deactivation, i.e., if there are no other active or pending SSCP-PU sessions using the CP-SVR pipe, the DLUS will UNBIND its CPSVRMGR conwinner and conloser sessions.

Figure 5-16 on page 5-59 illustrates an unsuccessful attempt at overriding an existing CP-SVR pipe: