11.3.4.4 Full Multi-Subnet Support EN DLUR Processing - NNS With Option Set 1116

An EN DLUR with full multi-subnet support will perform the following processing when it receives an XID3 from its NNS that has the DLUS-served LU registration indicator set:

An EN DLUR with full multi-subnet support may choose to reset the Search Status Indicator in the ENCP Search Control CV (X′33′) during the CP Capabilities exchange with its network node server if it registers all LUs with its NNS (this significantly cuts down domain broadcast traffic). It must register its DLUS-served LUs and non-DLUS-served LUs separately.

To register its DLUS-served LUs with its uplevel NNS, the DLUR will send a Register Resource (X′12C3′) GDS variable with a new DLUS-Served LU Indicator set to specify that the resources being registered are DLUS-served LUs.

& When the DLUR sets the DLUS-Served LU Indicator on in the Register Resource (X′12C3′) GDS
& variable, it must also reset the Central Resource Registration Request Indicator (both indicators are
& defined in the same byte).

The DLUR should not wait to register the LUs until they are active; it should let the NNS turn around
all of the non-OCR Locates as soon as possible and have the DLUR reject an OCR Locate only if the
LU is not there (see 11.3.5.1.1, “DLUR / PLU-initiated search” on page 11-8 and 11.3.5.2.1, “DLUR /
SLU-initiated search” on page 11-9 for more information).

11.3.4.5 NNS Processing For Option Set 1116

A NN with DLUS-served LU registration support will perform the following processing:

The NN will send an XID3 with the the DLUS-served LU registration indicator set.

When the NNS receives a Register Resource (X′12C3′) GDS variable with the DLUS-served LU indicator set, it will mark the resources being registered as DLUS-served LUs.

If the corresponding EN DLUR′s Search Status indicator is reset,

- when the NNS receives a Locate with the OCR bit off for a registered DLUS-served LU,
  - the NNS will not forward the Locate
  - the NNS will not delete the registered resource from the directory
  - the NNS will handle the Locate as if it had received a negative reply to it from the DLUR
- when the NNS receives a Locate with the OCR bit on for a registered DLUS-served LU,
  - the NNS will forward the Locate
  - the NNS will delete/retain the registered resource pending the results in the Locate reply

If the corresponding EN DLUR′s Search Status indicator is set,

- when the NNS receives a Locate with the OCR bit off for a registered DLUS-served LU,
  - the NNS will forward the Locate
  - the NNS will not delete the registered resource from the directory
- when the NNS receives a Locate with the OCR bit on for a registered DLUS-served LU,
  - the NNS will forward the Locate
  - the NNS will delete/retain the registered resource pending the results in the Locate reply

11.3.5 Multi-Subnet DLUR/S Locate Searches

The DLUS must respond to PLU-initiated Locates for DLUS-served LUs. The DLUS must initiate searches on behalf of the SLUs it serves. In both the SLU-initiated and PLU-initiated searches, the ensuing BIND must go from the PLU to the DLUR (not the DLUS) before reaching the SLU. The mismatch between the endpoints of the BIND and the Locate must be accounted for. The DLUS and EBN redirected searches required to handle this are described below.

11.3.5.1 PLU-initiated searches

For PLU-initiated searches, either the DLUS or OBN (if one exists) making the Locate response to the PLU must indicate that the BIND should be sent to the DLUR. If the DLUS does not already know the location of the DLUR (relative to the PLU), either the DLUS or the OBN must find it for the PLU.

If the DLUS and DLUR are in the same subnet, the DLUS will know the TGs for the DLUR and can return them in the Locate Found. In this case no additional search for the DLUR is required. The only modification the DLUS will need make to the Locate reply is return the DLUR TGs with the DLUR listed as ENCP in the reply. Both the DLUS and DLUR for the SLU must be located before the session is established. The DLUS(SLU) must be located first. In the case where the DLUR and DLUS are in the same subnet, only the Locate to the DLUS is necessary since the DLUS knows the TGs to the DLUR which can be used to determine the best route to the DLUR.

When the DLUS is in a different subnet than the DLUR, a separate search to the DLUR must be conducted to find a multisubnet route between the PLU and DLUR. This search will be initiated by the OBN when one is available. If there is no OBN, then the PLU is in the same subnet as the DLUS. In this case the DLUS must initiate the search (which verifies a COS-acceptable route across subnets). When the DLUR is located by the OBN or DLUS in this manner, the Locate Found returned to the PLU is modified so that it will be possible for the PLU to establish a session with the SLU which goes through the DLUR but need not go through the DLUS or even the subnet containing the DLUS.

What follows is the specific role of the DLUR node in a multi-subnet DLUR/S PLU-initiated search:

11.3.5.1.1 DLUR / PLU-initiated search: The function of the DLUR is to serve as the intermediary between the dependent LU and the SSCP on the DLUS. The session between a PLU and a DLUS-served SLU must pass through the DLUR to reach the SLU.

A DLUR will return a positive reply to a search for one of its dependent resources only if the Find has the OCR bit set and the DLUR supports full multi-subnet function. Only an EBN or DLUS should initiate a search with the OCR bit set. Except for when the EBN generates a search in response to a blind BIND, no searches for a dependent LU with the OCR bit set should be initiated unless the DLUS has first received a search without the bit set. Searches initiated by downlevel nodes will never have this bit set and will always locate the DLUS rather than the DLUR.

The DLUR Found response will have the DSL bit set, indicating that the SLU is a dependent LU. On a DLUR search reply, the DLUR should set the NNS(DLUR) as the NNS(SLU), the DLUR as ENCP (not
required if DLUR=NNS(DLUR)) and the DLUS is carried in the CV X′40′. If the DLUR has a prede-
fined or dynamically created LU for which it has received a Locate with OCR on, the DLUR should reply
Found to the Locate regardless of whether the LU is active or not. Because the Locate with OCR on is
generated after the DLUS gave its OK to the session, the DLUR could reply Found even with the pipe
down in the hope that the pipe will come back up before the BIND arrives. A Found returned by the

DLUR with the pipe down cannot include a CV X′40′ = DLUS since there is no current DLUS. There-
fore, CV X′40′ will not be included in the Found when there is no active CP-SVR pipe.

Responding positively to the Locate request removes the need for the DLUR to remember which dependent
SLUs it needs to re-register. It will also allow the search to be terminated at that point, instead of per-
forming a network broadcast, subarea search, border node search, etc. It will also allow the DS database
caches at CDS nodes and EBNs to retain knowledge of where the dependent LU resides. That way, when
the DLUR subsequently obtains a new DLUS, network broadcast searches may be avoided.

11.3.5.2 SLU-initiated searches

When a SLU wishes to initiate a search, the DLUS must begin the search on behalf of the SLU to find the PLU. The DSL bit is set to indicate that the SLU is a DLUS-served LU. The Locate is initiated at the DLUS. However, when the PLU receives the Locate, it must send a BIND to the SLU by way of the DLUR (and not back to the DLUS). The complication of the SLU-initiated search comes about because the multi-subnet route that the BIND takes from the PLU to the SLU by way of the DLUR may pass through a different set of BNs than the Locate did in its path from the DLUS to the PLU. The SLU-initiated Locate sent to the PLU must contain the appropriate node or TGs to get the BIND to the correct destination. If the PLU is local to the DLUR subnet, the TGs to the DLUR (if an EN) or an RSCV containing the DLUR as last entry (if a NN) are carried by the Locate to the PLU. When the PLU is not local to the DLUR subnet, the TGs will be those appropriate to leave the PLU subnet along a path to the DLUR. The DLUS will be carried as a CV X′40′ when an EBN has been crossed in the path between the DLUS and the PLU.

11.3.5.2.1 DLUR / SLU-initiated search: The function of the DLUR is to serve as the intermediary between the dependent LU and the SSCP on the DLUS. The session between a PLU and a DLUS-served SLU must pass through the DLUR to reach the SLU. A DLUR will return a positive reply to a search for one of its dependent resources only if the Find has the OCR bit set and the DLUR supports full multi-subnet function. Only an EBN or DLUS should initiate a search with the OCR bit set. Searches initiated by downlevel nodes will never have this bit set and will always locate the DLUS rather than the DLUR. The DLUR Found response will have the DSL bit set, indicating that the SLU is a dependent LU. On a DLUR search reply, the DLUR should set the NNS(DLUR) as the NNS(SLU), the DLUR as ENCP (not
required if DLUR=NNS(DLUR)) and the DLUS is carried in the CV X′40′. If the DLUR has a prede-
fined or dynamically created LU for which it has received a Locate with OCR on, the DLUR should reply
Found to the Locate regardless of whether the LU is active or not. Because the Locate with OCR on is
generated after the DLUS gave its OK to the session, the DLUR could reply Found even with the pipe
down in the hope that the pipe will come back up before the BIND arrives. A Found returned by the
DLUR with the pipe down cannot include a CV X′40′ = DLUS since there is no current DLUS. There-
fore, CV X′40′ will not be included in the Found when there is no active CP-SVR pipe.

Responding positively to the Locate request removes the need for the DLUR to remember which dependent
SLUs it needs to re-register. It will also allow the search to be terminated at that point, instead of per-
forming a network broadcast, subarea search, border node search, etc. It will also allow the DS database
caches at CDS nodes and EBNs to retain knowledge of where the dependent LU resides. That way, when
the DLUR subsequently obtains a new DLUS, network broadcast searches may be avoided.

11.3.6 Multi-Subnet Functional Impact Summary

The following DLUR functions are required for DLUR/S support in a multiple subnet environment:

11.3.6.1 DLUR / Multi-Subnet Impacts

- The DLUR returns not found for Locates for its DLUS-served resources unless the OCR bit is set and the DLUR supports full multi-subnet function.
- The DLUR returns Found (with the DSL bit set) if the OCR bit is set in the Find and the DLUR owns the resource (identifies the SLU as served by a DLUS) and the DLUR supports full multi-subnet func-
tion. Found is returned even when the LU and/or CP-SVR pipe is/are inactive.
• When the CP-SVR pipe is active, the DLUR returns Found with CV X′40′ indicating the DLUS name for use by management services.
- The DLUR sets the PSP bit when initiating a Locate for the DLUS for the purpose of setting up the CP-SVR pipe. This prevents setting up a pipe across a subarea.
- Wildcards do not apply to DLUS-served LUs. All DLUS-served LUs must be explicitly defined on the DLUR and on the DLUS. No wildcard responses are made with the DSL bit set.
- A DLUR-capable EN must set the Search Status Indicator in the ENCP Search Control CV (X′33′) during the CP Capabilities exchange with its network node server when the EN has full multi-subnet support but its NNS does not support DLUS-served LU registration. When an EN DLUR has full multi-subnet support and its NNS supports DLUS-served LU registration, the Search Status indicator
& can be reset and the DLUS-served LUs can be registered with the NNS (with the Central Resource
& Registration Request Indicator reset). When an EN DLUR has limited multi-subnet support, the Search Status Indicator can be reset and the DLUS-served LUs need not be registered with the NNS.

11.4 Multi-Subnet DLUR/S Flows

11.4.1 Multi-Subnet PLU-Initiated Searches

11.4.1.1 DLUS, DLUR, PLU In Different Subnets

Note: Refer to Table 3-1 on page 3-2 for an explanation of the notations used in the diagrams in this chapter.

3. Upon receipt of a RSP(UNBIND) from the attached dependent LU, the DLUR must build a SESSEND RU and send it to the SSCP by encapsulating the RU and sending it on the CP-SVR pipe to the DLUS.

12.1.6 Multi-Subnet Support

1. The DLUR returns not found for Locates for its DLUS-served resources unless the OCR bit is set and the DLUR supports full multi-subnet function.
2. The DLUR returns Found (with the DSL bit set) if the OCR bit is set in the Find and the DLUR owns the resource (identifies the SLU as served by a DLUS) and the DLUR supports full multi-subnet function. Found is returned even when the LU and/or CP-SVR pipe is/are inactive.
3. When the CP-SVR pipe is active, the DLUR returns Found with CV X′40′ indicating the DLUS name for use by management services.
4. The DLUR sets the PSP bit when initiating a Locate for the DLUS for the purpose of setting up the CP-SVR pipe. This prevents setting up a pipe across a subarea.
5. Wildcards do not apply to DLUS-served LUs. All DLUS-served LUs must be explicitly defined on the DLUR and on the DLUS. No wildcard responses are made with the DSL bit set.
6. A DLUR-capable EN must set the Search Status indicator in the ENCP Search Control CV (X′33′) during the CP Capabilities exchange with its network node server when the EN has full multi-subnet support but its NNS does not support DLUS-served LU registration. When an EN DLUR has full multi-subnet support and its NNS supports DLUS-served LU registration, the Search Status Indicator can be reset and the DLUS-served LUs can be registered with the NNS (with the Central Resource Registration Request Indicator reset). When an EN DLUR has limited multi-subnet support, the Search Status Indicator can be reset and the DLUS-served LUs need not be registered with the NNS.