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Enterprise Extender and SNA: Additional enhancements and changes

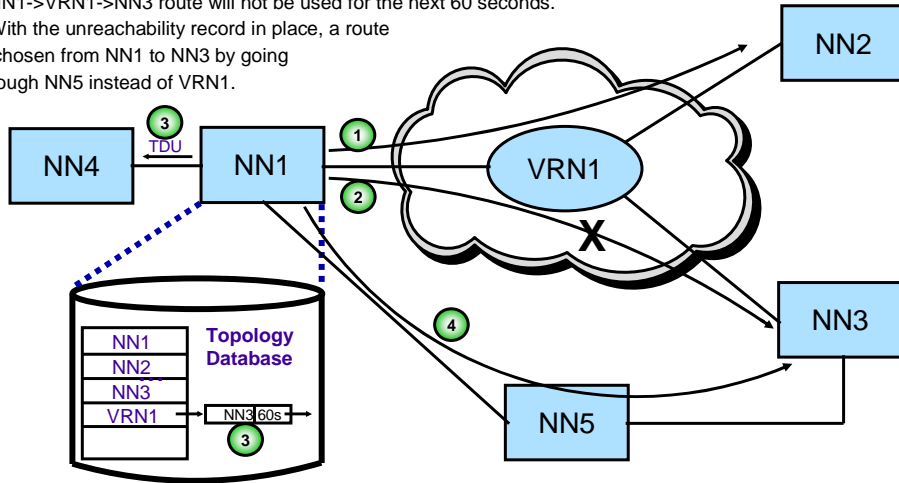*@*business on demand software

Agenda - SNA and Enterprise Extender

1 **Enterprise Extender Connection Network Reachability Awareness (EE CNRA) enhancements**
2 **Removal of multiple SAP support for EE parallel connections**

Enterprise Extender Connection Network Reachability Awareness (EE CNRA) enhancements

Background information - EE CNRA added in V1R6

1.NN1 successfully contacts NN2 across VRN1.

2.NN1's attempt to contact NN3 across VRN1 fails.

3.In NN1's topology database, an "unreachability record" is associated with VRN1 for the partner NN3 (with a duration of 60 seconds) and a TDU is sent to partner NNs. The NN1->VRN1->NN3 route will not be used for the next 60 seconds.

4.With the unreachability record in place, a route is chosen from NN1 to NN3 by going through NN5 instead of VRN1.

NN2

NN4 ③ TDU NN1 ① VRN1

②

Topology Database

NN1

NN2

NN3

VRN1 → NN3 60s →

③
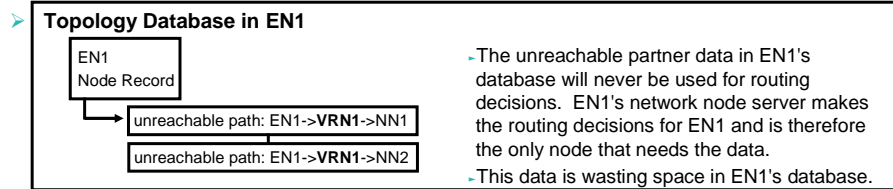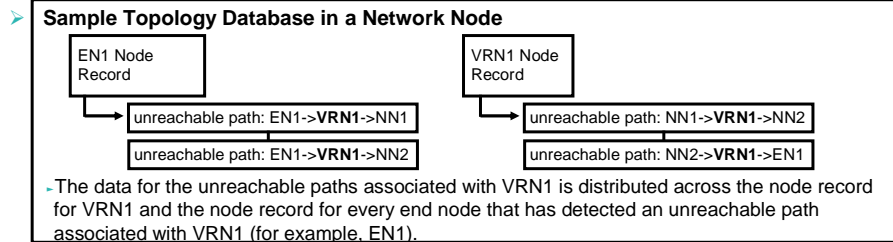
NN3

④

NN5

EE CNRA characteristics as of z/OS® V1R6

➢ **Unreachable partner information detected by a network node is associated with the virtual routing node record. However, unreachable partner information detected by an end node is associated with the end node record.**
  - ▸ Increases the processing required to locate unreachable partner information.

➢ **Unreachable partner information detected by an end node is maintained in the topology database of the end node (as well as in the database of the end node's network node server), even though it will never be used by the end node for routing decisions.**
  - ▸ Storage is used to hold information that is not needed by the end node.

➢ **Enhancements made to DISPLAY TOPO and MODIFY TOPO commands provided only the ID= operand to identify the unreachable records to be processed.**
  - ▸ Insufficient granularity - may require more records to be displayed or cleared than desired.
  - ▸ May require the issuance of multiple commands to process the desired set of records.

Notes about CNRA characteristics as of z/OS V1R6

N O T E S

➢ **Sample Topology Database in a Network Node**

EN1 Node Record

→ unreachable path: EN1->**VRN1**->NN1

unreachable path: EN1->**VRN1**->NN2

VRN1 Node Record

→ unreachable path: NN1->**VRN1**->NN2

unreachable path: NN2->**VRN1**->EN1

- ►The data for the unreachable paths associated with VRN1 is distributed across the node record for VRN1 and the node record for every end node that has detected an unreachable path associated with VRN1 (for example, EN1).

➢ **Topology Database in EN1**

EN1 Node Record

→ unreachable path: EN1->**VRN1**->NN1

unreachable path: EN1->**VRN1**->NN2

- ►The unreachable partner data in EN1's database will never be used for routing decisions. EN1's network node server makes the routing decisions for EN1 and is therefore the only node that needs the data.
- ►This data is wasting space in EN1's database.

➢To display or clear unreachable path NN1->VRN1->NN2, it would be necessary to use the ID=VRN1 operand. This would also display or clear unreachable path NN2->VRN1->EN1.....perhaps an undesirable result.

➢To display or clear all of the unreachable paths associated with VRN1, it would be necessary to issue two commands:
- ►one with ID=VRN1 (to process the paths associated with the VRN1 node record) and
- ►one with ID=EN1(to process the paths associated with the EN1 node record).
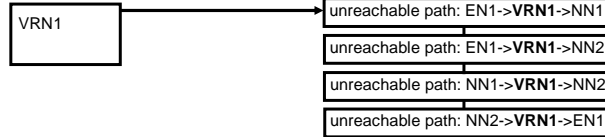
EE CNRA enhancements in z/OS V1R8

➢ **Unreachable partner information detected by both network nodes and end nodes is now associated with the virtual routing node.**
  ► Improves performance when locating unreachable partner information.

➢ **Unreachable partner information detected by an end node is now maintained only in the topology database of the end node's network node server.**
  ► No storage is used to hold this information on the end node.

➢ **New DISPLAY TOPO and MODIFY TOPO operands allow for the identification of the unreachable records to be processed using any combination of:**
  ► origin node name
  ► VRN name
  ► destination node name

➢ **The new DISPLAY TOPO and MODIFY TOPO operands improves management of EE connection networks:**
  ► Eliminates scenarios in which more records than desired will be displayed or cleared.
  ► Reduces the number of commands needed to process the desired records.
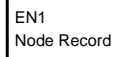
Notes about CNRA enhancements in z/OS V1R8

N O T E S

➢ **Sample Topology Database in a Network Node**

VRN1

unreachable path: EN1->**VRN1**->NN1

unreachable path: EN1->**VRN1**->NN2

unreachable path: NN1->**VRN1**->NN2

unreachable path: NN2->**VRN1**->EN1

▸The data for all of the unreachable paths associated with VRN1 is is now centralized under VRN1.

➢ **Topology Database in EN1**

EN1
Node Record

▸Although there are unreachable paths that were detected by EN1, there is now no unreachable partner data in EN1's database.

▸EN1's network node server **does** have the data for the unreachable paths that were detected by EN1 and will use that data when making routing decisions for EN1.

➢To display or clear unreachable path NN1->VRN1->NN2, it will now be possible to use the ORIG=NN1, VRN=VRN1, and DEST=NN2 operands. This would display or clear only unreachable path NN1->VRN1->NN2.

➢To display or clear all of the unreachable paths associated with VRN1, it will now be possible by issuing only one command (with the VRN=VRN1 operand).

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DISPLAY TOPO command - changes in z/OS V1R8

- **DISPLAY TOPO,LIST=UNRCHTIM command displays unreachable partner records known by the node.**

- **New operands on DISPLAY TOPO,LIST=UNRCHTIM command:**
  - ORIG=   Origin node (EN or NN) on an unreachable partner path
  - VRN=   Virtual node on an unreachable partner path
  - DEST=   Destination node (EN or NN) on an unreachable partner path

- **Default value for each of the new operands is *.***

- **ID= operand no longer allowed on DISPLAY TOPO,LIST=UNRCHTIM command**
  - Use of ID= operand now results in message:
    - IST452I ID PARAMETER EXTRANEOUS

- **Only the unreachable partner records that match ALL of the specified and defaulted operands are displayed.**

- **Since unreachable partner records are no longer maintained on end nodes, the DISPLAY TOPO,LIST=UNRCHTIM command is no longer accepted on an end node.**
  - Use of DISPLAY TOPO,LIST=UNRCHTIM on an end node now results in messages:
    - IST1348I VTAM STARTED AS END NODE
    - IST453I LIST PARAMETER VALUE UNRCHTIM NOT VALID

DISPLAY TOPO command syntax

```
                                                    _,ID=*.*_____
        >>___DISPLAY NET,TOPO,LIST=UNRCHTIM___|_____|_____>
                                              |__,ID=_cpname_|
                                                    |__*.*__|


              _,ORIG=*.*_____        _,VRN=*.*_____        _,DEST=*.*_____
        >__|_____|___|_____|___|_____|____>
           |_,ORIG=_cpname_|    |_,VRN=_cpname_|    |_,DEST=_cpname_|
                |_*.*__|            |_*.*__|            |_*.*__|


              _,MAX=DSPLYDEF_start_option_value_
        >__|_____|_____><
           |_,MAX=_ _*_____ ____|
                |_number_of_resources_|
```

DISPLAY TOPO example - command output

➢**Data displayed for each VRN is modified to include:**
  ‣Total number of unreachable partner records associated with the VRN
  ‣Indicator when the VRN is not being used due to its unreachable partner limit being exceeded, including lower threshold of records that must be reached before VRN will again be used

```
d net,topo,list=unrchtim,max=8
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = TOPOLOGY
IST2057I UNREACHABLE PARTNER INFORMATION:
IST924I ------------------------------------------------------------
IST2150I VIRTUAL NODE NETA.VRN1 – 6 UNREACHABLE PARTNERS
IST2052I   ORIGIN NODE         PARTNER NODE    UNRCHTIM  EXPIRES
IST2055I NETA.SSCP1A         NETWORKB.SSCP7B      300S   23:18:19
IST2055I NETA.SSCP1A         NETA.SSCPAA          300S   00:15:42
IST2055I NETA.TEST1          NETWORK1.TEST4444  14500S   01:15:24
IST2055I NETA.SSCP2A         NETA.SSCPAA          780S   00:24:10
IST2055I NETA.TEST1234       NETA.SSCPAA          300S   00:16:59
IST2055I NETA.TEST1233       NETWORKB.TEST5555    300S   00:02:33
IST924I ------------------------------------------------------------
IST2150I VIRTUAL NODE NETB.GVRN2 – 44 UNREACHABLE PARTNERS
IST2151I PARTNER LIMIT EXCEEDED - UNUSABLE UNTIL COUNT IS BELOW 32
IST2052I   ORIGIN NODE         PARTNER NODE    UNRCHTIM  EXPIRES
IST2055I NETA.SSCP1A          NETA.SSCPAA        1500S   00:40:47
IST2055I NETA.TEST1233        NETWORKB.TEST5555   300S   00:02:33
IST1315I DISPLAY TRUNCATED at MAX = 8
IST314I END
```

Notes about DISPLAY TOPO output

NOTES

- **IST2150I**
  - The network qualified name of an Enterprise Extender virtual routing node (VRN) is displayed along with the total number of unreachable partner paths in the topology database that are associated with that VRN.
  - Note that the count value may differ from the number of unreachable partner paths displayed for the VRN in IST2055I messages if the ORIG, VRN, or DEST operand is used on the DISPLAY TOPO,LIST=UNRCHTIM command to limit the scope of unreachable partner paths displayed or if the message display is truncated with message IST1315I.

- **IST2151I**
  - This message is issued when the number of unreachable partner paths associated with the VRN in IST2150I exceeds the unreachable partner limit.
  - A user specified limit of unreachability records associated with a VRN can be set on the UNRCHTIM start option. When the count of unreachable partner paths through a VRN exceeds this limit, the VRN is no longer used for session route selection. The VRN remains unusable until enough unreachability records that are associated with the VRN are deleted to bring the count below 80% of the limit set in the UNRCHTIM start option. An unreachability record is deleted when the unreachable time that is associated with that record expires, or when the unreachability records are manually cleared with the MODIFY TOPO,FUNCTION=CLRUNRCH command.

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MODIFY TOPO command - changes similar to those for DISPLAY TOPO command

➤**MODIFY TOPO,FUNCTION=CLRUNRCH command manually clears unreachable partner records.**
➤**New operands on MODIFY TOPO,FUNCTION=CLRUNRCH command:**
 ▸ORIG= Origin node (EN or NN) on an unreachable partner path
 ▸VRN= Virtual node on an unreachable partner path
 ▸DEST= Destination node (EN or NN) on an unreachable partner path
➤**ID= operand no longer allowed on MODIFY TOPO,FUNCTION=CLRUNRCH command**
 ▸New operands provide improved user control relative to what was possible with the ID= operand.
 ▸Any combination of origin node, VRN, and destination node is allowed.
 ▸At least one of the three new operands must be specified.
➤**Only the unreachable partner records that match ALL of the specified operands are cleared.**
➤**Since unreachable partner records are no longer maintained on end nodes, the MODIFY TOPO,FUNCTION=CLRUNRCH command is no longer accepted on an end node.**

```
>>___MODIFY procname,TOPO,FUNCTION=CLRUNRCH,~~ID=name~~_____>

 >__ _____ ___ _____ ___ _____ ____>
      |_,ORIG=_cpname_|   |_,VRN=_cpname_|   |_,DEST=_cpname_|

         _,SCOPE=LOCAL_____
 >__|_____|_____><
      |_,SCOPE=_ _LOCAL___ __|
               |_NETWORK_|
```

At least one of ORIG=, VRN=, and DEST= must be specified

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Things to think about

- **Because unreachable partner records are no longer maintained on an end node, the ownership of the unreachable time value is also centralized at the NNS.**

  - When an unreachable partner record is received by an NNS from a served EN, the unreachable time value for the record is set to the unreachable time value configured on the NNS.
  - An unreachable time value must still be configured on end nodes (to activate the EE Connection Network Reachability Awareness function).

- **What does this mean?**

  - Previously, the unreachable time value used for unreachable paths detected by an EN was the value configured on the EN. Beginning in V1R8, the value configured on the NNS will be used.
  - Note that it has been recommended that ENs be configured with the same value as the NNS. If this recommendation has been followed, there is no difference due to this change.
  - With this change, if you need to change the unreachable time value for a VRN, it is no longer necessary to reconfigure every node (ENs and NNs) attached to the VRN. Now, only the NNs and pre-V1R8 ENs will need to be modified.

Things to think about (cont.)

➤ **As previously mentioned, the following commands have been modified:**

- ‑ DISPLAY TOPO,LIST=UNRCHTIM
- ‑ MODIFY TOPO,FUNCTION=CLRUNRCH

➤ **The modifications are:**

- ‑ ORIG=, VRN=, and DEST= operands are now allowed.
- ‑ ID= operand is no longer allowed.

➤ **What does this mean?**

- ‑ Any automation that uses the ID= operand of these commands will need to be modified to use the ORIG=, VRN=, and DEST= operands.

One more thing to think about

➢ **When a MODIFY TOPO,FUNCTION=CLRUNRCH command is specified with the SCOPE=NETWORK operand, the request to clear unreachable partner records is propagated to all network nodes in the network.**

- ▸ The improved granularity provided by the ORIG=, VRN=, and DEST= operands is communicated as part of the request.

➢ **Network nodes with z/OS Communications Server V1R8 will recognize this information. However, network nodes with pre-V1R8 z/OS Communication Server will not.**

- ▸ V1R8 nodes will clear the desired set of unreachable partner records. Depending on the scenario, pre-V1R8 nodes may delete either more or fewer unreachable partner records than desired.
- ▸ APAR OA14203 adds new function to pre-V1R8 network nodes, giving them the ability to recognize the information and more closely match the desired set of unreachable partner records to be cleared. Unreachable partner records with end node origin will not be cleared.

➢ **What does this mean?**

- ▸ If the MODIFY TOPO,FUNCTION=CLRUNRCH command will be used on a node with z/OS Communications Server V1R8, network nodes with pre-V1R8 z/OS Communication Server should be updated with APAR OA14203.

Notes about APAR OA14203

> **Scenario 1: EN is a pre-V1R8 end node, NN1 is EN's V1R8 network node server:**
> - If MODIFY TOPO,FUNCTION=CLRUNRCH is issued on NN1 and the operands specified on the command identify origin of EN or identify a VRN/destination pair with which EN has unreachable partner records:
>   - You must also issue MODIFY TOPO,FUNCTION=CLRUNRCH,ID=EN on EN to delete the records with origin of EN from EN

> **Scenario 2: EN is a V1R8 end node, NN1 is EN's pre-V1R8 network node server with OA14203 installed:**
> - If MODIFY TOPO,FUNCTION=CLRUNRCH is issued on EN and the operands specified on the command identify origin of EN or identify a VRN/destination pair with which EN has unreachable partner records:
>   - You must also issue MODIFY TOPO,FUNCTION=CLRUNRCH,ID=EN on NN1 to delete the records with origin of EN from NN1

> **Scenario 3: EN is a pre-V1R8 end node, NN1 is EN's V1R8 network node server, and NN2 is a V1R8 network node:**
> - If MODIFY TOPO,FUNCTION=CLRUNRCH is issued on NN2 and the VRN= and DEST= operands specified on the command identify a VRN/destination pair with which EN has unreachable partner records:
>   - You must also issue MODIFY TOPO,FUNCTION=CLRUNRCH,ID=EN on EN to delete the records with origin of EN from EN. (NN1, a V1R8 network node, has cleared the desired records and requires no additional commands)

> **Scenario 4: EN is a pre-V1R8 end node, NN1 is EN's pre-V1R8 network node server with OA14203 installed, and NN2 is a V1R8 network node:**
> - If MODIFY TOPO,FUNCTION=CLRUNRCH is issued on NN2 and the VRN= and DEST= operands specified on the command identify a VRN/destination pair with which EN has unreachable partner records:
>   - You must also issue MODIFY TOPO,FUNCTION=CLRUNRCH,ID=EN,SCOPE=NETWORK on EN to delete the records with origin of EN from EN and NN1

> In each of these scenarios, when MODIFY TOPO,FUNCTION=CLRUNRCH,ID=EN is used to clear records for EN, all records with origin of EN will be cleared. This is the same as the ID=EN behavior in V1R6 and V1R7.
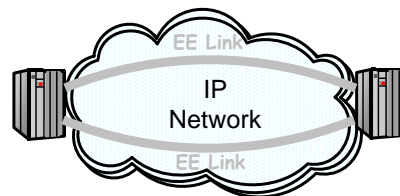
Removal of multiple SAP support
for EE parallel connections

Removal of Multiple SAP Support for EE Parallel TGs

➢ **Prior to V1R8, you have been able to define parallel EE TGs between two nodes by varying the SAP value.**

➢ **However, this serves no useful purpose:**
  - The IP cloud provides the availability/redundancy characteristics
  - Providing additional EE TGs between the same two APPN endpoints provides no additional availability or load distribution advantage

➢ **Allowing definition of parallel TGs via multiple SAPs has caused additional complexity and code path length.**

➢ **z/OS V1R8 makes the following changes in this area:**
  - A parallel EE connection will no longer be allowed to originate from VTAM®.
  - When activating an Enterprise Extender link over a connection network the link uses an existing predefined link if one exists.
  - VTAM will still allow inbound parallel EE connections. This maintains support for downlevel VTAMs as well as other products.

➢ **Beginning with V1R5, parallel EE TGs may be defined by using different EE VIPAs on one (or both) of the endpoints.**
  - This method of defining parallel TGs may be useful in some cases, since selection of one TG over the other could map to particular IP routes

Things to think about

> Example of EE switched major node that uses parallel TGs based on SAP values

```
TOIP2A   VBUILD TYPE=SWNET
*
SWIP2A1  PU    CPNAME=SSCP2A,                                 X
               DWINOP=YES,                                    X
               PUTYPE=2
PTHIP2A1 PATH  GRPNM=GPIP,                                    X
               SAPADDR=4,                                     X
               REDIAL=FOREVER,                                X
               IPADDR=9.67.1.2        MATCHES OTHER HOST'S VIPA
*
SWIP2A2  PU    CPNAME=SSCP2A,                                 X
               PUTYPE=2,                                      X
               DWINOP=YES
PTHIP2A3 PATH  GRPNM=GPIP,                                    X
               IPADDR=9.67.1.2,       MATCHES OTHER HOST'S VIPA  X
               SAPADDR=8,                                     X
               REDIAL=FOREVER
```

> You need to remove this type of definitions before migrating to z/OS V1R8. This major node will not activate on a z/OS V1R8 system.

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