Enterprise Extender
EE: We Bring Good things to Life !

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The Good Things in Life

- **Grasshopper Learns Wisdom from The Masters**
  - Those Who "Went Before"
    - IBM, MCI/Verizon, Cisco and ASC (Angela Schmitz Consulting)
  - Yoda "The Great One"
    - LOGMODE and Class of Service Resolution
    - Broadcast and Border Node Searching
- **Mid-Life Grasshopper**
  - TN3270 Benchmark Testing
  - Extended Border Node – EE Migration Experiences
- **Advanced-Life Grasshopper**
  - Grasshopper exploits New Features and '*goes*' IPv6

The Masters of APPN in a TCP/IP World

- TCP/IP and APPN on the Mainframe – Planning and Doing
  - **IBM**: Nancy Gates and Chuck Gardiner
    - Original Planning (too many to name for "afterward")
  - **Cisco:** Dave Katz, Ray Romney and Junie Sadler
    - Validation – Test Drive … awesome !
  - **MCI/Verizon:** Jay Buddiga, Joe Berkeley, Jack Williams, etc.
    - Dual Stacks (IP and EE Segregation)
    - Dual Routers (DLSw & SNA Switch IOS Segregation)
  - **ASC** (Angela Schmitz Consulting) and **Net-Q**
    - CP-CP Session Keys and SNA Firewall
    - Followed Recommendations from Yoda "The Great One"
      - *One and only one MODETAB (ISTINCLM)*
      - *APPNCOS on EVERY LOGMODE Entry*

Enterprise Extender in the Enterprise

- Enterprise Motivations – Technology Obsolescence
  - FEPs/NCP -- Source of initial "push" for EE
    - CCL/Linux became, effectively, a "delay" for EE
  - SNA/LLC, SDLC, and DLSw (No IPv6 future)
  - Low-Speed Copper NICs on iSeries required for SNA/LLC
- Platform Expansion
  - IBM: z/OS, AIX, PComm, and iSeries
  - Other: MS-Windows Host Integration Server, HP-Unix SNAPlus
- IPv6 and Single-Wire Protocol Mandates
- zEnterprise (TN3270) and EE Advancements
  - Enterprise Extender
    - z/OS 1.9 Multiple XCA VIPAs / Groups
    - z/OS 1.10 Compatibility patch & MTU on SWNET
  - TN3270
    - z/OS 1.11 Significantly Reduced ECSA Usage
    - z/OS 1.12 Shared ACB for Telnet

What Remains of the Pre-EE Legacy?

- NO FEPs Remain !
  - 2010 - 1 IBM 3745 FEP/NCP at HQ Data Center Only
    - *Supported SOLITARY SDLC Back-to-Back SNI/INN Site*
  - 2009 - 2 FEPs with 7 Sites
- OSA/LLC at HQ Data Center ONLY
  - Supports SOLITARY *Adjacent* SNI/INN (CCL/Linux) Site
  - Supports SEVERAL BNN Sites
- Over 100k Concurrent Desktops using PComm with SNA/LLC, and 100 Laptops using PComm with EE
  - Large-Scale TN3270 Coming … soon ?
    - APPC Elimination and ECSA Constraints
      - *Relief in each release*
- 48 SNA/LLC iSeries to Migrate by April (9 EE iSeries)

TN3270 Testing Breakthroughs in EE

- Interactive traffic CAN appear “like” streamed data
  - HPRCLKRT=ADAPTIVE
    - Granular Timer Values
  - HPRSESLM=NOLIMIT
    - We’re using 8000
    - Modifiable VTAM Start `Option

```
12:40:59 * D NET,RTPS
12:40:59 ' IST350I  DISPLAY TYPE = RTPS
12:40:59 ' IST1695I  PU NAME       CP NAME      COSNAME SWITCH CONGEST STALL SESS
12:40:59 ' IST1960I  CNR000CF SSANET1.N01CP003 #BATCH    NO      NO      NO      2
12:40:59 ' IST1960I  CNR000C5 SSANET2.N02CP024 #CONNECT  NO      NO      NO   8000
12:40:59 ' IST1960I  CNR000C3 SSANET2.N02CP024 #CONNECT  NO      NO      NO   8000
12:40:59 ' IST1960I  CNR000C2 SSANET2.N02CP024 #CONNECT  NO      NO      NO   7998
12:40:59 ' IST1960I  CNR000C0 SSANET1.N01CP017 #BATCH    NO      NO      NO      3
```

- NOTE: HPRSESLM Values used by RTP Endpoints are NOT REQUIRED to be equal !

HPRSESLM Sense 0897 000A: System Definition Mismatch

- Usage could result in nodes choosing different ICN RTPs
  - 2 Scenarios for Failure - **Sense 0897 000A** for ICN Session

The PU of an independent PLU named in BFINIT does not have the same element address as the one in the ALS field of BFINIT.

- HPRSESLM Incompatibility
  - *Pre-V1R10 Partners*
    - *SSA Initiated Project to Track Partner z/OS releases*

- Differing HPRSESLM Values by ICN and Adjacent APPN Node

A Different Sense 0897 000A Experience: System Definition Mismatch

- COS Mapping Can be Problematic
  - DO NOT USE IF YOU DO NOT HAVE TO !!
    - #BLANK is NOT a Standard Value

```
SATOAPPN VBUILD TYPE=SATOAPPN
         MAPSTO COS=#BLANK,DEFAULT=YES
#CONNECT MAPSTO COS=#INTERSC
ISTVTCOS MAPSTO COS=CPSVCMG
BEST     MAPSTO COS=SNASVCMG
HIGH     MAPSTO COS=#INTER
MEDIUM   MAPSTO COS=#CONNECT
LOW      MAPSTO COS=#BATCHSC
BATCH    MAPSTO COS=#BATCH
SSANDMBT MAPSTO
COS=#BATCH
```

Partner COS Maps

```
APPNTOSA VBUILD TYPE=APPNTOSA
#BLANK   MAPSTO COS=,DEFAULT=YES
CPSVCMG  MAPSTO COS=ISTVTCOS
SNASVCMG MAPSTO COS=BEST
#CONNECT MAPSTO COS=MEDIUM
#INTER   MAPSTO COS=HIGH
#INTERSC MAPSTO COS=#CONNECT
#BATCH   MAPSTO COS=BATCH
#BATCHSC MAPSTO COS=LOW
```

Trace revealed odd APPNCOS: #BLANK

Partner did not have #BLANK as their LOGMODE's APPNCOS value --- **they had NO COS values;**

However, they did have **active COS Maps**

d net,satoappn

```
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = SATOAPPN
IST1321I TABLE FOR SATOAPPN
IST1514I SUBAREA COS APPNCOS
IST1323I COSAPPL1 #CONNECT
IST1323I COSAPPL2 #BATCH
IST1323I COSAPPL3 #BATCHSC
IST1323I COSAPPL4 #INTER
IST1323I COSAPPL5 #CONNECT DEFAULT
IST1323I ISTCOSDF #INTERSC
IST314I END
```

Sample from manual

More Sense 0897 Experiences: System Definition Mismatch

- Dynamic Coding vs. Pre-Defined Coding
  - Relatively Common Error – **Sense 0897 0015**
    - DYNLU=YES/NO (EE PU / ADJCP)

```
* CNM60    DI EEPUABC
  CNM60    IST097I  DISPLAY  ACCEPTED
' CNM60
IST075I  NAME = EEPUABC         , TYPE = PU_T2.1
IST486I  STATUS= ACTIV     , DESIRED STATE= ACTIV
IST1043I  CP NAME = CP1ABC    - CP NETID = ABCNET   - DYNAMIC LU = NO
IST1589I  XNETALS = YES
IST2238I  DISCNT = NO    - FINAL USE = *NA*
IST1105I  RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I  EEPUABC  AC/R     1 YES   98430000000000000000209100808080
IST1482I  HPR = RTP  - OVERRIDE = N/A - CONNECTION = YES
IST1510I  LLERP = NOTPREF  - RECEIVED = NOTALLOW
IST1680I  LOCAL  IP ADDRESS 10.0.1.11
IST1680I  REMOTE IP ADDRESS 172.1.2.3
IST2114I  LIVTIME:    INITIAL =   25   MAXIMUM =    0   CURRENT =   25
IST136I  SWITCHED SNA MAJOR NODE = SWEEABC
IST081I  LINE NAME = E00000F5, LINE GROUP = XCAPRD1G, MAJNOD = XCASY60
IST654I  I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I  STATE TRACE = OFF
IST1656I  VTAMTOPO = REPORT  , NODE REPORTED - YES
IST1657I  MAJOR NODE VTAMTOPO = REPORT
IST172I  NO LOGICAL UNITS        EXIST
IST314I  END
```

The OLU is represented using a dynamically defined resource but the ALS selected to provide its services **does not permit dynamic definitions.** The condition is detected when a session initiation request is received for an independent LU and no predefinition is found for the OLU resource. The session initiation is rejected.

Another Sense 0897 Experience: System Definition Mismatch

- Dynamic Coding vs. Pre-Defined Coding
  - Uncommon Error – **Sense 0897 0017**
    - ALSREQ=YES/NO
      (Start Option / CDRSC)

```
* CNM41    DI ABCNDM
  CNM41    IST097I  DISPLAY  ACCEPTED
' CNM41
IST075I  NAME = USNET01.ABCNDM , TYPE = CDRSC
IST486I  STATUS= ACT/S----Y, DESIRED STATE= ACTIV
IST1402I  SRTIMER =    30  SRCOUNT =    10
IST1447I  REGISTRATION TYPE = NO
IST977I  MDLTAB=***NA*** ASLTAB=***NA***
IST1333I  ADJLIST = ***NA***
IST861I  MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I  DLOGMOD=***NA*** USS LANGTAB=***NA***
IST597I  CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I  CDRSC    MAJOR NODE = ISTCDRDY
IST479I  CDRM NAME = N01CP008, VERIFY OWNER = NO
IST1184I  CPNAME = USNET01.D2CDRM   - NETSRVR = ***NA***
IST1044I  ALSLIST = ISTAPNPU
IST1131I  DEVICE = ILU/CDRSC
IST654I  I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I  STATE TRACE = OFF
IST171I  ACTIVE SESSIONS = 0000000001, SESSION REQUESTS = 0000000000
IST206I  SESSIONS:
IST1081I  ADJACENT LINK STATION = CNR00300
IST634I  NAME     STATUS        SID         SEND RECV VR TP NETID
IST635I  NDM01    ACTIV/SV-S FAC767C6EE587BC1 0004 0004       SSANET1
IST314I  END
```

The OLU is represented using a dynamically defined resource but the ALS selected to provide its services **does not permit dynamic definitions.** The condition is detected when a session initiation request is received for an independent LU and no predefinition is found for the OLU resource. The session initiation is rejected.

ALSREQ: Specifies that an adjacent link station name MUST MATCH an entry in the default link station list of the independent LU

Common EE Session Status Problems

- Firewall Problems Manifested as Session Establishment Issues
  - UDP 12000-12004 MUST be OPEN Bi-Directionally
  - Common Firewall Session Status Manifestations
    - PSESST B-P
      - *Pending SESSST or BFESSST request. The session can be expecting any of several signals.*
        - *Use the D NET,SESSIONS,SID= command to see the specific signal(s) needed.*
    - PBIPLUBF
      - *Pending receipt of the BFINIT from the boundary function of the APPN LU*

EE Security Considerations

- Connection Network
  - Internal use ONLY – z/OS End Nodes, SNA Switch
- CP-CP Session Keys (VERIFYCP=OPTIONAL)
  - Authenticate whenever possible (no encryption)
- Unique XCA Groups (Internet vs Dedicated)
  - Separate VIPAs with DYNPU=NO/YES
- ADJCP & ADJCLUST and SNA Firewall
  - AUTHNET=(netlist) & ALIASRCH=NO, BNDYN=NONE & SNVC=3

VTAM XCA Multi-Group Coding


```
XCASY60  VBUILD TYPE=XCA          EXTERNAL COMMUNICATIONS ADAPTER
*
XCASY60R PORT MEDIUM=HPRIP,       EE/HPR CONNECTION
         HPREELIV=YES,      ENABLE HPR LIVENESS REDUCTION (EE)
         LIVTIME=25,        LLC LIVENESS TIMER INTERVAL
         SRQTIME=15,        LLC SHORT REQUEST TIMER INTERVAL
         SRQRETRY=7,        SHORT REQUEST TIMER RETRY
         SAPADDR=04         SERVICE ACCESS POINT ADDRESS
XCAPRD1G GROUP ANSWER=ON,         PU DIAL-IN CAPABILITY TO VTAM
         IPADDR=10.1.2.60,  TCPIPEE VIPA
         AUTOGEN=(256,E,$),  AUTO GEN LINES, NO PU'S
         CALL=INOUT,        IN/OUT CALLING CAPABILITY
         DIAL=YES,          SWITCHED LINE CONNECTION
         DYNPU=NO,          DO NOT ALLOCATE DYNAMIC PU'S
         KEEPACT=YES,       REACTIVATE LINE IF INOP OCCURS
         LIMRES=NO,         LINES NOT LIMITED RESOURCE
         ISTATUS=ACTIVE     INITIAL ACTIVATION STATUS
XCAPRD1I GROUP ANSWER=ON,         PU DIAL-IN CAPABILITY TO VTAM
         IPADDR=10.1.2.70,  TCPIPEE VIPA FOR INTERNET
         AUTOGEN=(16,IE,$),  AUTO GEN LINES, NO PU'S
         CALL=INOUT,        IN/OUT CALLING CAPABILITY
         DIAL=YES,          SWITCHED LINE CONNECTION
         DYNPU=NO,          DO NOT ALLOCATE DYNAMIC PU'S
         KEEPACT=YES,       REACTIVATE LINE IF INOP OCCURS
         LIMRES=NO,         LINES NOT LIMITED RESOURCE
         LIVTIME=(25,180),  LLC LIVENESS TIMER INTERVAL
         SRQTIME=20,        LLC SHORT REQUEST TIMER INTERVAL
         SRQRETRY=9,        SHORT REQUEST TIMER RETRY
         ISTATUS=ACTIVE     INITIAL ACTIVATION STATUS
```

```
XCASY43  VBUILD TYPE=XCA          EXTERNAL COMMUNICATIONS
         ADAPTER
*
XCASY43R PORT MEDIUM=HPRIP,       EE/HPR CONNECTION
         HPREELIV=YES,      ENABLE HPR LIVENESS REDUCTION (EE)
         LIVTIME=25,        LLC LIVENESS TIMER INTERVAL
         SRQTIME=15,        LLC SHORT REQUEST TIMER INTERVAL
         SRQRETRY=7,        SHORT REQUEST TIMER RETRY
         SAPADDR=04         SERVICE ACCESS POINT ADDRESS
XCAPRD1G GROUP ANSWER=ON,         PU DIAL-IN CAPABILITY TO
         VTAM
         IPADDR=10.1.2.43,  TCPIPEE VIPA
         AUTOGEN=(256,E,$),  AUTO GEN LINES, NO PU'S
         CALL=INOUT,        IN/OUT CALLING CAPABILITY
         DIAL=YES,          SWITCHED LINE CONNECTION
         DYNPU=NO,          DO NOT ALLOCATE DYNAMIC PU'S
         KEEPACT=YES,       REACTIVATE LINE IF INOP OCCURS
         LIMRES=NO,         LINES NOT LIMITED RESOURCE
         ISTATUS=ACTIVE     INITIAL ACTIVATION STATUS
XCAPRD1I GROUP ANSWER=ON,         PU DIAL-IN CAPABILITY TO VTAM
         IPADDR=10.1.2.53,  TCPIPEE VIPA FOR INTERNET
         AUTOGEN=(512,IE,$), AUTO GEN LINES, NO PU'S
         CALL=INOUT,        IN/OUT CALLING CAPABILITY
         DIAL=YES,          SWITCHED LINE CONNECTION
         DYNPU=YES,         ALLOCATE DYNAMIC PU'S
         KEEPACT=YES,       REACTIVATE LINE IF INOP OCCURS
         LIMRES=NO,         LINES NOT LIMITED RESOURCE
         LIVTIME=(25,180),  LLC LIVENESS TIMER INTERVAL
         SRQTIME=20,        LLC SHORT REQUEST TIMER INTERVAL
          SRQRETRY=9,       SHORT REQUEST TIMER RETRY
         ISTATUS=ACTIVE     INITIAL ACTIVATION STATUS
```

Granular LDLC Timers **Dynamic PUs Permitted**

D NET,EE,LIST=DETAIL DYNPU=YES/NO vs. LDLC Timers

```
IST1680I  LOCAL  IP ADDRESS 10.1.2.43
IST2004I  LIVTIME = (25,180)   SRQTIME =    20  SRQRETRY =     9
IST2009I  RTP PIPES =        405      LU-LU SESSIONS      =        649
IST2010I  INOPS DUE TO SRQRETRY EXPIRATION                =       1431
IST2013I  AVAILABLE LINES FOR PREDEFINED EE CONNECTIONS   =        262
IST2014I  ACTIVE PREDEFINED EE CONNECTIONS                =        250
IST2015I  ACTIVE LOCAL  VRN EE CONNECTIONS                =          0
IST2016I  ACTIVE GLOBAL VRN EE CONNECTIONS                =          0
IST924I  -------------------------------------------------------------
IST1680I  LOCAL  IP ADDRESS 10.1.2.53
IST2004I  LIVTIME = (25,0)     SRQTIME =    15  SRQRETRY =     7
IST2009I  RTP PIPES =        508      LU-LU SESSIONS      =       4384
IST2010I  INOPS DUE TO SRQRETRY EXPIRATION                =          0
IST2013I  AVAILABLE LINES FOR PREDEFINED EE CONNECTIONS   =        240
IST2014I  ACTIVE PREDEFINED EE CONNECTIONS                =         16
IST2015I  ACTIVE LOCAL  VRN EE CONNECTIONS                =          0
IST2016I  ACTIVE GLOBAL VRN EE CONNECTIONS                =          0
```

Let the Search Begin
Register "Target" LU Resources

- Searching Basics
  - 1st Thing: Directory DB !
    - Register "Target" LUs !!
      - *Printers and Applications*
  - Next: Topology DB
    - CP Names
  - Then: Search
    - Central Directory Server and ADJCLUST Lists

```
*
CSERVMDL VBUILD TYPE=MODEL
*--------------------------------------------------------------------*
* This model is used for the "standard" printer.   (HrrrddE0)       *
*--------------------------------------------------------------------*
LU1PRNTR LU    LOCADDR=02,                                          X
               REGISTER=CDSERVR,                                    X
               PACING=(2,1),                                        X
               VPACING=4,                                           X
               USSTAB=ISTINCDT,                                     X
               DLOGMOD=SCSA
*--------------------------------------------------------------------*
* Baltimore region display models                                   *
*--------------------------------------------------------------------*
LU22BA1  LU    LOCADDR=02,                                          X
               PACING=7,                                            X
               SSCPFM=USSSCS,                                       X
               USSTAB=USSTBA1,                                      X
               DLOGMOD=SSA3279
LU23BA1  LU    LOCADDR=02,                                          X
               PACING=7,                                            X
               SSCPFM=USSSCS,                                       X
               USSTAB=USSTBA1,                                      X
               DLOGMOD=SSA32793
LU24BA1  LU    LOCADDR=02,                                          X
               PACING=7,                                            X
               SSCPFM=USSSCS,                                       X
               USSTAB=USSTBA1,                                      X
               DLOGMOD=SSA32794
LU25BA1  LU    LOCADDR=02,                                          X
               PACING=7,                                            X
               SSCPFM=USSSCS,                                       X
               USSTAB=USSTBA1,                                      X
               DLOGMOD=SSA32795
```

```
IST097I  DISPLAY  ACCEPTED
IST075I  NAME = SSANET1.CICSTOR1 , TYPE = DYNAMIC APPL
IST486I  STATUS= ACT/S     , DESIRED STATE= ACTIV
IST1447I  REGISTRATION TYPE = CDSERVR
IST1363I  GENERIC RESOURCE NAME PTORSVGR REPRESENTS SSANET1.CICSTOR1
IST2062I  SNPS FORCED TAKEOVER REQUESTS ARE ACCEPTABLE
IST1629I  MODSRCH = NEVER
IST977I  MDLTAB=***NA*** ASLTAB=***NA***
IST861I  MODETAB=***NA*** USSTAB=***NA*** LOGTAB=***NA***
IST934I  DLOGMOD=LU62     USS LANGTAB=***NA***
IST1632I  VPACING =  7
IST1938I  APPC = NO
IST597I  CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I  APPL     MAJOR NODE = CIWILD
```

APPN CDRSC Coding

Non-native CDRSC definitions for DLUs (Destination LUs) :

Applications (e.g., CICS) and printer LU cross-domain resources (CDRSCs) MUST be coded as NETID-specific AND with any CPNAME

--on both primary and backup EBN systems, or on OLU (origin application) Host

Note: Without “directory entry” for CDRSC, the directory search will fail !

```
CDRSCSSA VBUILD TYPE=CDRSC
SSANET NETWORK NETID=SSANETID
NDM08    CDRSC CPNAME=SSANETID.SSACPN08,DLOGMOD=NDMLOGM,NQNMODE=NAME
NDM17    CDRSC CPNAME=SSANETID.SSACPN17,DLOGMOD=NDMLOGM,NQNMODE=NAME
```

Code CPNAME for ALL CDRSCs in each □target□ NETID

--provide LOGMODE and, as needed, also specify MODETAB

APPN does not like ‘*blank*’ *Logmodes!!!!*

What "Kind" of Search?

- **End Nodes**
  - Check **NNS**
- **Network Nodes**
  - **Native** Network Search
    - "MY CP NAME" Coded in ADJCLUST
  - **CDS Query** Search
  - **Border Node** Search
- **Border Nodes**
  - **Non-Native** Adjacent **NN** Search
  - **Native** Peer **EBN** Search
  - ENTIRE Native Network

Native Network Search by NNs/BNs

- Broadcast Search any “Served” ENs
  - ENs with ENBCAST=YES
- APPN Network Broadcast
  - ISTAPNCP
- Interchange Node Search
  - Subarea Networks
- SORDER=APPNFRST
  - Always FIRST !!
  - Formerly only SORDER=APPN
    - 1st Unless Owning CDRM “known”

Tailoring EBN Search Process

- Prevent unnecessary searching
- Use BNDYN=NONE !
- Use ACCURATE SNVC !
  - Commonly SNVC=3 on Start Option
  - May need SNVC=4 (or more) on ADJCLUST

- Only Border Nodes “have”, and “go into” ADJCLUST Lists
- AT LEAST ONE Non-Native “link” MUST BE ACTIVE to maintain status as a “Border Node”
  - Engineer as “Persistent” Border Nodes
- BNs can, *and will*, change their “type” to EN to prevent “architectural violation”

Well-Defined ADJCLUST Lists

- Code "**MY CP Name**" for trial and error Broadcast search of Native Network
- Spread Non-Native EBN Connections
  - Aids in maintaining "Border Node" status
- Use CPCP=NO between EBN and Non-Native NN (*Non-EBN)*
  - Else EBN becomes an EN – **NO searching**!

Trying to eliminate the Broadcast Search step is a VERY RISKY GAME !

Search Failure: EBN Link Activated EBN Connectivity Any-to-Any CAUTION !

```
IST663I  INIT OTHER REQUEST                FAILED  , SENSE=087D0001
IST664I  REAL  OLU=SSANET1.E1210006   ALIAS DLU=SSANET1.TPXITS
IST889I  SID = EB1374A12002BEAD
IST1727I  DNS NAME: ST36045.BAD.SSA.GOV
IST1669I  IPADDR..PORT 10.2.3.4..59841
IST1705I  SORDER   = APPN     FROM START OPTION
IST1705I  SSCPORD  = PRIORITY FROM START OPTION
IST894I  ADJSSCPS TRIED  FAILURE SENSE   ADJSSCPS TRIED  FAILURE SENSE
IST895I     ISTAPNCP         08900037
IST314I  END
```

IPINFO=SNDLOCAL vs SENDALL

SENSE DATA:
CATEGORY - (08) **Search failure**.
MODIFIER - (90) Bytes 2 and 3 following the sense code contain
BYTE 2 - (00) sense-code-specific information.
BYTE 3 - (37)
Unknown TG vectors to dependent LU requester.
A resubmitted Located search for a dependent LU
at its dependent LU requester was unsuccessful.
This condition arises only after the dependent
LU server has verified the existence of the
dependent LU.
VTAM Hint**: VTAM was unable to successfully locate the dependent LU requester (DLUR) node** in order to obtain the necessary DLUR endpoint transmission group (TG) vectors. The current session setup will fail. Verify that connectivity exists between the node that issued the sense code and the DLUR node.
END OF DATA

- Use CPCP=NO to Non-Native NNs (Non-EBN)
  - Else EBN becomes an EN
    - See D NET,CPCP

From SSANET1 Non-EBN (System 12) D NET,CPCP

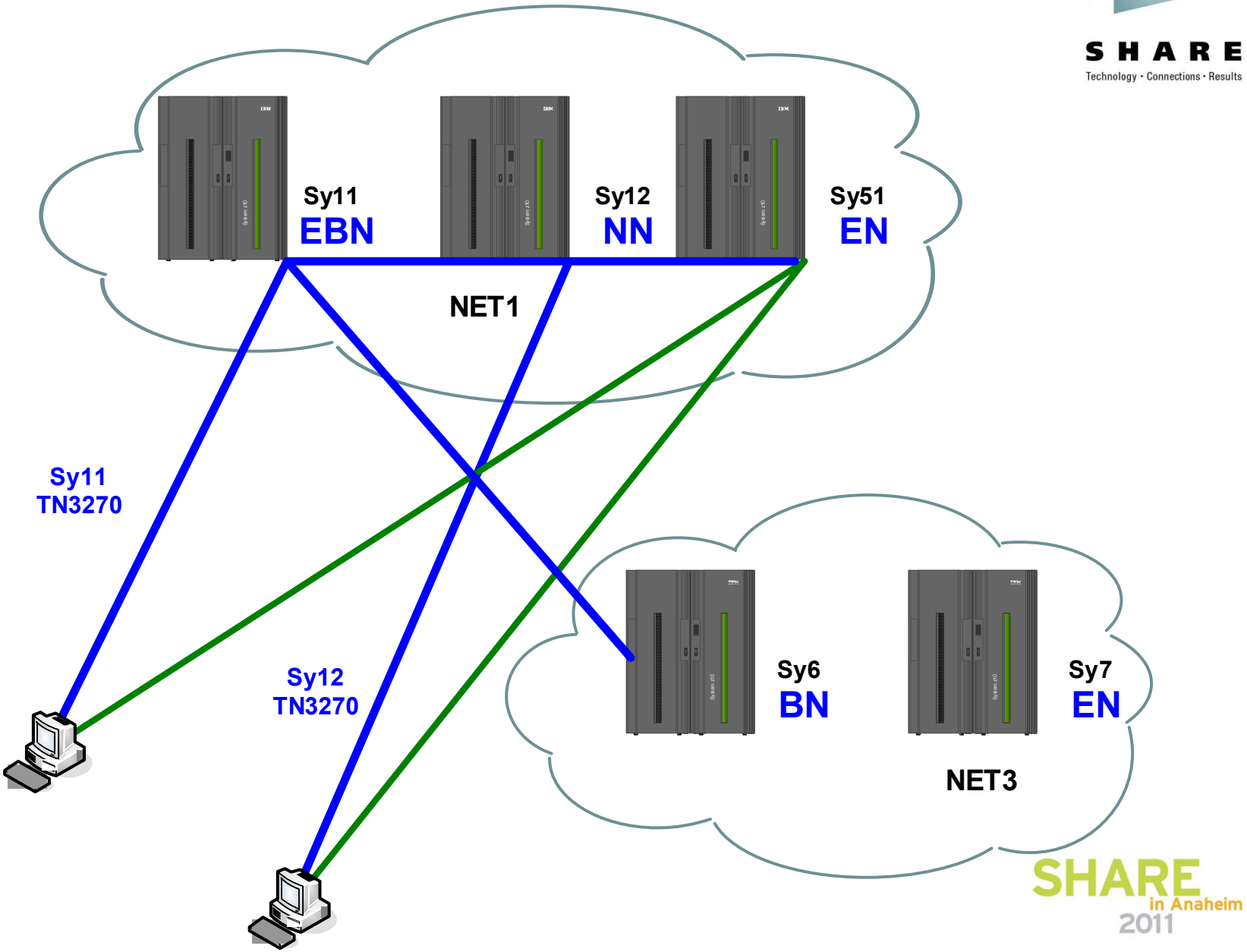

```
IST097I  DISPLAY  ACCEPTED
IST350I  DISPLAY TYPE = CP-CP SESSION STATUS
IST1765I  ADJACENT CP        WINNER   LOSER   STATE      NODE ANDCB
IST1766I  SSANET3.D02CP006   ACT      ACT     UP           EN 22BE47F0
        -       -       -       -  MORE -       -       -       -
IST1766I  SSANET1.N01CP011   ACT      ACT     UP           NN 22BE4910
IST1766I  SSANET1.N01CP010   INACT    INACT   BOTH DOWN    EN 22BE4A30
```

While Non-EBN (Network 1 – System 12) to EBN (Network 3 - System 6) Non-Native Connection "Up"

EBN "morphed" into an End Node for the Connection

Unpredictable Session Establishment Issues

Border Node Becomes End Node



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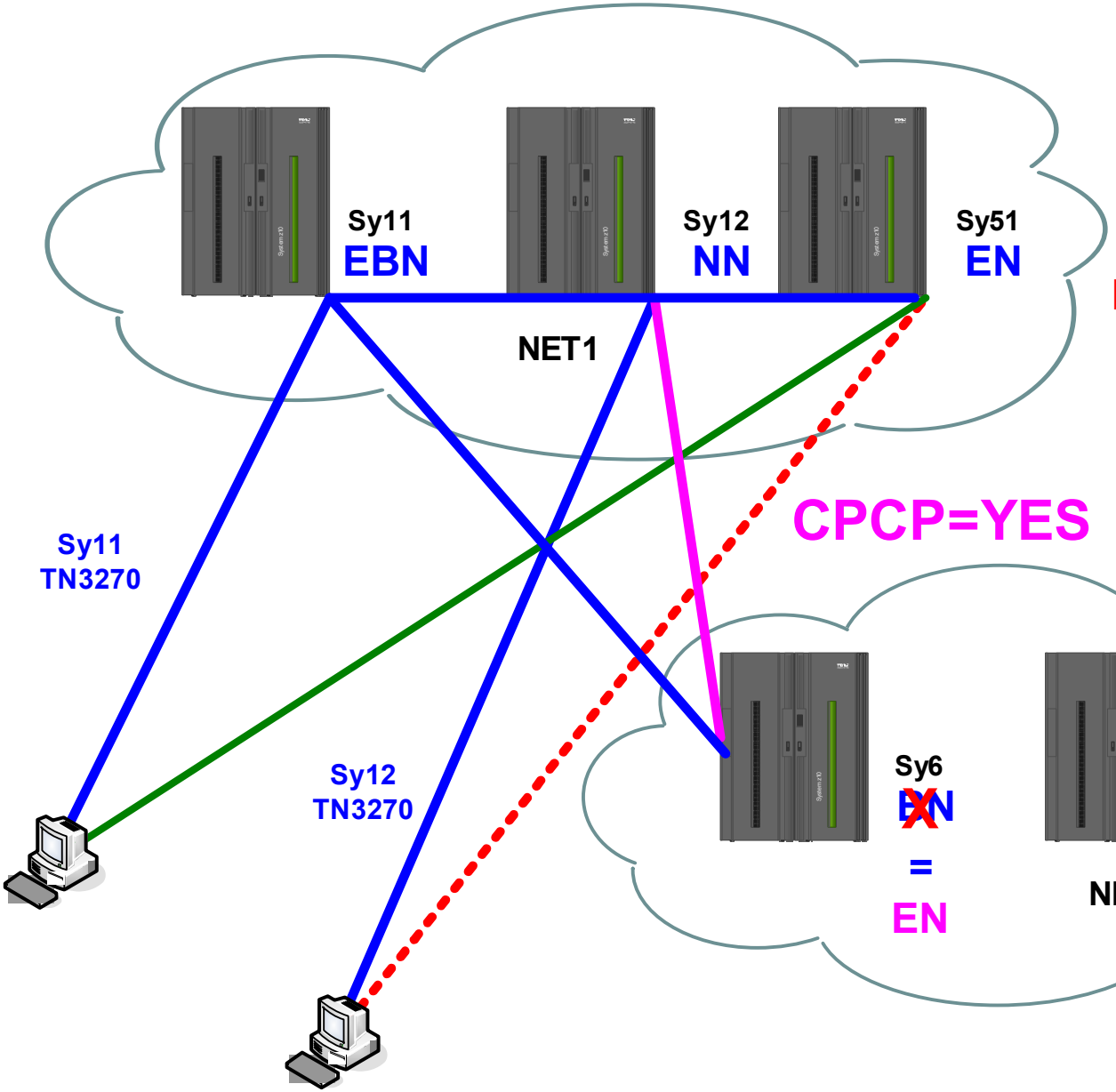
Border Node Becomes End Node



Searches Became Unpredictable

Even External Business Partners Had Session Establishment Issues

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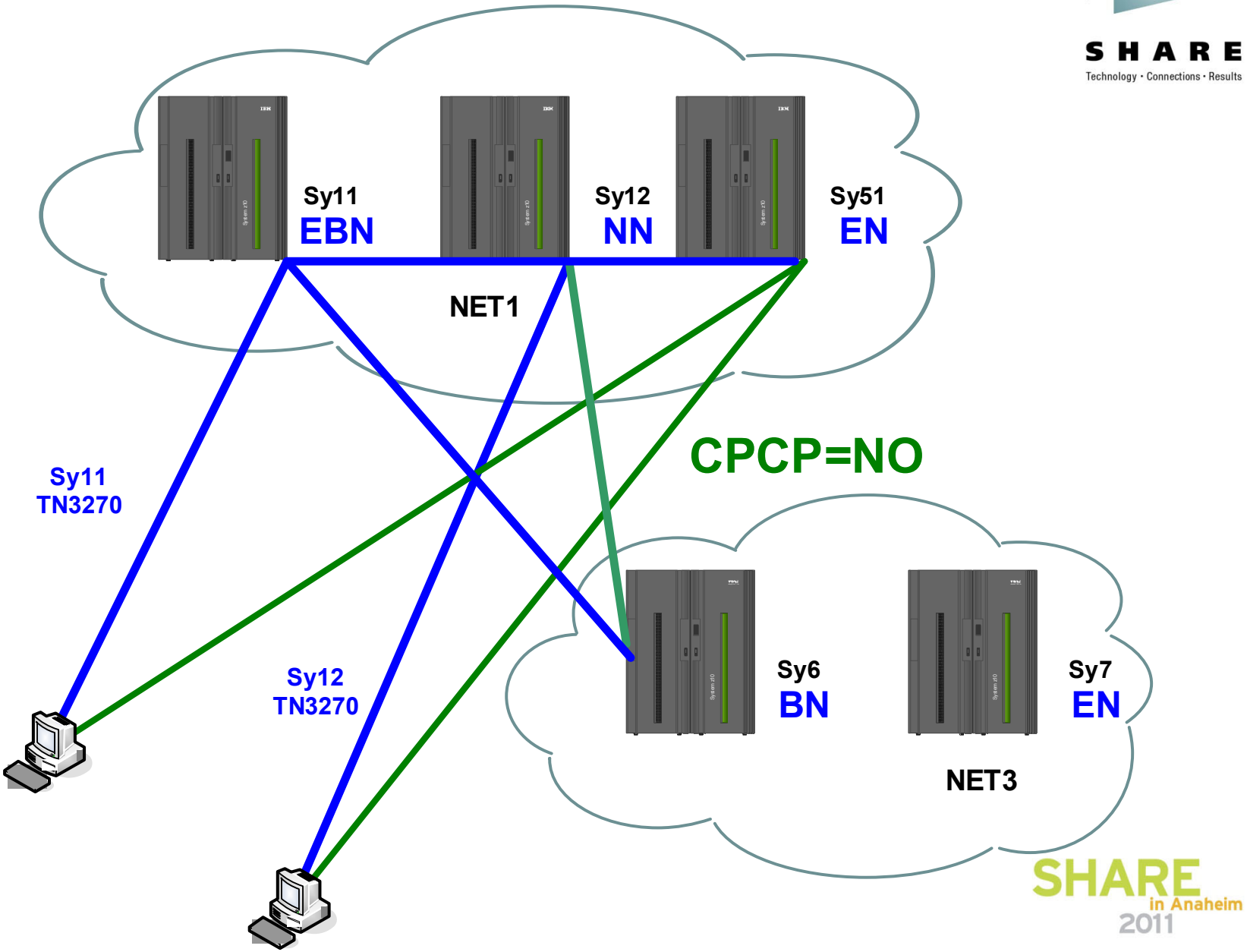
Border Node Becomes End Node



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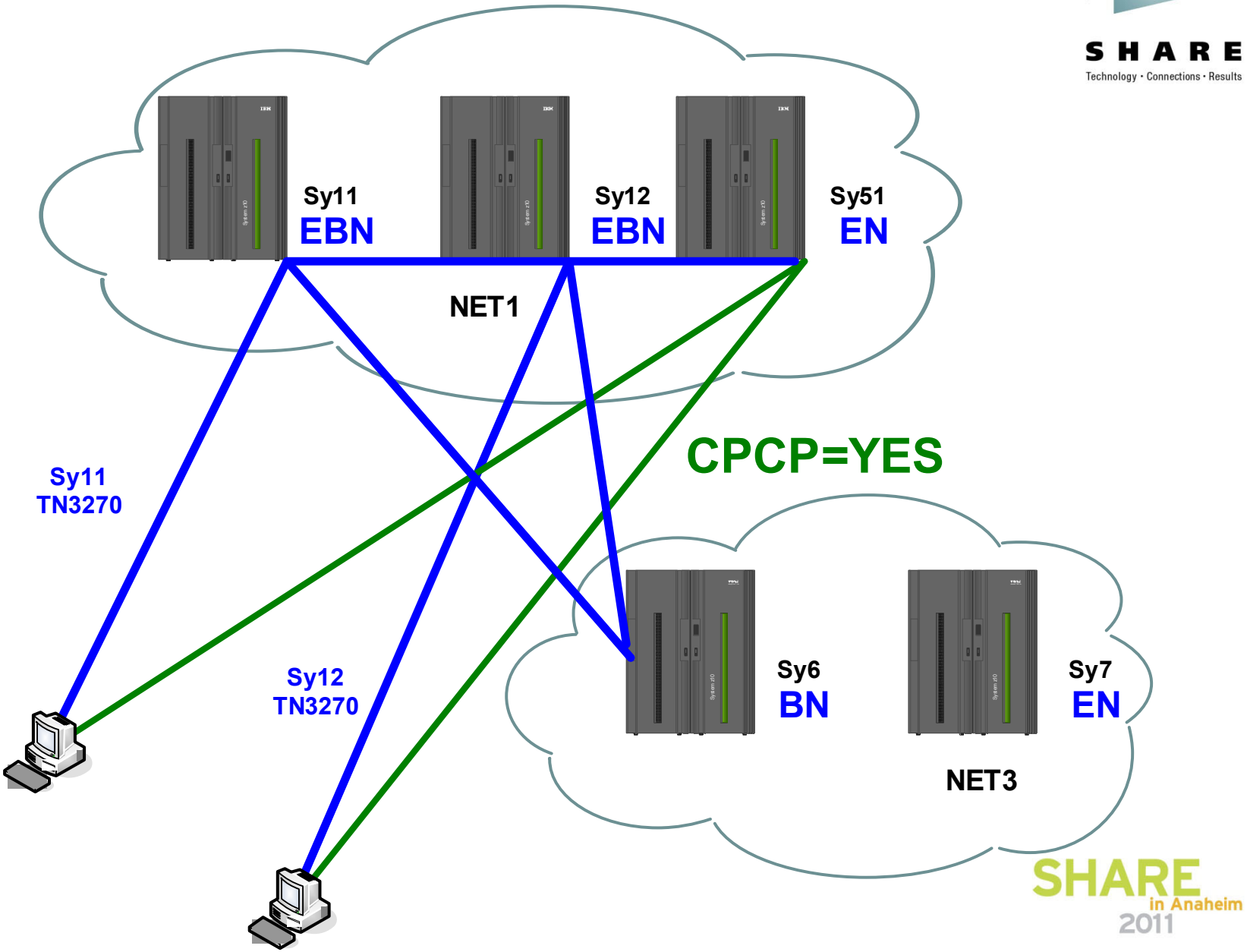
Border Node Becomes End Node



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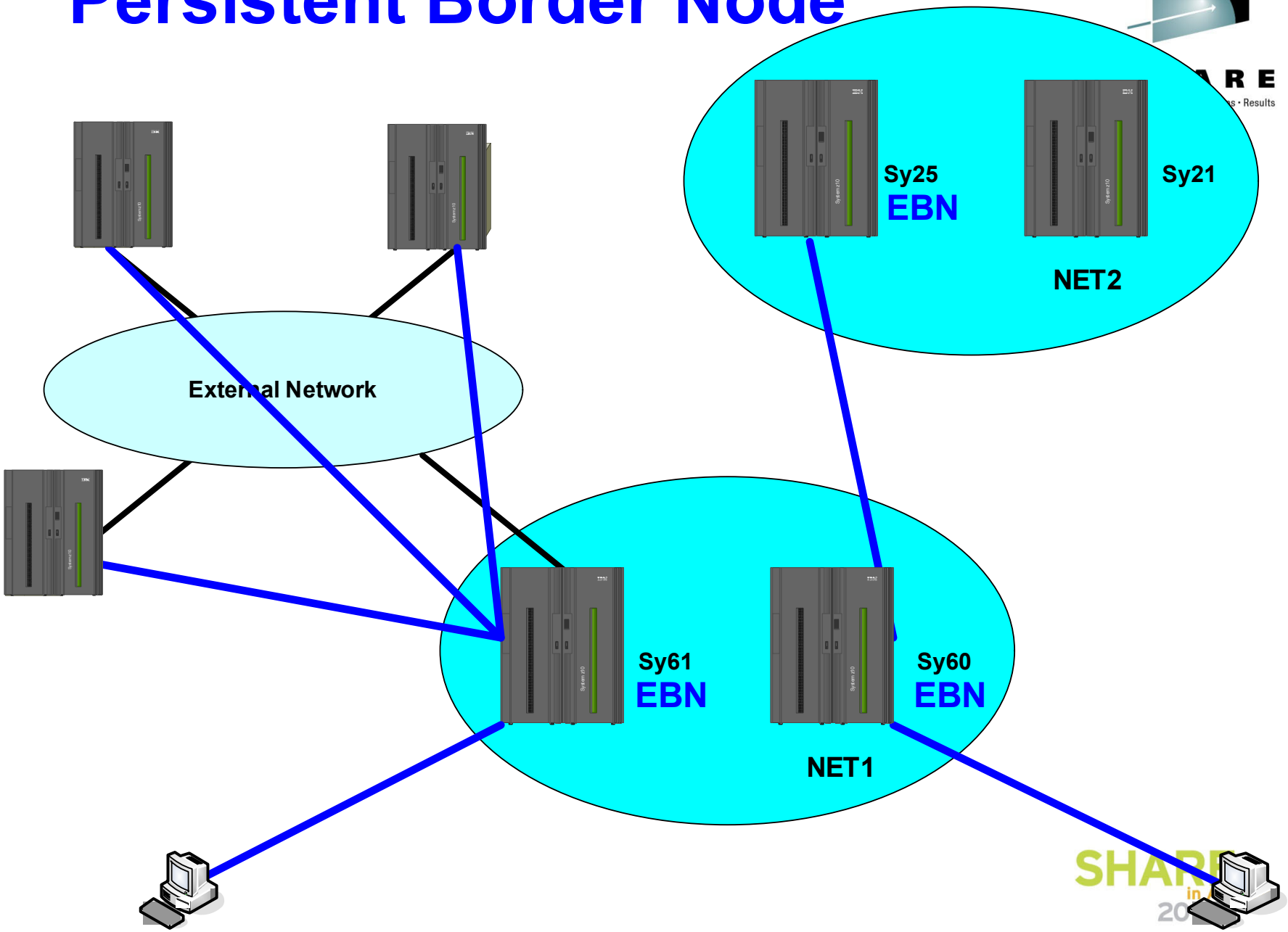
Search Failure: EBN Link Inactivated
D NET,TOPO,LIST=BN


```
*       D NET,TOPO,LIST=BN
IST350I  DISPLAY TYPE = TOPOLOGY
IST1308I  RESOURCE WAS NOT FOUND IN THE TOPOLOGY DATABASE
```

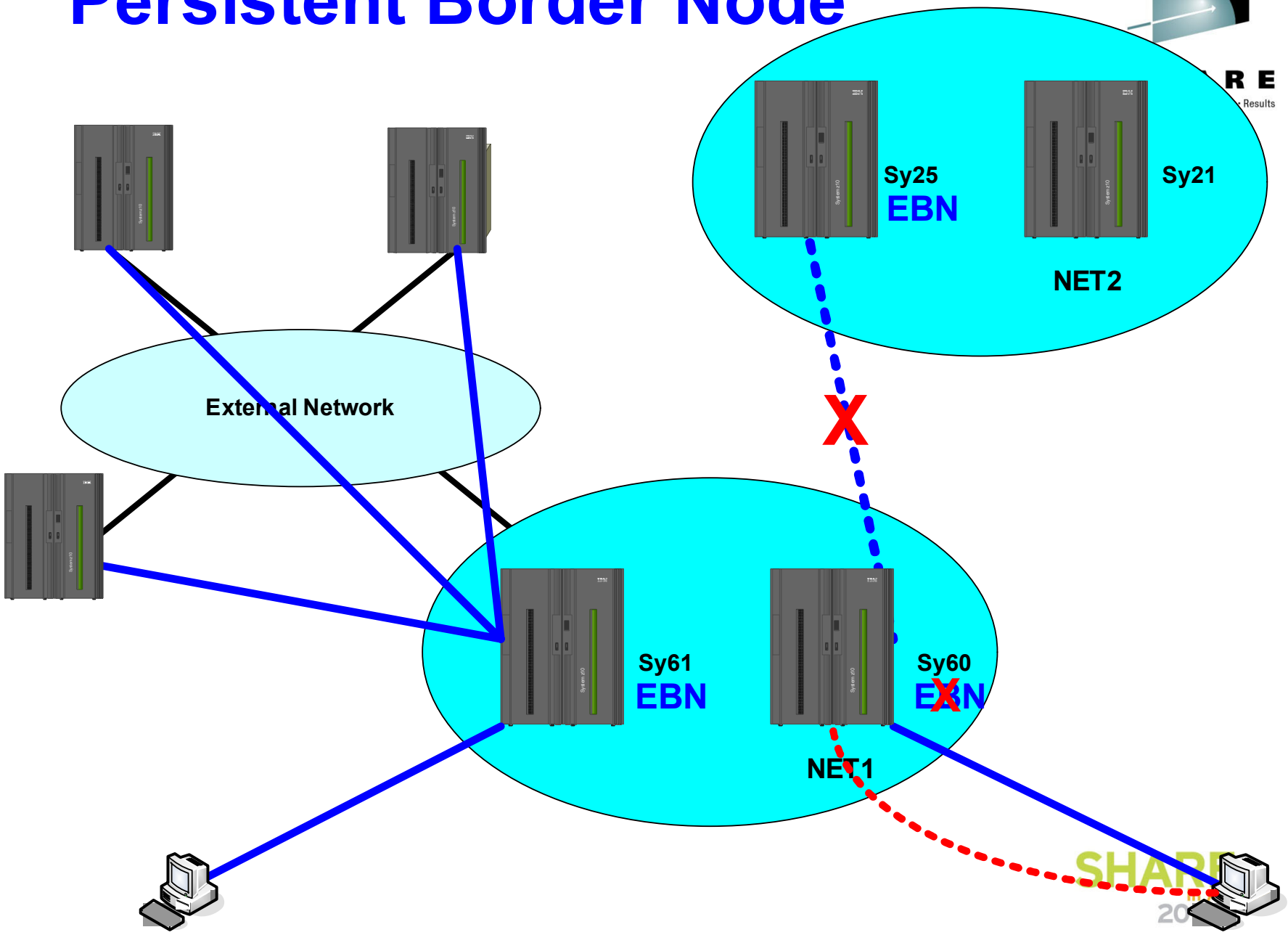
```
VARY NET,ACT,ID=LSNF2560
IST1132I  LSNF2560          IS ACTIVE, TYPE = LCL SNA MAJ NODE
IST1086I  APPN CONNECTION FOR SSANET1.N01CP012 IS ACTIVE - TGN = 21
IST1132I  LF025060          IS ACTIVE, TYPE = PU_T2.1
IST1096I  CP-CP SESSIONS WITH SSANET1.N01CP012 ACTIVATED

VARY NET,ACT,ID=LSNF2561
IST1132I  LSNF2561          IS ACTIVE, TYPE = LCL SNA MAJ NODE
IST1086I  APPN CONNECTION FOR SSANET1.N01CP002 IS ACTIVE - TGN = 21
IST1132I  LF025061          IS ACTIVE, TYPE = PU_T2.1
IST1096I  CP-CP SESSIONS WITH SSANET1.N01CP002 ACTIVATED
```

```
*       D NET,TOPO,LIST=BN
IST350I  DISPLAY TYPE = TOPOLOGY
IST1295I  CP NAME            NODETYPE ROUTERES CONGESTION  CP-CP WEIGHT
IST1296I  SSANET1.N01CP002 NN       160      NONE         YES    *NA*
IST1296I  SSANET1.N01CP012 NN       160      NONE         YES    *NA*
IST1296I  SSANET2.N02CP025 NN       160      NONE         *NA*   *NA*
IST314I  END
```

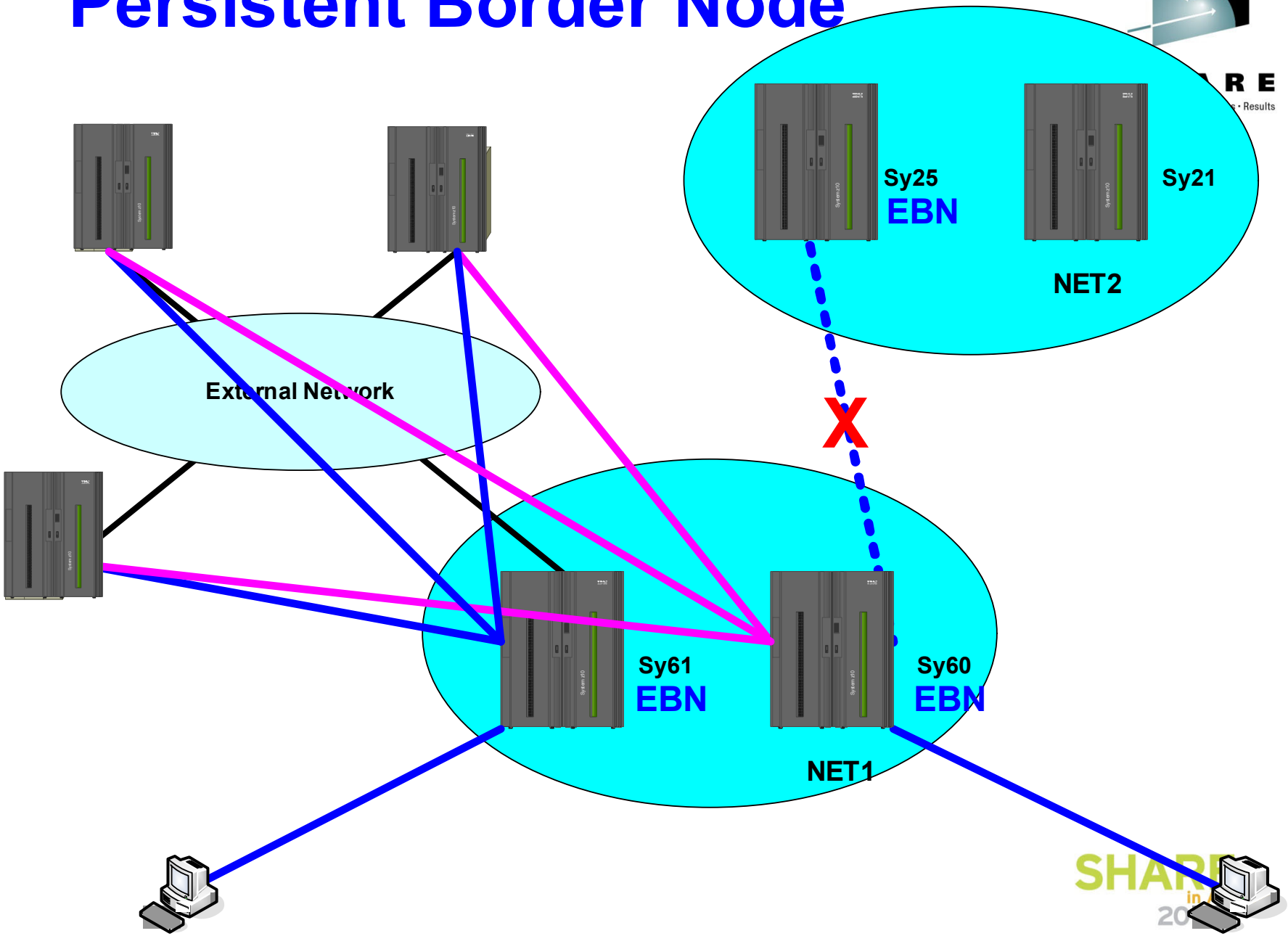
Persistent Border Node



Persistent Border Node



Persistent Border Node

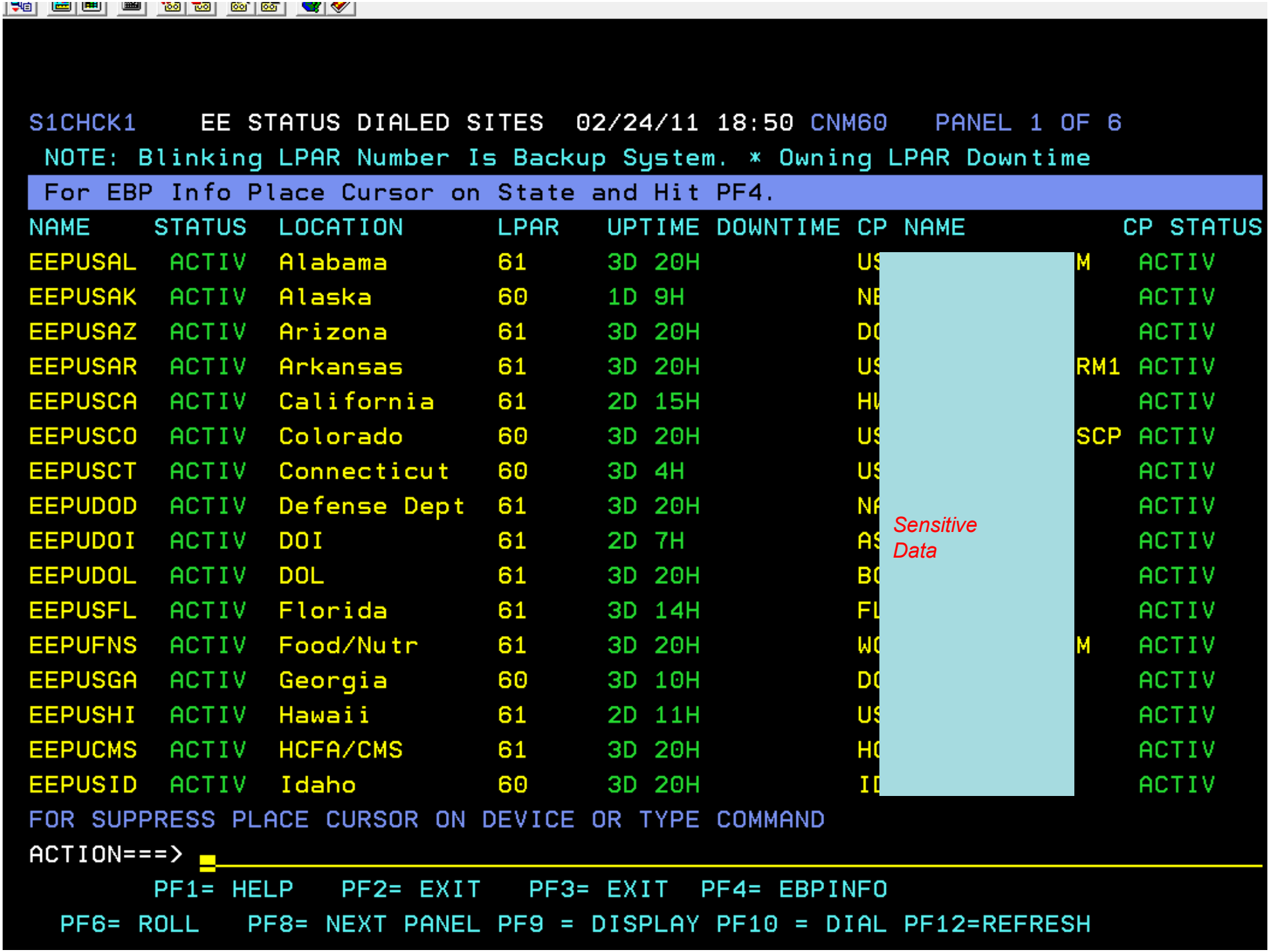


APPN CP-CP Session Design

- Ideal to FULLY Mesh NNs within "Same NETID"
  - CP-CP Sessions Between ALL NATIVE NN
    - Consistent APPN Topology in all NNs
    - Automatic Efficient APPN Routing
      - *Especially After the Weekend IPLs*
- Cross-Network (Non-Native) EBN
  - EBNs Full Mesh with CP-CP Sessions
  - Non-EBN to EBN MUST use CPCP=NO

Monitoring Enterprise Extender

- Traditional IP Monitors don't do UDP very well
  - Connectionless "connections" require special "monitor" consideration
  - Commercial Off-The-Shelf (*we wish) vs RYO*
- What to Monitor?
  - UP and DOWN Time (On Demand)
  - Path Switch (Daily Reporting)
  - REXMIT (Daily Reporting)
  - INOP (SNMP & e-Mail Alerts; Daily Reporting)
- What to Automate?
  - HANGUP when CP-CP mismatched
  - DIAL during delayed outage


S1CHCK1 EE STATUS DIALED SITES 02/24/11 18:50 CNM60 PANEL 1 OF 6
NOTE: Blinking LPAR Number Is Backup System. * Owning LPAR Downtime
For EBP Info Place Cursor on State and Hit PF4.
NAME STATUS LOCATION LPAR UPTIME DOWNTIME CP NAME CP STATUS
EEPUSAL ACTIV Alabama 61 3D 20H US M ACTIV
EEPUSAK ACTIV Alaska 60 1D 9H NE ACTIV
EEPUSAZ ACTIV Arizona 61 3D 20H DC ACTIV
EEPUSAR ACTIV Arkansas 61 3D 20H US RM1 ACTIV
EEPUSCA ACTIV California 61 2D 15H HW ACTIV
EEPUSCO ACTIV Colorado 60 3D 20H US SCP ACTIV
EEPUSCT ACTIV Connecticut 60 3D 4H US ACTIV
EEPUDOD ACTIV Defense Dept 61 3D 20H NA ACTIV
EEPUDOI ACTIV DOI 61 2D 7H AS ACTIV
EEPUDOL ACTIV DOL 61 3D 20H BC ACTIV
EEPUSFL ACTIV Florida 61 3D 14H FL ACTIV
EEPUFNS ACTIV Food/Nutr 61 3D 20H WC M ACTIV
EEPUSGA ACTIV Georgia 60 3D 10H DC ACTIV
EEPUSHI ACTIV Hawaii 61 2D 11H US ACTIV
EEPUCMS ACTIV HCFA/CMS 61 3D 20H HC ACTIV
EEPUSID ACTIV Idaho 60 3D 20H ID ACTIV
Sensitive Data
FOR SUPPRESS PLACE CURSOR ON DEVICE OR TYPE COMMAND
ACTION===>
PF1= HELP PF2= EXIT PF3= EXIT PF4= EBPINFO
PF6= ROLL PF8= NEXT PANEL PF9 = DISPLAY PF10 = DIAL PF12=REFRESH

D NET,ID=eepuname vs D NET,EE

```
* CNM61 D NET,ID=EEPUSAR
CNM61 IST097I DISPLAY ACCEPTED
' CNM61
IST097I DISPLAY ACCEPTED
IST075I NAME = EEPUSAR , TYPE = PU_T2.1
IST486I STATUS= ACTIV , DESIRED STATE= ACTIV
IST1043I CP NAME = ARCPNAME -CP NETID = ARNETID -DYNAMIC LU = YES
IST1589I XNETALS = YES
IST2238I DISCNT = NO -FINAL USE = *NA*
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I EEPUSAR AC/R 1 YES 984300000000000000000209100008080
IST1482I HPR = RTP -OVERRIDE = N/A -CONNECTION = YES
IST1510I LLERP = NOTPREF -RECEIVED = NOTALLOW
IST1680I LOCAL IP ADDRESS 10.1.2.3
IST1680I REMOTE IP ADDRESS 172.4.5.6
IST2114I LIVTIME: INITIAL = 25 MAXIMUM = 0 CURRENT = 25
IST136I SWITCHED SNA MAJOR NODE = SWEESAR
IST081I LINE NAME = E00000CD, LINE GROUP = XCAPRD1G, MAJNOD = XCASY61
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT , NODE REPORTED -YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST172I NO LOGICAL UNITS EXIST
IST314I END *
```

```
CNM61 D NET,EE,ID=EEPUSAR
CNM61 IST097I DISPLAY ACCEPTED '
CNM61 IST350I DISPLAY TYPE = EE
IST2001I ENTERPRISE EXTENDER CONNECTION INFORMATION
IST075I NAME = EEPUSAR , TYPE = PU_T2.1
IST1680I LOCAL IP ADDRESS 10.1.2.3
IST1680I REMOTE IP ADDRESS 172.4.5.6
IST2022I EE CONNECTION ACTIVATED ON 07/26/10 AT 00:43:41
IST2114I LIVTIME: INITIAL = 25 MAXIMUM = 0 CURRENT = 25
IST2023I CONNECTED TO LINE E00000CD
IST2025I LDLC SIGNALS RETRANSMITTED AT LEAST ONE TIME = 0
IST2026I LDLC SIGNALS RETRANSMITTED SRQRETRY TIMES = 0
IST2009I RTP PIPES = 4 LU-LU SESSIONS = 5
IST2027I DWINOP = NO REDIAL = *NA* REDDELAY = *NA*
IST2028I KEEPACT = YES
IST924I -------------------------------------------------
IST2035I TOTALS FOR ALL PORT PRIORITIES
IST2036I NLPS SENT = 277822 ( 277K )
IST2037I BYTES SENT = 174854692 ( 174M )
IST2038I NLPS RETRANSMITTED = 0 ( 000K )
IST2039I BYTES RETRANSMITTED = 0 ( 000K )
IST2040I NLPS RECEIVED = 235229 ( 235K )
IST2041I BYTES RECEIVED = 52373294 ( 052M ) IST314I END
```

What's the Manual Say for NQNMODE?

- **2.4.3 Rules for multiple definition of resources**
  - Table 8
- **2.4.3.2 NQNMODE values after a merge of resource definitions**
  NQNMODE values after merges of resources are explained in the following tables:
  - Table 10 -13

- **Table 10.** Resource types for NQNMODE merges. This table shows the resource types that are involved in the merge. Information includes whether the resource has sessions, and the current value of NQNMODE. NQNMODE must be either NAME or ***NQNAME.***
- **Table 11**. Matrix for NQNMODE merges, part 1. In this table, input resources 1-5 are read left to right across the top of the five columns. The existing resources are read top to bottom, in the far left column. Letters and numbers at the intersection of a particular input resource with an existing resource are explained in Table 13.
- **Table 12**. Matrix for NQNMODE merges, part 2. In this table, input resources are read left to right 6-10 across the top of the five columns. The existing resources are read top to bottom, in the far left column. Letters and numbers at the intersection of a particular input resource with an existing resource are explained in Table 13.
- **Table 13**. Notes for NQNMODE merges tables. This table explains the letters and numbers seen in Table 11 and Table 12.

NQNMODE Recommendations

- Code Start Option with
  - NQNMODE=NAME
- Code ONLY “duplicates” with
  - NQNMODE=NQNAME
- Use CORRECT NETID
  - Sense 0888 0009
  - Sense 0888 0006

VTAM Hint: Sense code 0888000n may be issued when an attempt to establish a session fails in an intermediate VTAM along the session setup path. This error may occur because the intermediate VTAM that set the sense code is operating with NQNMODE=NAME or is a pre-V4 VTAM.

Start Option: NQNMODE=NAME

```
CDRSCSNI VBUILD TYPE=CDRSC
*
*********************************************
* STATE 1 AND STATE 2 BOTH DEFINE GATEWAY
*********************************************
         NETWORK NETID=NETWORK1
GATEWAY1 CDRSC NQNMODE=NQNAME
         NETWORK NETID=NETWORK2
GATEWAY1 CDRSC NQNMODE=NQNAME
*********************************************
* STATE 3 AND STATE 4 BOTH DEFINE CICS
*********************************************
         NETWORK NETID=NETWORK3
CICS      CDRSC NQNMODE=NQNAME
        NETWORK NETID=NETWORK4
CICS      CDRSC NQNMODE=NQNAME,CPNAME=NETWORK4.SYS04
```

Change the intermediate domain to operate with NQNMODE=NQNAME to **allow definition of multiple resources with the same name and different network identifiers,** or reroute the session through another path.

What's New with Grasshopper?

- VTAM Options to Explore
  - EE Health Checker
    - EEVERIFY=ACTIVATE
  - EEPORTCK=NO

- IPv6
  - Tested SNA Switch
    - Migration Date? TBD
  - Websphere App Request

OMPROUTE Impact on EE

- Main Issue with OMPROUTE Losing Neighbor Relation
  - No Actual Network Interruptions
  - **Missing OSPF Hello**
    - **Interstate Open – But On RAMPS Closed**
    - EE RTPs Get Backed Up
- OMPROUTE does NOT get dispatched by z/OS

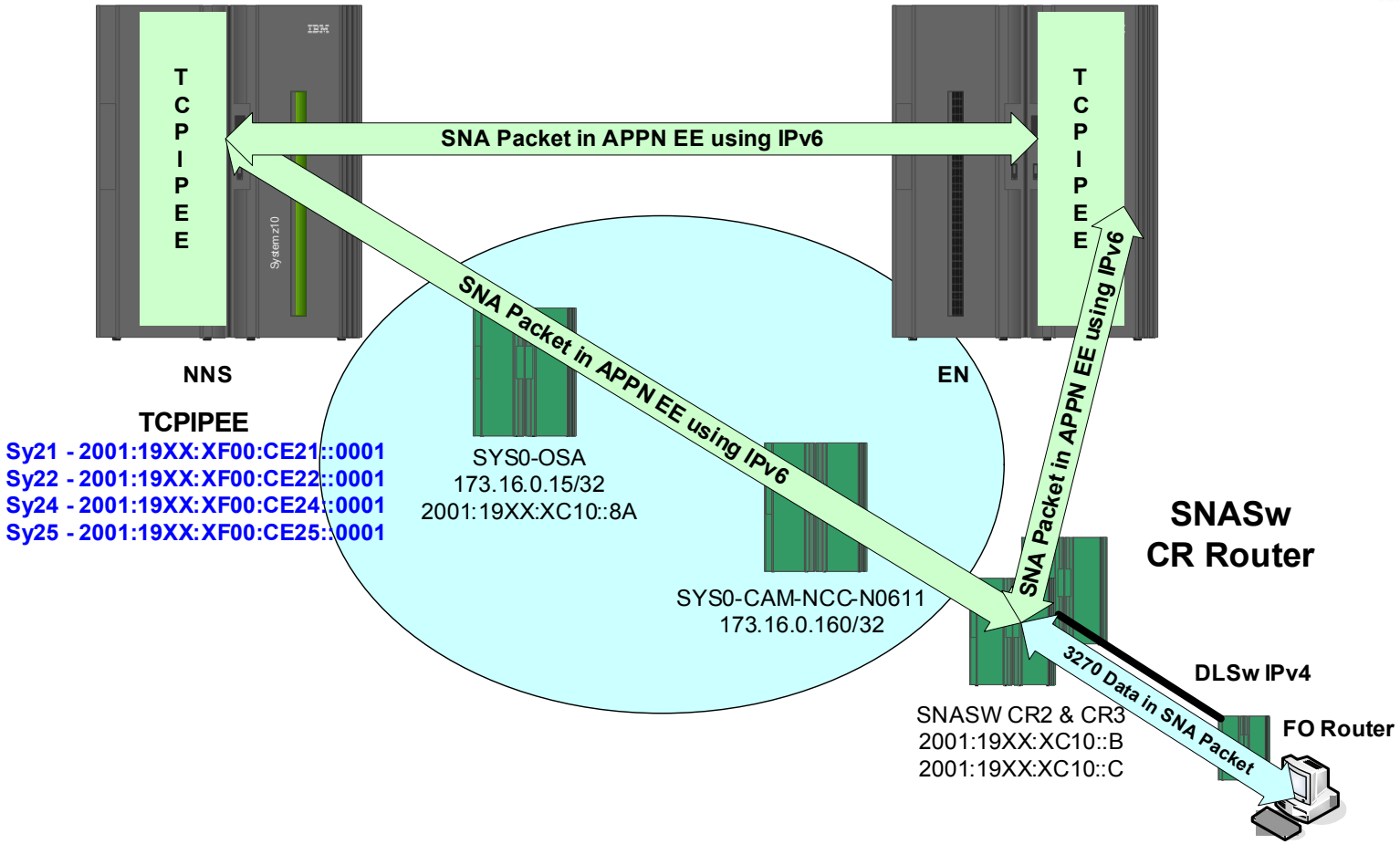
- OMPROUTE **Service Class**
  - Set ONE Below TCPIP and ONE Above Every Other Application

- Newer Option
  - OMPROUTE_OPTIONS=**hello_hi**

IPv6 and The Mainframe

- Dual Stack Implementation – Concurrent IPv4 & IPv6
  - Update the Current TCPIP Stack with IPv6 Address
- SSA Has Successfully Tested IPv6 for Enterprise Extender
  - EE – Z/OS Mainframe to Z/OS Mainframe
  - EE – Z/OS Mainframe to Cisco SNASw
- IPv6 Address Space Allocation / Subdivision
  - SSA Has a /32 IPv6 Space
- Challenge
  - SSA Decided to Allocate /48 To Each Mainframe Sysplex
    - Flexibility to Move the Sysplex Between Data Centers
    - When the Sysplex Moves the IPv6 Address Space Moves

Test Network
Phase I Mainframe Testing
EE from SNASw Router to Mainframe



SNA Switch Configuration

snasw pdlog exception buffer-size 8000 file ftp://172.3.4.5/SNA-BABI1.pdlga
snasw dlctrace buffer-size 8000 file ftp://172.3.4.5/SNA-BABI1.dlctrac
snasw rtp pathswitch-timers 480 240 180 180
snasw cpname SSANETID.SNABABI max-pacing-window 7 station-segmentation
snasw dlus SSANETID.SSACPNM1 backup SSSANETID.SSACPNM3 prefer-active
retry 15 10
snasw port EEPORT hpr-ip Loopback0 vnname SSANETID.SSACNEE no-limres
ldlc 25 15 7
snasw port PORT0001 vdlc 4091 mac 4000.1000.0001 conntype nohpr nns-required
max-links 5000 maxbtu 1416
snasw link CNM1TG1 port EEPORT ip-dest 'primary IP' nns
snasw link CNM3TG1 port EEPORT ip-dest 'backup IP' nns
snasw link CNM2TG1 port EEPORT ip-dest 'alternate IP'

IPv6 Coding
Cisco SNA Switch


```
;  DEVICE/LINK definitions
; XCA
DEVICE IUTSAMEH MPCPTP AUTORESTART
LINK   SAMEHLNK MPCPTP IUTSAMEH
; OSA Devices
DEVICE OSA0&SSAHRDID&SSAPLEX2 MPCIPA NONROUTER
AUTORESTART
LINK   OSA21LK00  IPAQENET OSA0&SSAHRDID&SSAPLEX2
;  VIPAs for SY21
DEVICE DEV49    VIRTUAL 0
LINK   VLINK49  VIRTUAL 0 DEV49
DEVICE DEV69    VIRTUAL 0
LINK   VLINK69  VIRTUAL 0 DEV69
HOME
   13.0.27.49     VLINK49     ; VIPA
   13.0.27.69     VLINK69     ; VIPA
   13.0.27.110    OSA21LK00   ; OSA0

INTERFACE VIPA21V6EE DEFINE VIRTUAL6
        IPADDR FEC0::CE21:0001
             2001:1930:7F00:CE21::0001

; XCA
INTERFACE SAMEHLNKV6 DEFINE MPCPTP6
        TRLENAME IUTSAMEH
; OSA Devices
INTERFACE OSA0INTV6EE DEFINE IPAQENET6
        PORTNAME OSA0&SSAHRDID&SSAPLEX2
        SOURCEVIPAINT VIPA21V6EE
        IPADDR FEC0::A000:EE21
             2001:1930:7F00:A000::EE21
        MTU 1500
; Start all the defined devices

 START IUTSAMEH              ;XCA
 START OSA0&SSAHRDID&SSAPLEX2  ;OSA0
 START SAMEHLNKV6             ;XCA (IPv6)
 START OSA0INTV6EE            ;OSA0 (IPv6)
```

```
XCASY21  VBUILD TYPE=XCA          EXTERNAL COMMUNICATIONS
ADAPTER
*
XCASY21R PORT MEDIUM=HPRIP,       EE/HPR CONNECTION
                                  - - - - -
XCADEV1S GROUP ANSWER=ON,         PU DIAL-IN CAPABILITY TO
VTAM
        HOSTNAME=SY21EEV6.SSA.GOV, HOSTNAME FOR IPV6 VIPA
        AUTOGEN=(16,IPV6,$), AUTO GEN LINES, NO PU'S
        CALL=INOUT,         IN/OUT CALLING CAPABILITY
        DIAL=YES,           SWITCHED LINE CONNECTION
        DYNPU=NO,           DO NOT ALLOCATE DYNAMIC PU'S
        KEEPACT=YES,        REACTIVATE LINE IF INOP OCCURS
        LIMRES=NO,          LINES NOT LIMITED RESOURCE
        ISTATUS=INACTIVE    INITIAL ACTIVATION STATUS
```

```
snasw rtp pathswitch-timers 480 240 180 120
snasw cpname SSANET2.SSZCR2
snasw port EEV6 hpr-ip Loopback3 hostname SYS0-SSZCR2 ipv6
snasw port EEV4GBL hpr-ip Loopback0 vnname SSAGVRN.SSAEEGCN ldlc 15 15 9
snasw port EEV4LCL hpr-ip Loopback1 vnname SSANET2.SSAEECN ldlc 15 15 9
snasw link SY21V6 port EEV6 host-dest sy21v6 nns tgp high
snasw link SY22V6 port EEV6 host-dest sy22v6 nns tgp high
snasw link SY24V6 port EEV6 host-dest sy24v6 nns tgp high
snasw link SY25V6 port EEV6 host-dest sy25v6 nns tgp high
snasw link SY21V4 port EEV4LCL ip-dest 13.0.27.49 nns tgp low
snasw link SY25V4 port EEV4LCL ip-dest 13.0.27.65 nns tgp low
```