



Duplicate MAC Address – Circuit Weighting

Sample Conversion from the IBM 3745 to
Communications Controller for Linux z/Series

Target Audience

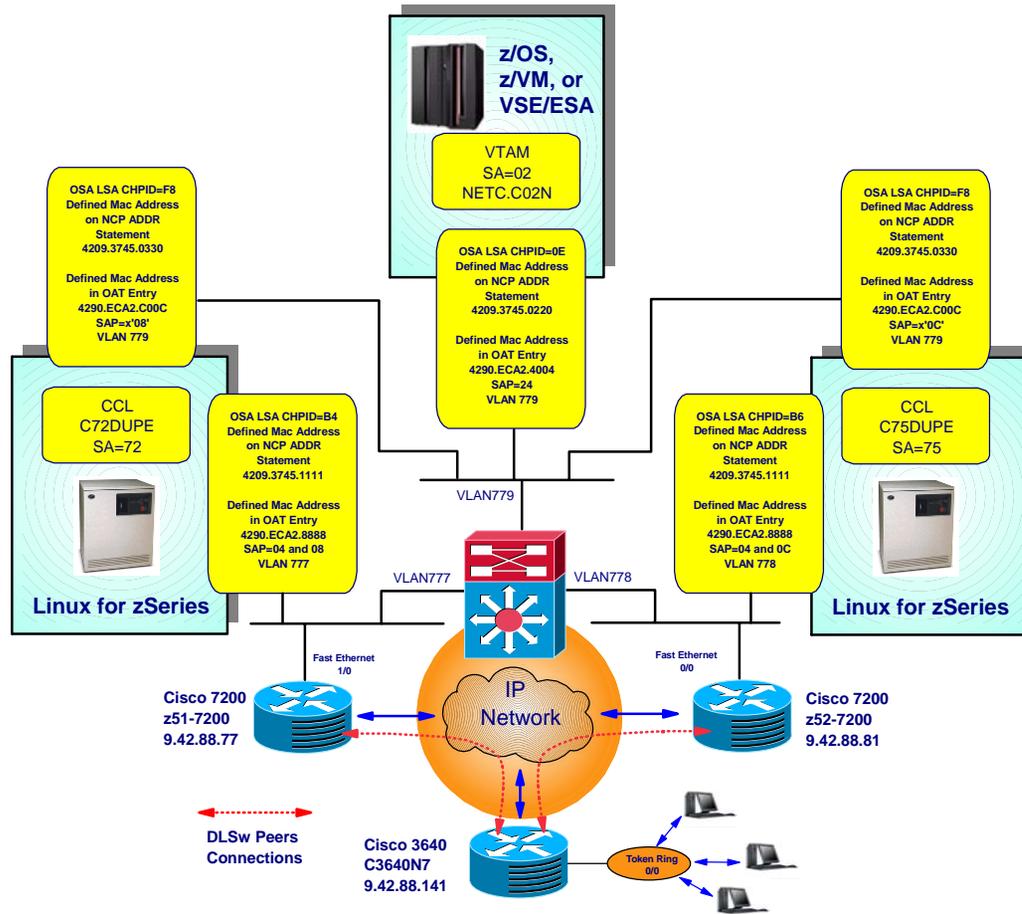
Customers currently using load balancing techniques with the 3745/3746-900s and will be replacing the FEP with Communication Controller for Linux z/Series V1R1.

Purpose of this Paper

The intent of this paper is to provide a tested solution for customers during the migration from 3745/3746-900 FEPs to Communication Controller for Linux z/Series (CCL). This document will provide working examples of the following:

- VTAM XCA Major Node – VTAM to CCL
- NCP Physical and Logical lines
 - NCP to VTAM
 - NCP BNN Devices
- DLSw Definitions for Routers

Test Configuration



Resources Used for Solution Verification

- One z/OS Communications Server
- Two Linux IDs running as guest under z/VM
 - 512mb of memory
 - 3 Virtual CPs
 - 2 3390-3 DASD volumes
- Four OSA Copper Ethernet OSA adapters
- Layer 2 or Layer 3 Ethernet Switch
- Layer 2 Token Ring Switch or hub
- Three Cisco IOS Routers
 - For testing purposes, we used Cisco 3600 and 7200 Series IOS Routers
 - Cisco Catalyst 6500 was configured with Cisco IOS software

Starting CCL from Linux

- From the Linux console, change to the CCL directory:
 - `cd /opt/ibm/Communication_Controller_for_Linux/`

- Load the CCL kernel module
 - `./load_ndh.sh`
 - You will receive the message :
NDH kernel modules loaded. You are now able to run the cclengine

- Start the CCL engine
 - `nohup ./cclengine -mC72DUPE -p2072 SVTC72 &`
 - `nohup ./cclengine -mC75DUPE -p2075 SVTC75 &`
 - If you use telnet or ssh into the Linux host you will want to preface the command with “nohup” so that the process will remain active even after the telnet/ssh session is terminated.

Activating XCA from NETC.C02N

- From NETC.C02N activate the XCA major node

```
v net,act,id=c02xcadt,all
IST093I C02XCADT ACTIVE
IST464I LINK STATION C02ETHPB HAS CONTACTED C75DUPE SA 75
IST093I C02ETHPB ACTIVE
IST464I LINK STATION C02ETHPA HAS CONTACTED C72DUPE SA 72
IST093I C02ETHPA ACTIVE
```

Activating NCP from NETC.C02N

- From NETC.C02N activate the NCP C72DUPE

```
v net,act,id=c72dupe,all
IST093I C72DUPE ACTIVE
IST093I C72PU88A ACTIVE
IST464I LINK STATION C72PG2A HAS CONTACTED C02NPU SA 2
IST093I C72PG2A ACTIVE
```

- From NETC.C02N activate the NCP C75DUPE

```
v net,act,id=c75dupe,all
IST093I C75DUPE ACTIVE
IST093I C75PU88A ACTIVE
IST464I LINK STATION C75PG2A HAS CONTACTED C02NPU SA 2
IST093I C75PG2A ACTIVE
```

Displaying the XCA Major Node - NETC.C02N

- Display the XCA major node

```
D NET, ID=C02XCADT, E
IST097I DISPLAY ACCEPTED
IST075I NAME = C02XCADT, TYPE = XCA MAJOR NODE 589
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1021I MEDIUM=CSMA/CD, ADAPNO= 0, CUA=2EEA, SNA SAP= 24
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST170I LINES:
IST232I C02ETHLA ACTIV----E
IST232I C02ETHLB ACTIV----E
IST314I END
```

Displaying the XCA Major Node - NETC.C02N

- Display the XCA Lines

```
D NET, ID=C02ETHLA, E
IST097I DISPLAY ACCEPTED
IST075I NAME = C02ETHLA, TYPE = LINE 592
IST486I STATUS= ACTIV----E, DESIRED STATE= ACTIV
IST087I TYPE = LEASED, CONTROL = SDLC, HPDT = *NA*
IST134I GROUP = C02GRPA, MAJOR NODE = C02XCADT
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST396I LNKSTA STATUS CTG GTG ADJNODE ADJSA NETID ADJLS
IST397I C02ETHPA ACTIV--W-E 1 1 C72DUPE 72 NETC
IST314I END
```

```
D NET, ID=C02ETHLB, E
IST097I DISPLAY ACCEPTED
IST075I NAME = C02ETHLB, TYPE = LINE 600
IST486I STATUS= ACTIV----E, DESIRED STATE= ACTIV
IST087I TYPE = LEASED, CONTROL = SDLC, HPDT = *NA*
IST134I GROUP = C02GRPA, MAJOR NODE = C02XCADT
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST396I LNKSTA STATUS CTG GTG ADJNODE ADJSA NETID ADJLS
IST397I C02ETHPB ACTIV--W-E 1 1 C75DUPE 75 NETC
IST314I END
```

BNN Devices Connecting into VTAM

- From the BNN device, establish the connection to VTAM. In our case, we used TPNS to simulate boundary devices.
- The weighting of circuits was defined on the branch router so that 14 connections went to CCL C72DUPE and 6 connections went to C75DUPE. The J0028 lines belong to C72 and J002B belong to C75. A count of the connections show the connections load balanced as defined. Display of the J-Lines are on the following page.
- Once the CONNECTIN is received at the VTAM console, the LUs downstream will receive the USS10 message and the user will be able to logon to the application.

BNN Devices Connecting into VTAM

- Load balanced J-Lines

```
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3101 ON LINE J002B169
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3101 ON LINE J0028169
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3101 ON LINE J002816B
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3101 ON LINE J002816F
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3101 ON LINE J002B16B
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3101 ON LINE J002816D
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3102 ON LINE J0028171
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3104 ON LINE J0028173
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3103 ON LINE J002B18B
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3105 ON LINE J0028175
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3106 ON LINE J002B181
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3107 ON LINE J0028177
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3108 ON LINE J0028179
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3109 ON LINE J002817B
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3110 ON LINE J002B16F
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3111 ON LINE J002817F
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3112 ON LINE J002818F
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3113 ON LINE J002B173
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3114 ON LINE J0028181
IST590I  CONNECTIN  ESTABLISHED FOR PU NTPU3115 ON LINE J002818B
```

C02XCADT – XCA Major Node Definitions

C02XCADT VBUILD TYPE=XCA

*

C02PRTA PORT MEDIUM=CSMACD,ADAPNO=0,SAPADDR=24,CUADDR=2EEA,
TIMER=100

*

C02GRPA GROUP DIAL=NO,ISTATUS=ACTIVE

*

C02ETHLA LINE USER=SNA,ISTATUS=ACTIVE

C02ETHPA PU MACADDR=4290ECA2C00C,PUTYPE=5,SUBAREA=72,TGN=1,
SAPADDR=08,ALLOWACT=YES

*

*

C02ETHLB LINE USER=SNA,ISTATUS=ACTIVE

C02ETHPB PU MACADDR=4290ECA2C00C,PUTYPE=5,SUBAREA=75,TGN=1,
SAPADDR=12,ALLOWACT=YES

*

C72DUPE – NTRI Physical Line Definitions

```

*****
* Physical NTRI Lines
*****
*
C72PTRG1 GROUP ECLTYPE=(PHY,ANY),ADAPTER=TIC2,ANS=CONT,MAXTSL=16732, X
          RCVBUFC=32000,ISTATUS=ACTIVE,XID=NO, X
          RETRIES=(20,5,5)
*
*-----
* Physical Ethernet - DLSw BNN and INN
*-----
*
C72TR88  LINE  ADDRESS=(1088,FULL),TRSPEED=16,PORTADD=88, X
          LOCADD=420937451111
C72PU88A PU
*
*-----
* Physical Ethernet - Connection to VTAM
*-----
*
C72TR89  LINE  ADDRESS=(1089,FULL),TRSPEED=16,PORTADD=89, X
          LOCADD=420937450330
C72PU89A PU
*

```

C72DUPE – NTRI Logical Line – INN and BNN

```

*****
*      NTRI BNN LOGICAL LINES FOR TOKEN RING PORT 1088      *
*****
*
C72BNNG1 GROUP ECLTYPE=LOGICAL,ANS=CONTINUE,AUTOGEN=200,CALL=INOUT,      X
              ISTATUS=ACTIVE,PHYSRSC=C72PU88A,                          X
              RETRIES=(10,10,10,20),XMITDLY=NONE
*
*****
*      NTRI INN LOGICAL LINES FOR TOKEN RING PORT 1089      *
*****
*
C72INNG1 GROUP ECLTYPE=(LOGICAL,SUBAREA),ANS=CONT,PHYSRSC=C72PU89A,      X
              LOCALTO=13.5,REMOTTO=18.2,T2TIMER=(0.2,0.2,3),           X
              ISTATUS=ACTIVE,SDLCST=(C72PRI,C72SEC),MONLINK=CONT
*
*-----
* Linkstation to VTAM NETC.C02N
*-----
*
C72LG2A  LINE  TGN=1,TGCONF=SINGLE
C72PG2A  PU    ADDR=18420937450220,SSAP=(08,H)

```

C75DUPE – NTRI Physical Line Definitions

```

*****
* Physical NTRI Lines
*****
*
C75PTRG1 GROUP ECLTYPE=(PHY,ANY),ADAPTER=TIC2,ANS=CONT,MAXTSL=16732, X
          RCVBUFC=32000,ISTATUS=ACTIVE,XID=NO, X
          RETRIES=(20,5,5)
*
*-----
* Physical Ethernet - DLSw BNN and INN
*-----
*
C75TR92  LINE  ADDRESS=(1092,FULL),TRSPEED=16,PORTADD=92, X
          LOCADD=420937451111
C75PU92A PU
*
*-----
* Physical Ethernet - Connection to VTAM
*-----
*
C75TR93  LINE  ADDRESS=(1093,FULL),TRSPEED=16,PORTADD=93, X
          LOCADD=420937450330
C75PU93A PU
*

```

C75DUPE – NTRI Logical Lines – INN and BNN

```

*****
*      NTRI BNN LOGICAL LINES FOR TOKEN RING PORT 1092      *
*****
*
C75BNNG1 GROUP ECLTYPE=LOGICAL,ANS=CONTINUE,AUTOGEN=200,CALL=INOUT,      X
              ISTATUS=ACTIVE,PHYSRSC=C75PU92A,                          X
              RETRIES=(10,10,10,20),XMITDLY=NONE
*
*****
*      NTRI INN LOGICAL LINES FOR TOKEN RING PORT 1093      *
*****
*
C75INNG1 GROUP ECLTYPE=(LOGICAL,SUBAREA),ANS=CONT,PHYSRSC=C75PU92A,      X
              LOCALTO=13.5,REMOTTO=18.2,T2TIMER=(0.2,0.2,3),          X
              ISTATUS=ACTIVE,SDLCST=(C75PRI,C75SEC),MONLINK=CONT
*
*-----
* Linkstation to VTAM NETC.C02N
*-----
*
C75LG2A  LINE  TGN=1,TGCONF=SINGLE
C75PG2A  PU    ADDR=18420937450220,SSAP=(0C,H)
*

```

Cisco Router Definition – z51-7200

```
dlsw local-peer peer-id 9.42.88.77 promiscuous
dlsw bridge-group 1
!
interface Loopback0
  description Loopback Interface
  ip address 9.42.88.77 255.255.255.252
  ip broadcast-address 0.0.0.0
  no ip route-cache
  no ip mroute-cache
end
!
interface FastEthernet1/0
  description DSLw Connection to CCL C72DUPE - Load Balancing
  no ip address
  no ip route-cache
  duplex full
  bridge-group 1
end
!
bridge 1 protocol ieee
```

Cisco Router Definition – z52-7200

```
dlsw local-peer peer-id 9.42.88.81 promiscuous
dlsw bridge-group 1
!
interface Loopback0
  description Loopback Interface
  ip address 9.42.88.81 255.255.255.252
  ip broadcast-address 0.0.0.0
  no ip route-cache
  no ip mroute-cache
end
!
interface FastEthernet1/0
  description DSLw Connection to CCL C75DUPE - Load Balancing
  no ip address
  no ip route-cache
  duplex full
  bridge-group 1
end
!
bridge 1 protocol ieee
```

Cisco Router Definition – C3640N7

```
source-bridge ring-group 2000
dlsw local-peer peer-id 9.42.88.141
dlsw remote-peer 0 tcp 9.42.88.77
dlsw remote-peer 0 tcp 9.42.88.81
dlsw timer explorer-wait-time 100
dlsw load-balance circuit-count
dlsw remote-peer 0 tcp 9.42.88.77 circuit-weight 14
dlsw remote-peer 0 tcp 9.42.88.81 circuit-weight 6
!
!
interface Loopback0
  description Loopback Interface
  ip address 9.42.88.141 255.255.255.252
end
!
interface TokenRing0/0
  description DLSw Token Ring Port for TPNS Traffic
  mac-address 4000.3640.0700
  no ip address
  ring-speed 16
  no cdp enable
  source-bridge 500 1 2000
  source-bridge spanning
```

Cisco Switch Definition – NIVT6500

```
interface FastEthernet4/1
  description Connection to Z51 FastEthernet 1/0
  duplex full
  speed 100
  switchport
  switchport access vlan 777
  switchport mode access
end
!
interface FastEthernet4/2
  description Connection to Z52 FastEthernet 0/0
  duplex full
  speed 100
  switchport
  switchport access vlan 778
  switchport mode access
end
!
```

Cisco Switch Definition – NIVT6500

```
interface FastEthernet4/3
  description OSA Fast Ethernet - CHPID=B4 - C72DUPE
  duplex full
  speed 100
  switchport
  switchport access vlan 777
  switchport mode access
end
!
interface FastEthernet4/4
  description OSA Fast Ethernet - CHPID=B6 - C75DUPE
  duplex full
  speed 100
  switchport
  switchport access vlan 778
  switchport mode access
end
!
```

Cisco Router Definition – NIVT6500

```
interface FastEthernet4/5
description OSA Fast Ethernet CHPID 0E - LSA Connection for VTAM
duplex full
speed 100
switchport
switchport access vlan 779
switchport mode access
end
!
interface FastEthernet4/6
description OSA Fast Ethernet - CHPID F8 - Shared LCS Connection
duplex full
speed 100
switchport
switchport access vlan 779
switchport mode access
end
```

Cisco Router Definition – NIVT6500

```
interface Vlan777
  description VLAN for C72 to Router Z51-7200
  no ip address
End
!
interface Vlan778
  description VLAN for C75 to Router Z52-7200
  no ip address
End
!
interface Vlan779
  description VLAN for VTAM C02N to CCL C72 and C75
  no ip address
end
!
```