Honeywell

Use Multiple NIMs

L5693
UCN

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Figures and Tables

Acronyms

APM..... Advanced Process Manager
APMM..... Advanced Process Manager Module
EIP..... Event Initiated Processing
HM.....History Module
IOP ..... Input Output Processor
LCN .....Local Control Network
LM ..... Logic Manager
NCF .....Network Configuration File
NIM ..... Network Interface Module
PM..... Process Manager
PMM ..... Process Manager Module
TDC ..... Total Distributed Control
UCN.....Universal Control Network
US ..... Universal Station

Parameters

NODEASSN..... Node Assignment

References

Publication Title	Publication Number	Binder Title	Binder Number
For R5xx :			
Universal Control Network Guidelines	UN20-500	Installation/Universal Control Network	TDC 3041
HPM Implementation Guidelines	HP12-500	Implementation/HPM-1	TDC 3066-1
APM Implementation Guidelines	AP12-500	Implementation/APM-1	TDC 3042-1
PM Implementation Guidelines	PM12-500	Implementation/PM-1	TDC 3040-1
For R4xx:			
UCN Guidelines	UN20-400	Installation/UCN	TDC 2041
APM Implementation Guidelines	AP12-400	Implementation/APM	TDC 2042-1
PM Implementation Guidelines	PM12-400	Implementation/PM	TDC 2040-1

Introduction

Module Overview

About this module

This course module discusses using multiple NIMs on the same physical UCN. This type of configuration results in more than one logical UCN. Clarifying concepts, such as logical UCNs, helps you understand the decisions and procedures you need to follow when using multiple NIMs on one physical UCN.

Objectives

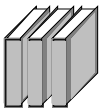
The objectives of this course module are to

- Configure multiple NIMs.
- Discuss alarm management and checkpointing considerations.
- Use peer-to-peer communication on logical UCNs.

Sample test items

This course module's Criterion Test includes the following items:

- Configure a system using multiple NIMs.
- Use UCN Status displays for a system defined with two logical UCNs on the same physical UCN.



REFERENCE—For more information about when and how to configure multiple NIMs, you can refer at a later time to Section 4 in the *HPM, APM, or PM Implementation Guidelines manual.*

Terms to know

Some terms to become familiar with when adding an extra NIM or NIM pair to the same physical UCN process network are

- physical UCN (the actual network topology),
- logical UCN (the process network definition in the TDC system),
- remote NIM (an extra NIM on a UCN network).

These terms are discussed further in this course module.

Assumptions

This course module assumes that when multiple NIMs are added to the same physical UCN, they are added as redundant NIM pairs. In practice, you may find nonredundant NIMs assigned to the same physical UCN. As you review this course module, note that references to NIM pairs also apply to nonredundant NIMs.

Logical UCN Concepts

Physical UCN Definition

Introduction

Multiple NIMs on the same physical UCN are sometimes used for the following reasons:

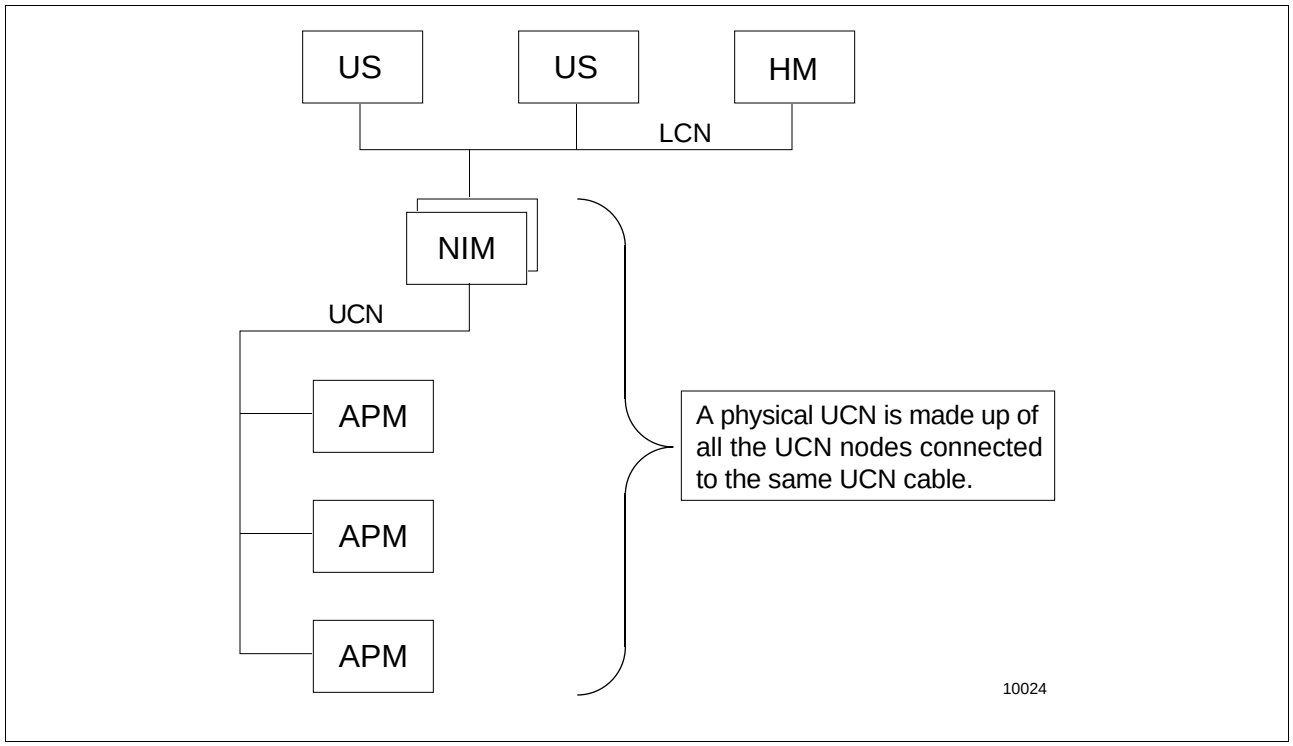
- To get additional parameter throughput.
- To share processing load. Because processing load is being shared, some users take a further step of organizing the process-connected devices according to process control functions, such as boiler control functions (Figure 4).

When an extra NIM is added to the same physical UCN, another process network (logical UCN) is established.

Definition

Before discussing multiple NIMs, first consider what is meant by the terms "physical UCN." In the following example system, all the UCN nodes connected to the same coaxial cable (same transmission media) make up a physical UCN. *Thus, a physical UCN could be described as a process network of UCN nodes connected to the same coaxial cable.*

Figure 1 Physical UCN Definition



UCN Configuration Review

Background

The following discussion reviews UCN configuration; you may find it helpful to refer to Figure 2. UCN configuration results in a physical UCN being defined as a logical UCN in the TDC system.

Configuration review

To configure the physical UCN from the TDC system, recall that the steps are:

- Configure the NIM pair to appear as an LCN node pair during NCF configuration. During this step you assign a process network number to the NIM pair.
- Assign all the UCN nodes on the physical network to the process network during NIM configuration. During this step all nodes connected to the same UCN cable are assigned to a NIM pair.

The result is that one physical UCN process network becomes defined in the TDC system as one logical UCN process network.

Distinction is usually unimportant

In cases where the UCN has one NIM pair, the distinction between the terms “physical” and “logical” networks is of no concern to most users, because they represent the same network; however, when more than one NIM pair is assigned to a physical UCN, the distinction becomes important to understand. In order to understand this distinction, consider what occurs when a second NIM pair is added to a physical UCN.

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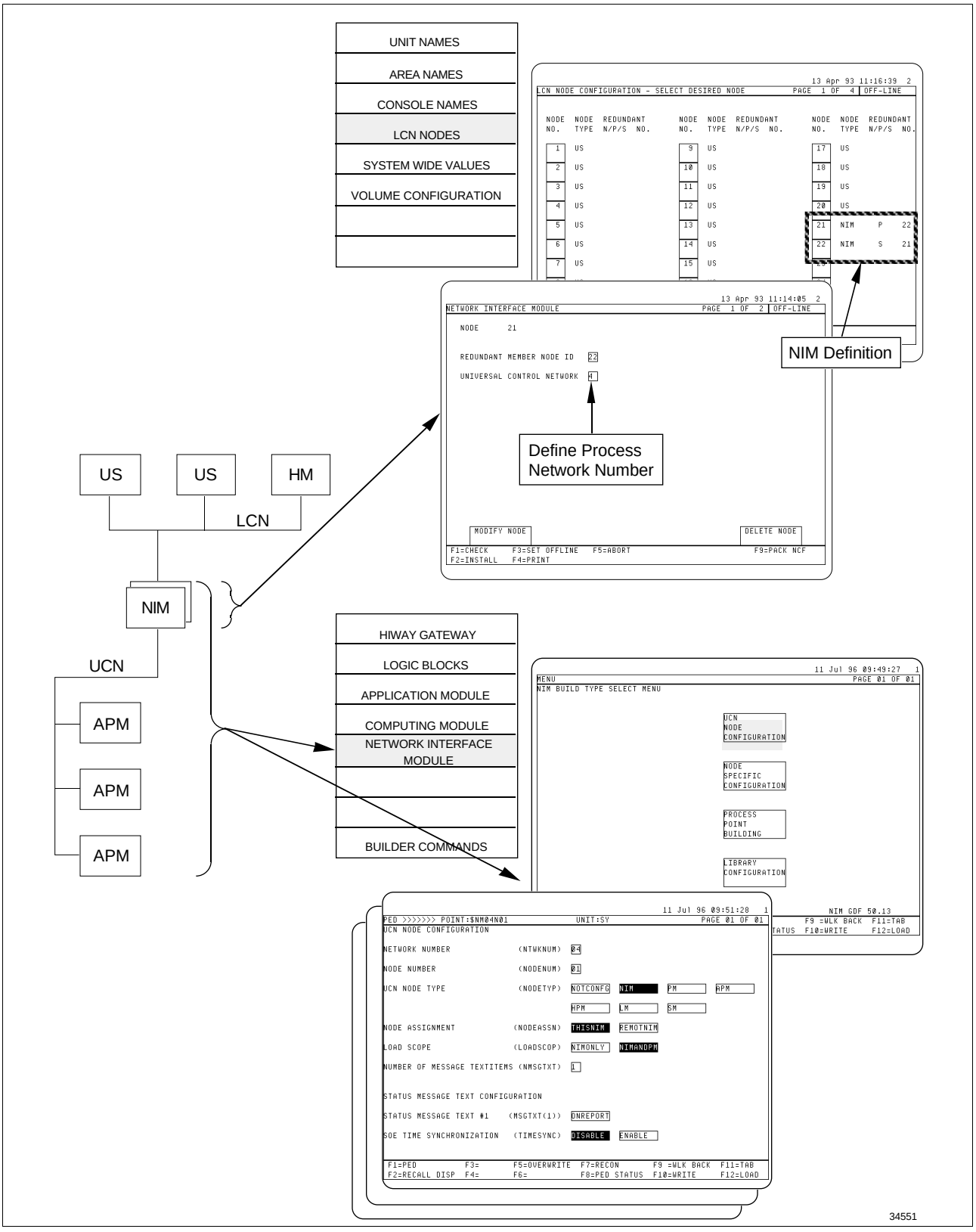
Figure 2 Logical UCN Definition



Configuration Overview of Additional Logical UCN

Background

Consider what configuration steps are necessary to add an extra NIM. You may find it helpful to refer to Figure 3.

Configuration of logical UCN

To configure a second logical UCN on the same physical UCN from the TDC system, the steps are

- Install an extra NIM pair on the LCN and UCN.
- Configure the extra NIM pair to appear as an LCN node pair during NCF configuration. During this step assign *another* unused process network number to the extra NIM pair.
- Assign *all* the UCN nodes on the physical network to *each* logical process network:
  - in NIM configuration *for the original NIM pair* define any additional UCN nodes that have been added, including the "extra" NIM(s).
  - in NIM configuration *for the extra NIM pair* define all UCN nodes on the physical network, including the "original" NIM(s).

The result is that one physical UCN becomes defined in the TDC system as *two* logical UCNs. Both logical UCNs *must* have all of the nodes that appear on the physical UCN configured in their database. All nodes are defined in each logical UCN so that personnel can see the full results of UCN cable commands and view cable status.

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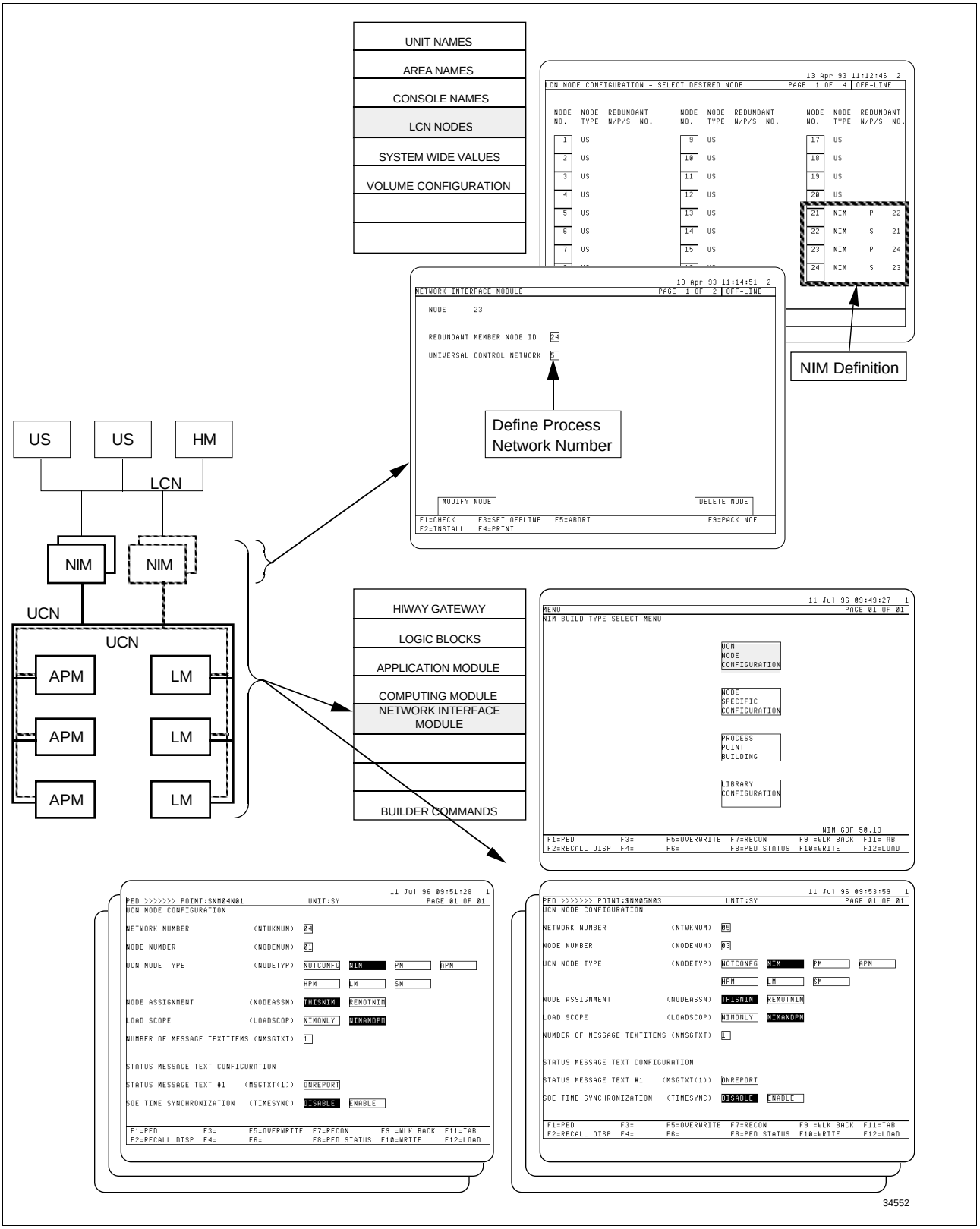
Configuration Overview of Additional Logical UCN, Continued

Figure 3 Multiple NIM Configuration



Configuration Overview of Additional Logical UCN, Continued

Why nodes are configured

Nodes are configured on both logical UCNs for several reasons:

- To ensure proper cable handling, an operator or technician must see the full result of cable commands and current cable status.
- Alarm annunciation, checkpoint operations, and node commands are routed through the NIM the nodes are assigned to.

Alarm and checkpoint overview

The relationship of the UCN nodes to the NIM (that is, how their points are processed, checkpointed, and alarmed) is defined through the node configuration parameter for node assignment, NODEASSN. This parameter is discussed later in this module, when an example application is reviewed.

System Status alarms

System Status alarms are reported for both logical UCNs. If this is not desirable, the alarms can be inhibited during Area Database configuration.

Summary

A physical UCN shown in Figure 1 is made up of all the UCN nodes that are connected to the same physical cable. Defining a physical network through configuration also defines the network to the LCN as a logical network. When an additional NIM or NIM pair is needed, an additional logical network is defined. Although there is one physical network from the operator's viewpoint, the TDC system "sees" two logical networks.

Example Application

Introduction

The next discussion reviews an example application (Figure 4) from a system where two logical UCNs are defined for the same physical network. The example describes why an extra NIM pair may be required and how the TDC system is set up to handle multiple NIM operations.

Example application

In this example application from a power industry customer, two logical UCNs are defined. The network definitions are based on the following criteria:

- Multiple NIMs are used to share processing load.
- The devices on the UCN control two processes:
  - Logic Managers on one logical UCN control the burner management areas
  - Advanced Process Managers on the other logical UCN perform boiler control
- Peer-to-peer communication is required between the burner management process (controlled with Logic Managers) and the boiler control processes (controlled with Advanced Process Managers.)

Two logical UCNs are defined to support the customer's needs. This example is summarized in Figure 4. (Note: In actual practice, the system has 24 UCN nodes on one physical UCN, two logical UCNs. For reasons of privacy and clarity, the example application is simplified).

How the nodes are set up

In the example, the nodes for UCN 4 are set up to do the following:

- APMs 9, 11, and 13 have their process points built in NIM pair 1 and 2.
- LMs 15, 17, and 19 have *no* process points built in NIM pair 1 and 2.
- The NIM pair 1 and 2 are defined as part of logical UCN 4.
- The NIM pair 3 and 4 are defined as part of the other logical UCN, UCN 5. During node configuration NIM pair 3 and 4 are defined as remote NIMs on UCN 4.
- LMs 15, 17, and 19 are defined on UCN 4 as remote.

The nodes for UCN 5 are set up to do the following:

- APMs 9, 11, and 13 have *no* process points built in NIM pair 3 and 4.
- LMs 15, 17, and 19 have their process points built in NIM pair 3 and 4.
- The NIM pair 3 and 4 are defined as part of logical UCN 5.
- The NIM pair 1 and 2 are defined as part of the other logical UCN, UCN 4. During node configuration NIM pair 1 and 2 are defined as remote NIMs on UCN 5.
- APMs 9, 11, and 13 are defined on UCN 5 as remote.

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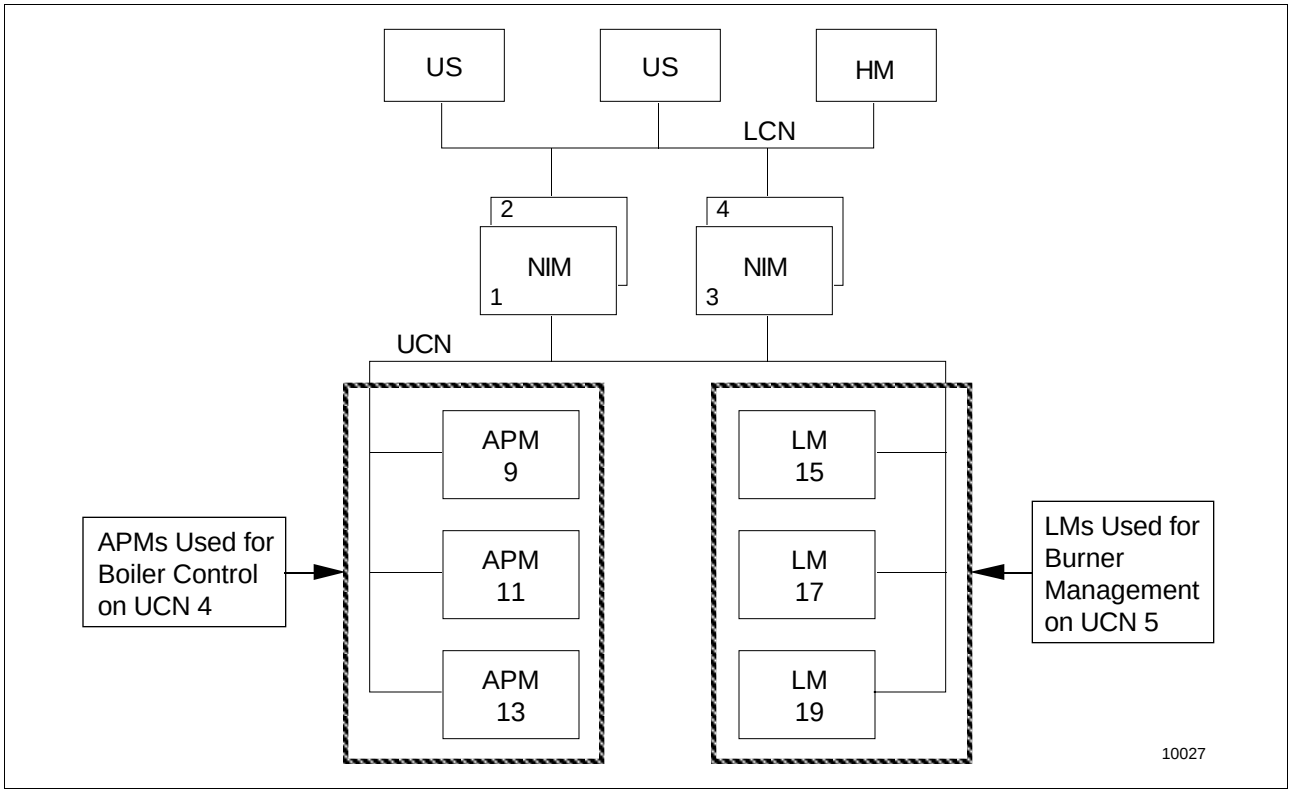
Figure 4 Example Application



Two UCN Status displays

The result of this configuration is that two UCN Status Displays represent two logical UCNs, even though the nodes are connected to the same physical coaxial cable. The display representations are discussed next.

Display Representations

UCN Status Displays

Introduction

This section provides some example displays from an application (Figure 4) with more than one NIM pair on a physical UCN. Figure 5 shows how the UCN Status displays represent the UCN nodes.

Example displays

In our earlier application example, logical UCNs are defined and the display results are shown in Figure 5. When you first look at the displays for UCN 4 and UCN 5, you might not notice much difference; however, the nodes are assigned to the NIM (through the parameter NODEASSN) and that assignment determines how their descriptors appear. Note that node descriptors reporting (assigned) to the other NIM on the other logical UCN appear with yellow text.

UCN rule: All nodes are assigned

You may have also noticed in Figure 5 that all of the NIMs and UCN nodes on the physical UCN appear in both displays. This is because all nodes on a physical UCN must be assigned to any logical UCN defined for that network to assure proper UCN cable handling. In other words, an operator or technician can see the results of cable commands and current cable status.

Checkpointing differences

Also note that your checkpoint procedures are different when more than one logical UCN is configured on a physical UCN. Checkpointing saves data from the UCN nodes defined on the logical UCN (which are the nodes that appear in green text in the UCN Status display). In our example, on logical UCN 4, when a node checkpoint is requested, *all the point data assigned to that node on UCN 4 (but not UCN 5) is saved.*

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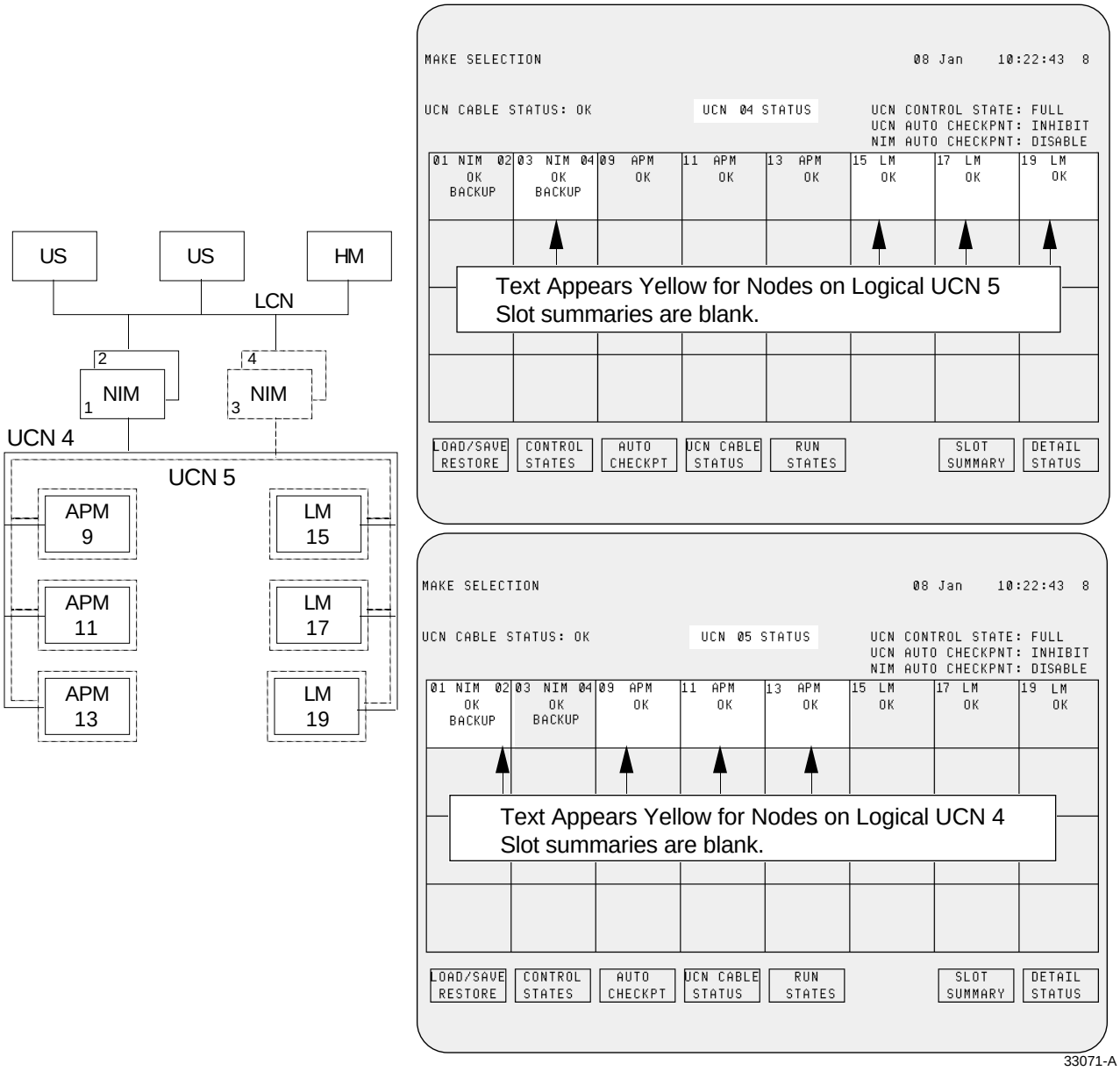
Figure 5 UCN Status Display Examples



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Example checkpoint scenario

As an example, let's say in our application example you checkpoint APM 9 from UCN 4's Status display. You select APM 9, the appropriate targets, and complete a successful database save (checkpoint). What is saved? In this example, you saved the APMM- and IOP-resident data from APM 9 and the APM 9's point data (tagnames) from NIM pair 1 and 2.

Note that any point data (which on some occasions may be configured as alias points for APM 9's peer-to-peer communication to UCN 5) in NIM pair 3 and 4 is *not* saved. In order to save that data, a NIM pair 3 and 4 checkpoint must also be requested from.*UCN 5's* Status display. In that case, you would request a NIM database save (checkpoint) from NIM pair 3 and 4. Note that you do not select APM 9 on UCN 5 and attempt a checkpoint. If you did, a node assignment error message (NODE_ASN) would appear.

Finally, to save the any of the LMs databases, you would of course have to checkpoint those nodes from UCN 5.

Configuration Considerations

Node Assignments

Introduction

This section provides some example displays from a system with more than one NIM pair. Figure 6 shows where to make the configuration entries when logical UCNs are implemented.

Extra means remote

Configuring an extra NIM pair is easier if you begin to think of the "extra NIM pair" as a "remote NIM" pair. That is, in fact, the choice you make during node assignment (NODEASSN) configuration. Assuming that two logical UCNs are defined, the added or extra NIM pair is defined as a REMOTNIM on one UCN, and THISNIM on the other logical UCN.

Nodes assigned for each logical UCN

Notice in Figure 6 that the NIMs and UCN nodes are configured for each logical UCN. To meet this requirement, the following examples show that on one UCN they are assigned using THISNIM, on the other UCN they are assigned using REMOTNIM.

Helpful hint

One way to think through the configuration of logical UCNs is to consider the selection for THISNIM as "MY NIM on this network" and consider REMOTNIM as the "OTHER NIM or ADDED NIM on this network."

You can also think of the parameter for node assignment, NODEASSN, as a "boss" assignment. The "boss" assignment determines which NIM is the boss of a UCN node for alarming and checkpointing purposes.

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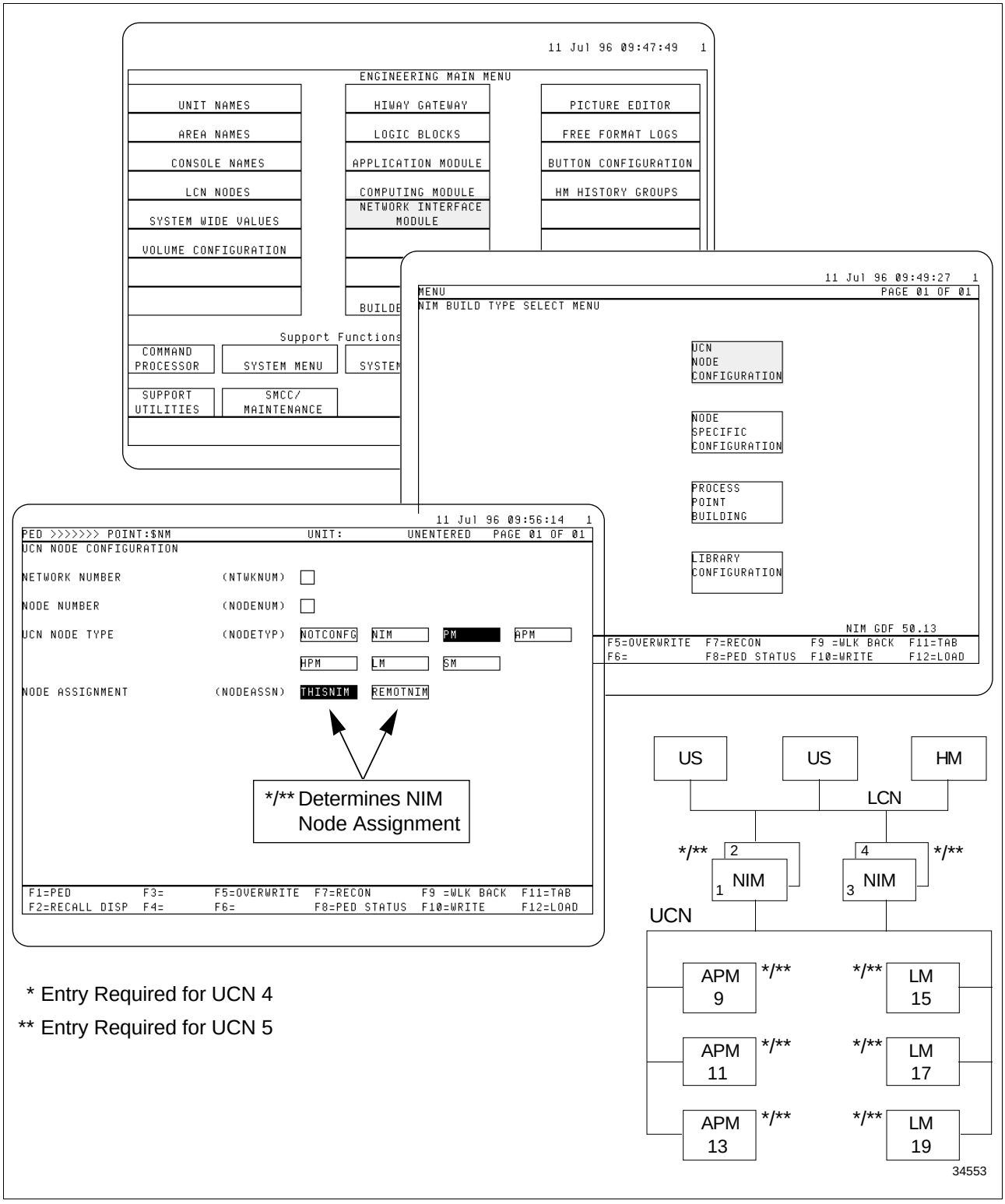
Figure 6 Configuration of Node Assignment



* Entry Required for UCN 4

** Entry Required for UCN 5

Node Assignment Examples

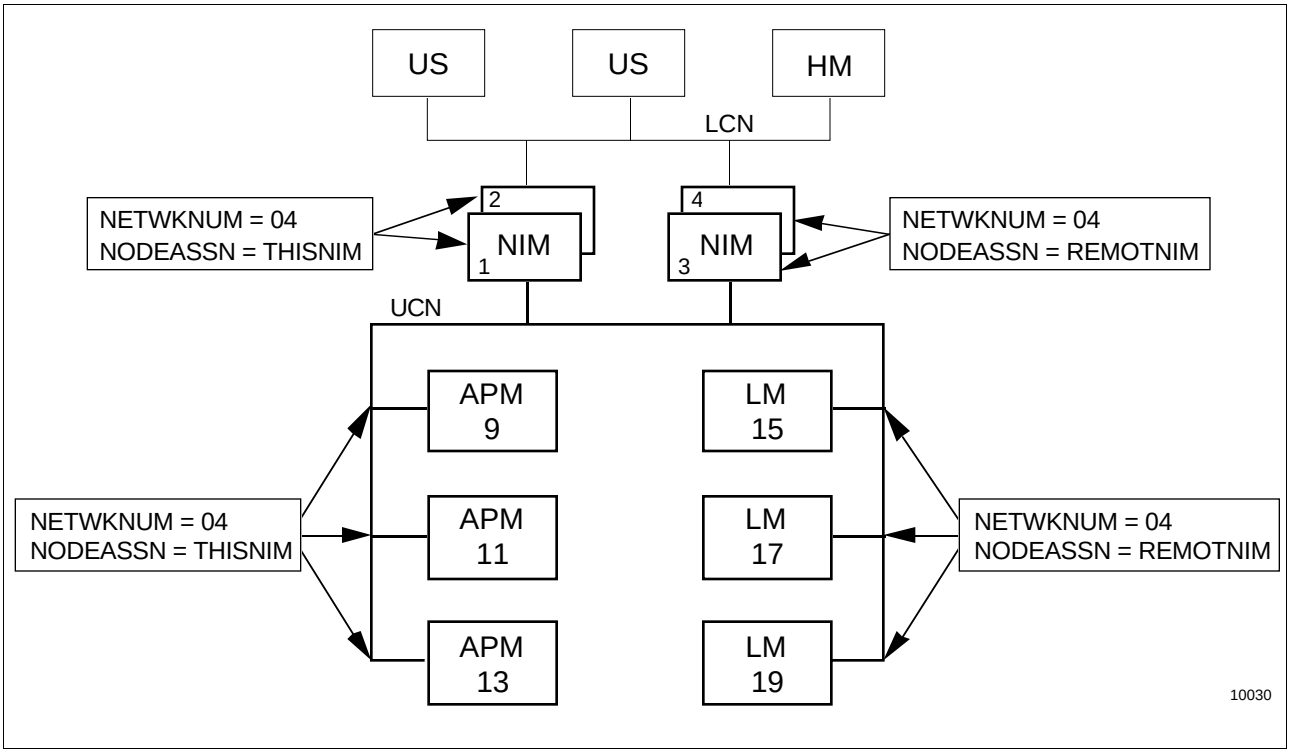
Additional detail

Additional detail on the example configuration are shown in Figure 7 and Figure 8. You may want to compare these examples to see how the node assignments are specified for the two logical UCNs.

Choices for UCN 4

Figure 7 shows the choices for UCN 04 from our example application.

Figure 7 Example Assignments for UCN 4



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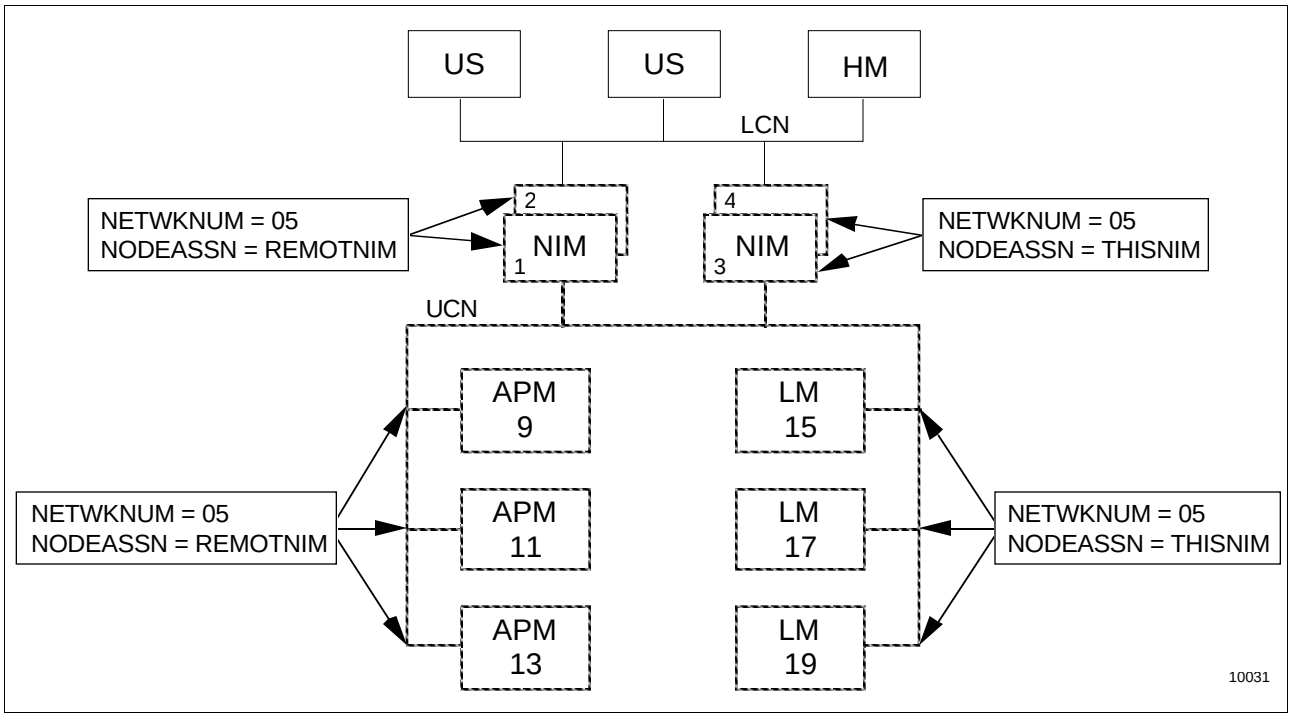
Node Assignment Examples, Continued

Choices for UCN 5

Figure 8 shows the choices for UCN 5 from our example application.

Figure 8 Example Assignments for UCN 5



Summary

In this section you have seen how the logical UCN are defined at the network level in NCF configuration and UCN level by defining node assignments. After having configured the nodes, the next step is to review what steps may be necessary to accomplish peer-to-peer communication.

Peer-to-peer on Logical UCNs

Example of Alias Point

Introduction

Peer-to-peer communication is possible on logical UCNs that are on the same physical UCN. There is more than one way to do this, you can

- build an alias point and make a peer connection to it, or,
- use a $NMnnBaa reference, where “nn” *represents the same UCN number as peer point’s* and “aa” represents the node number.

Alias point overview

Briefly, peer-to-peer with two logical UCNs/same physical UCN can be accomplished through using a process data point on both UCNs for the same slot resource. In other words, an alias of a data point from one UCN is defined as a data point on the other UCN. The point connection is then made to the alias point.

Rule to remember

The rule to remember is

- All peer-to-peer connections must reside on the same logical UCN.

This rule will become clearer as you review the following examples.

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Example of Alias Point , Continued

Example of alias point

Refer to Figure 9 for the following discussion. In the following discussion, assume:

- NIM pair 1 and 2 “own” APM 9; that is, APM 9 is assigned to NIM 1 and 2.
- NIM pair 3 and 4 “own” LM 15; that is, LM 15 is assigned to NIM 3 and 4.

Because a peer-to-peer connection is desired between APM 9 and LM 15, do the following

- Build APM 9’s data point (for example, X101) in NIM pair 1 and 2.
- Build LM 15’s data point (for example, Y101) in NIM pair 3 and 4.
- Reconstitute LM 15’s data point in NIM pair 3 and 4 (Y101).
- Create an alias point by
  - changing its tagname (for example, Y101_AL)
  - change the UCN number to the other logical UCN number (this will then permit you to load it to NIM pair 1 and 2)
- Reload the new point (example, Y101_AL) to NIM pair 1 and 2 (Note: To be sure the point in LM 15 does not change, set its load scope to NIM only.)
- Build the peer-to-peer connection using the points in NIM pair 1 and 2. For example, build a connection from X101 to Y101_AL.

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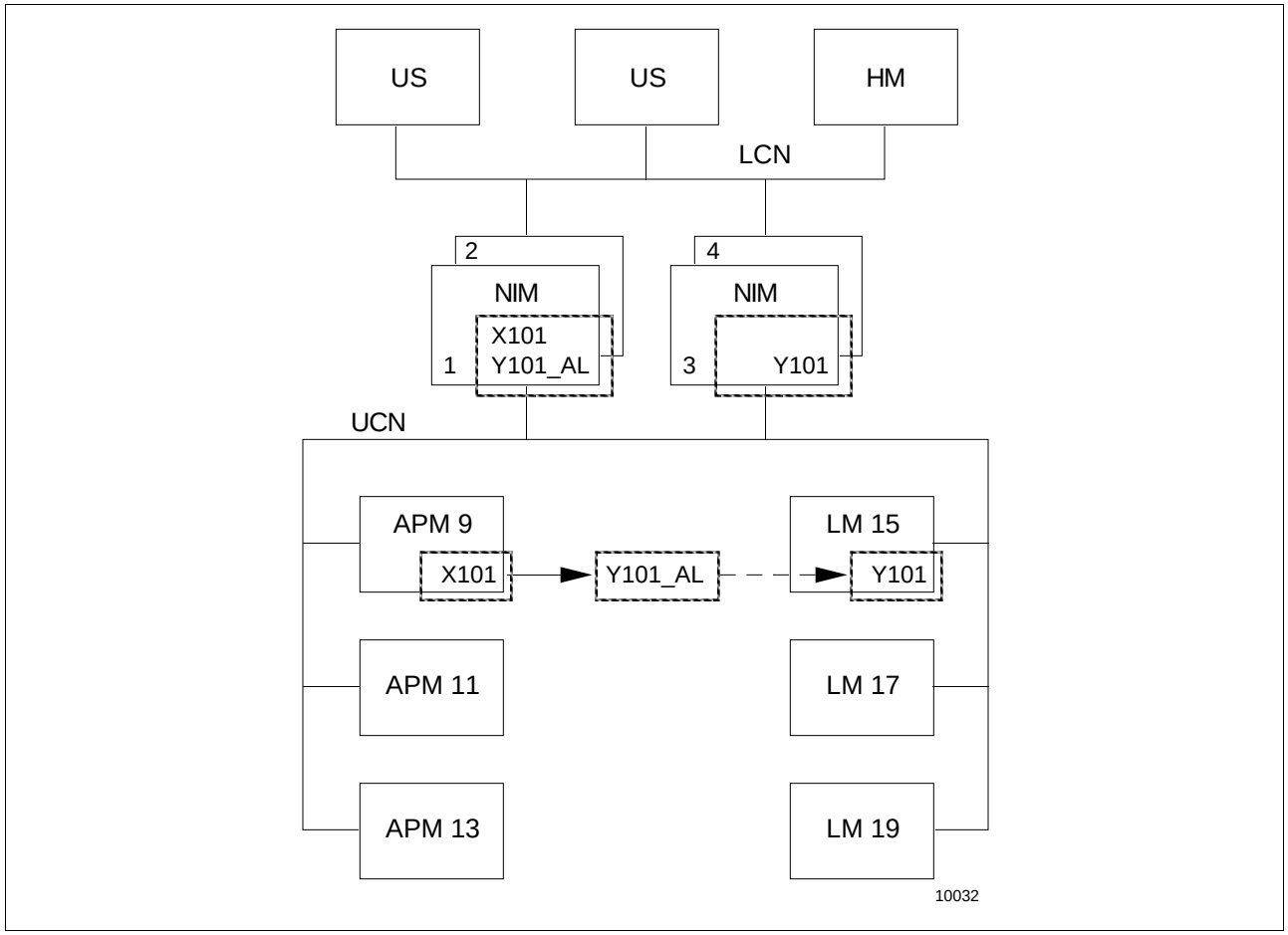
Example of Alias Point , Continued

Figure 9 Example Alias



System point overview

Peer-to-peer with two logical UCNs/same physical UCN can also be accomplished through using a system reference point (in the format, $NMnnBaa, where nn is the UCN number and aa is the device address) on the same logical UCN for the same slot resource.

Example of System Reference Point

Example of system point

Refer to Figure 10 for the following discussion. In the following discussion, assume

- NIM pair 1 and 2 owns APM 9; that is, APM 9 is assigned to NIM 1 and 2.
- NIM pair 3 and 4 owns LM 15; that is, LM 15 is assigned to NIM 3 and 4.

Because a peer-to-peer connection is desired from a logic slot in APM 9 and a flag in LM 15, do the following:

- Build APM 9's logic slot point (for example, L101) in NIM pair 1 and 2, which resides on UCN 4.
- Build LM 15's flag point (for example, FLAGTAG) in NIM pair 3 and 4, which resides on UCN 5.
- Connect FLAGTAG in LM 15 to a L101 logic slot input or output connection by using a system reference
  - the format is $NM04B15.FL(537), *where the network number, 04, is the same logical UCN number* as the one L101 is built against.

Note that the connection does not use the data point FLAGTAG or the system reference $NM05B15.FL(537). This is because peer-to-peer connections cannot references entities that reside on another logical UCN (that is, peer-to-peer cannot go across logical UCNs).

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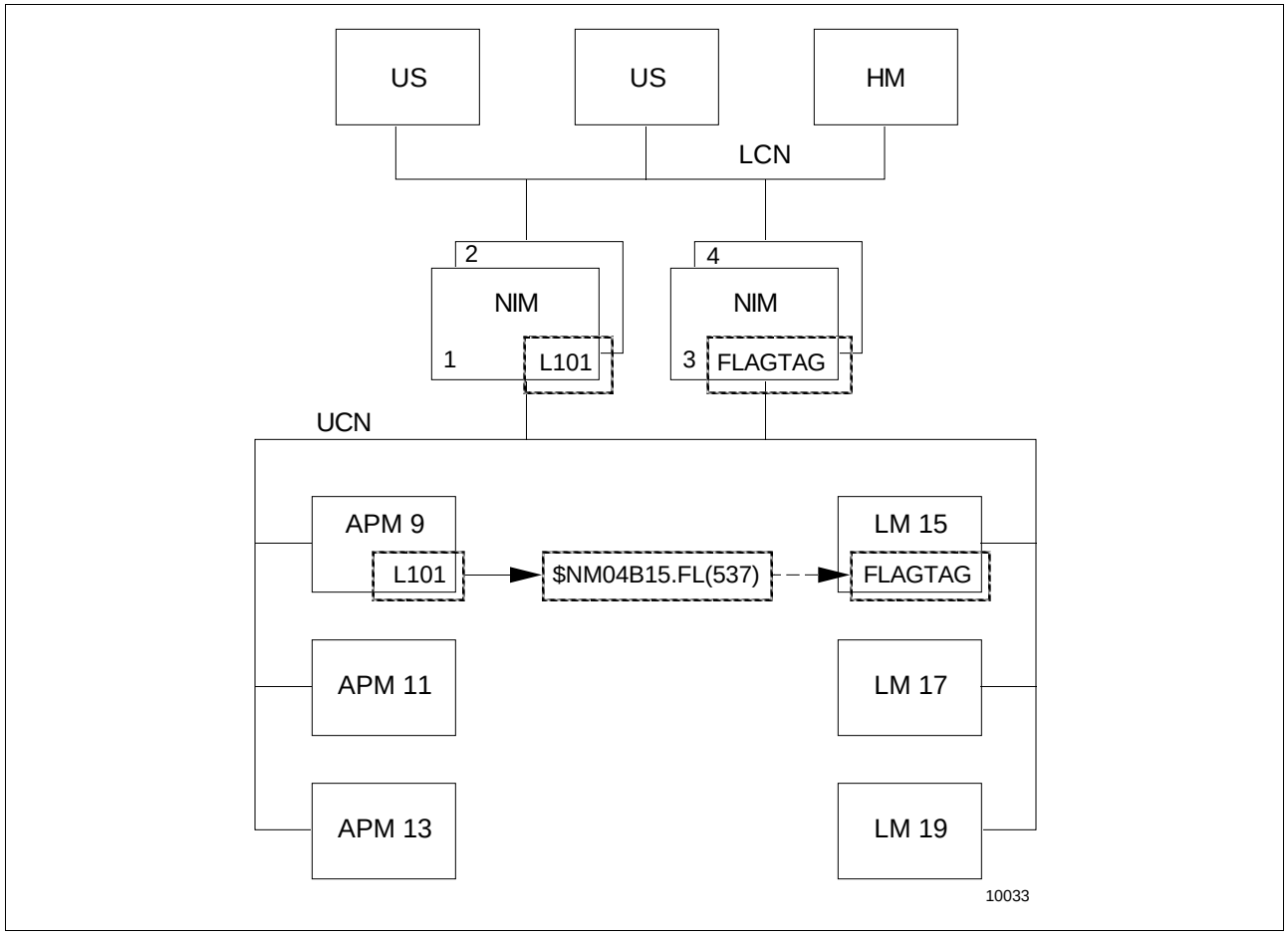
Example of System Reference Point , Continued

Figure 10 Example System Reference



Alarm and Checkpoint Considerations

Introduction

The peer-to-peer approach you use may affect how you choose to implement checkpointing, alarming, and event-initiated processing.

Checkpointing when aliases are used

When peer-to-peer communication on logical UCNs is accomplished through alias points, the following checkpointing tasks apply:

- A checkpoint from both UCNs must be taken:
  - A checkpoint from the UCN node where the point is originally built.
  - A checkpoint from the other logical UCN's *NIM*. This is done to save the NIM-resident data of the alias point.(Note: an attempt to checkpoint the UCN node on the other logical UCN would return a node assignment error, NODE_ASN.)

Checkpointing when system references are used

When peer-to-peer communication on logical UCNs is accomplished through system ($NMnnBaa) references, the following checkpointing task applies:

- Checkpoint from only one of the UCNs. The checkpoint is usually taken from the UCN node where the point is originally built.

Checkpoint rule

An easy way to remember where to take checkpoints from is in the following rule:

- "Checkpoint from the network where the point (tagname) is built."

Alarming and alias points

When peer-to-peer communication on logical UCNs is accomplished through alias points, the following alarming choices apply:

- Typically the alias point has alarming configured for DISABLED to avoid having the alarm reported twice. This helps reduce LCN loading.
- If alarming is configured on both UCNs' alias point, the alarm acts as follows:
  - A return to normal condition is reported from both UCNs.
  - An alarm acknowledgement is required for both points.
- Typically the alias point may have EIP configured for NOACTION to avoid having an event trigger processing twice.

Tradeoffs of Using Alias Versus System References

Summary

Table 1 summarizes the tradeoffs between using aliases and system references for peer-to-peer on logical UCNs.

Table 1 Alias Versus System Reference

	Alias Point	System Reference
Checkpointing	Checkpointing must be done from both logical UCNs: • from the logical UCN node where the point is originally built • from the logical UCN's NIM where the alias resides	No special checkpointing requirements when system references are used.
Alarming and EIP	To avoid additional LCN bandwidth consumption, the alias point typically has alarming and EIP configured for NOACTION.	N/A
Documentation	Both points have user-visible tag names.	The configured system reference should be documented, to avoid a user accidentally using the same slot resource twice.
Types of slots	Must be used when connection is to a control partition slot (example: regulatory control, logic slot, etc.). Optional for some global variables such as flags, numerics.	System references are available for global variables (such as flags, numerics). System references are not available for control partition slots (examples: regulatory control and logic slots).
Ease of use	Requires additional configuration steps (for example, changing load scope in NIM to load or delete the point to NIMONLY). Point connections residing on another logical UCN appear as dashes, which could become confusing to technicians or other engineers.	Easier to implement than alias point.

ATTENTION

ATTENTION—When deleting an alias point of an alias point pair, be sure to set LOADSCOP to NIMONLY; otherwise, the node-resident database will be deleted (nulled) for the point built on the other logical UCN.

Lab exercise follows

Next go to the lab and practice using logical UCNs on the same physical UCN.

Lab Exercise

Lab Overview

Introduction

In the lab exercises that follow become familiar with multiple NIM by doing the following:

- Configure a UCN with multiple NIMs
- Use the resulting UCN Status displays. In this exercise, you will be able to
  - Identify nodes that reside on the logical UCN
  - Checkpoint from a logical UCN
- Use peer-to-peer communication on logical UCNs

Lab requirements

The lab exercises require an off-process system. Some exercises have special requirements; your course manager can provide additional detail on whether the lab can be performed at your training facility. The requirements are summarized as follows:

- Configure a UCN with multiple NIMs
  - An extra NIM or NIM pair is required. Your course manager may decide to use the redundant NIM as an extra NIM for this exercise.
  - An NCF change is required to add the extra NIM. Your course manager will decide whether the lab can support that change.
  - The UCN node assignments will be provided by the course mangers
  - The lab exercise requires a group effort, not everyone can do this exercise at the same time.
- Use the resulting UCN Status displays
  - The lab exercise requires a group effort; not everyone can do this exercise at the same time. For example, to avoid confusion, not everyone should attempt checkpointing at the same time.
- Use peer-to-peer communication on logical UCNs
  - Your course manager will provide the point resources you can use.

Configure Multiple NIMs

Introduction

In this exercise, configure multiple NIMs on the same physical UCN. Steps 1 through 4 have to be coordinated as a group, because the system's NCF is examined. DO NOT INSTALL the NCF. Instead, examine how the lab is configured.

Step	Action
1	Set the NCF path to the cartridge or removable media device that your course manager has provided for you.
2	Return to the MAIN MENU and call up the NCF LCN Nodes Configuration display.
3	Review the NIM node assigned to you.
4	Review the a process network number(s) assigned to this NIM.
5	DO NOT INSTALL the NCF. Abort to return to the Engineering Main Menu.
6	Call up the NIM Configuration displays.
7	Select UCN Node configuration
8	Assign the proper node assignments for each NIM on each logical UCN
9	Write the configurations to an IDF.
10	For any UCN node and node-specific configuration must be configured for both logical UCNs.
11	Reconstitute the UCN node and node-specific configurations.
12	After your configuration loads successfully, call up the UCN Status displays and verify that your configuration has loaded correctly. Example result: The NIM appears in both UCN Status displays. One status display, the NIM, has yellow text, indicating a remote NIM to the UCN.
13	Get printouts of your node and node-specific configurations that show the nodes defined on both logical UCNs.

Use Multiple NIM Status Displays

Introduction

In this exercise, use UCN Status displays that contain more than one NIM. This helps you become familiar with the display representations and checkpointing considerations.

Step	Action
1	Call up the UCN Status display with multiple NIMs configured on UCN 1.
2	Note the UCN node numbers that appear with yellow text. These nodes have REMOTNIM as their node assignment, which means they are assigned to another UCN's NIM. • _____ _____ _____ • _____ _____ _____
3	Call up the UCN Status display for the other logical UCN.
4	Note the UCN node numbers that appear with yellow text. • _____ _____ _____ • _____ _____ _____
5	Select a PM/APM/LM node that appears with yellow text descriptors.
6	Attempt a checkpoint to see the NODE_ASN error. This error indicates that the node cannot be checkpointed from this UCN.
7	Select a NIM node that appears with yellow text descriptors.
8	Now attempt a NIM checkpoint to see the NODE_ASN error again. This error indicates that the node cannot be checkpointed from this UCN.
9	To examine alarm considerations, take a known process point and build it so that it resides on both UCNs. The steps are summarized as • Reconstitute a point your course manager has assigned for you. • Give it an alias name. For example if your tagname is TIC100, give the tag an alias of TIC100xx. • Change the node number to the other logical UCN. • Load the point.
10	Call up the alias point and cause it to go into alarm. Note that the Alarm Summary reports both the original and alias point alarms.
11	Cause the point to return to normal.
12	Change the alias points alarm action to be NOACTION.
13	Cause the point to go into alarm again. Note that the alarm is reported against only one point in the Alarm Summary

Use Peer-to-peer with Multiple NIMs

Introduction

In this exercise, use peer-to-peer communication on a physical UCN that has more than one logical UCN (that is, the UCN contains more than one NIM). This exercise has you reconstitute a point and add a peer connection to it from the *same* logical UCN.

Step	Action
1	Reconstitute a point your course manager assigns to you. This point is resident in a NIM configured as THISNIM.
2	Configure the peer connection to be a variable (flag or numeric) from a node on another logical UCN. The format of the variable can be $NMnnBaa, where xx is the process network number of the *same logical* UCN
3	Cause a change to be sent to your peer connection. Observe its results from both UCNs.

Directions

DIRECTIONS—This is the end of the study material for this module. Discuss questions concerning the study material or the lab activities with a colleague or a course manager

If you are satisfied that you have achieved the objectives of this module, continue with the next section, the Student Proficiency Evaluation.

Student Proficiency Evaluation

Criterion Test

What you are expected to know

This course module's Criterion Test includes the following items:

- Configure a system using multiple NIMs. Printouts of your UCN node and node-specific configurations from both logical UCNs meet the requirements for this test item.
- Use UCN Status Displays for a system defined with two logical UCNs on the same physical UCN.
- Describe in general terms two methods for using peer-to-peer communication on logical UCNs.

Self-Evaluation

What your course manager may ask

- Configure a system using multiple NIMs. Printouts of your UCN node and node specific configurations from both logical UCNs meet the requirements for this test item.

  Be sure to provide printouts of node configuration on both logical UCNs, which show the REMOTE and THISNIM assignments.

- Use UCN Status Displays for a system defined with two logical UCNs on the same physical UCN.

  Your course manager may decide to call up a UCN Status display and ask you identify which nodes can be checkpointed.

- Describe in general terms two methods for using peer-to-peer communication on logical UCNs.

  Use system references or alias tagnames, as long as the point reference resides on the same logical UCN.

Directions

DIRECTIONS—This is the end of this module.

Use your course map to

- Get your course manager to sign off this module.
- Choose your next eligible module.

If you have a question

- Ask your course manager.