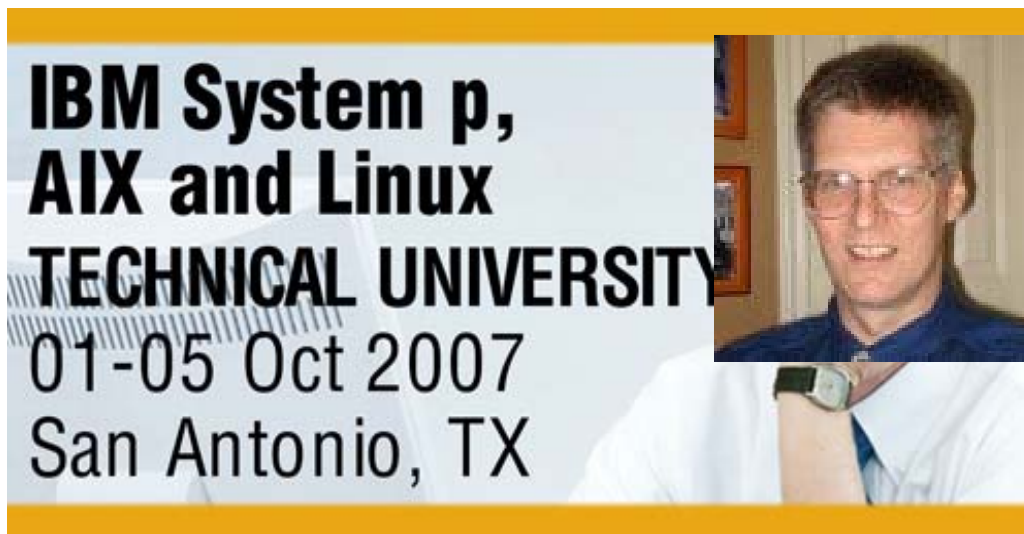


# A24

## AIX Network Installation Management Basic

Steve Knudson sjknuds@us.ibm.com



**IBM System p,  
AIX and Linux  
TECHNICAL UNIVERSITY**  
01-05 Oct 2007  
San Antonio, TX

# NIM Configuration

- **Setting up NIM Master**
  - Why NIM?
  - Typical Directory Structure, filesets for NIM master
  - Initial Master Config - smitty nim
  - Making the lppsouce
  - Making the spot
  - Making a minimal mksysb image
  - Or, nim\_master\_setup the easy way
- **Enabling Client Installs**
  - Define Client Machine
  - Define optional bosinst\_data resource
  - Define optional image\_data resource
  - Define optional script resource
  - Prepare for Client Install - smitty nim\_bosinst
- **Client Network Boot**

# Why NIM?

- An LPAR machine – could be many different AIX instances, not every partition has install device
- Not elegant or convenient to move install device from LPAR to LPAR (also a negative in the event of emergency restore)
- NIM in AIX 4.1 replaced netinstl of AIX 3.2.5. NIM was well exercised by PSSP in the mid 1990s.
- Reasonable for one LPAR to be NIM server to other LPARs
- Or standalone NIM master can be on same or different subnet as LPARs best way to avoid “chicken and egg” scenarios
- TSM Sysback also available for AIX 5L, an alternative or wrapper to NIM
- NIM standard part of AIX, no additional charge

# Typical filesystems, Directory Structure, filesets for NIM master

/export/53

lppsource\_53TL6

spot\_53TL6 (don't create this one - it will be created for you)

/export/mksysb

/export/res

Install these filesets on NIM master, and reboot

bos.net.tcp.server

bos.net.nfs.server

bos.sysmgt.nim.master

bos.sysmgt.nim.spot

(aside: in older versions of AIX, the mksysb image to install on clients could not contain nim master and spot filesets. Alleviated at 433 and later.)

## Typical Directory Structure, filesets for NIM master

- lpp\_source directory to hold installp images from AIX 53 install CDs – approx 5 GB
- spot - shared product object tree - an installed copy of the /usr filesystem (clients use command from here during install process). Built from images in the lppsource – approx 600 MB
- /export/mksysb directory for the mksysb image files to install on clients – approx 1.5 GB per image
- res directory for miscellaneous resources; optional, bosinst\_data, image\_data, or scripts



# Initial Master Config - smitty n1m

- Network name - any name you choose. Perhaps you include the subnet address in the name, e.g., eth\_9\_19\_51
- Network Install Interface - e.g., en0
- Allow machines to Register Themselves - yes

# Making the lppsourc

First, copy software from CD or DVD into /export/53 filesystem

**smitty bffcreate**

Copy Software to Hard Disk for Future Installation

Type or select values in entry fields.

Press Enter AFTER making all desired changes.

	[Entry Fields]	
* INPUT device / directory for software	/dev/cd0	
* SOFTWARE package to copy	[all]	+
* DIRECTORY for storing software package	<b>[/export/53/lppsourc_53TL6]</b>	
DIRECTORY for temporary storage during copying	[/tmp]	
EXTEND file systems if space needed?	yes	+
Process multiple volumes?	yes	



# Making the lppsourc

Next, point at the lpp\_source directory, and define it as a NIM resource

[mitti nim](#) / [Configure the NIM Environment](#) / [Advanced Configuration](#) / [Create Basic Installation Resources](#) / [Create a New LPP\\_SOURCE](#)

## Create an LPP\_SOURCE

Type or select values in entry fields.

Press Enter AFTER making all desired changes.

	[Entry Fields]	
* Resource SERVER	master	
Input device for installation images (specify the device on the resource server)	[ ]	+
* LPP_SOURCE Name	[ <b>lppsource_53TL6</b> ]	
* LPP_SOURCE Directory	[ <b>/export/53/lppsource_53TL6</b> ]	+
Architecture of Resource	[ ]	+
Create new filesystem for LPP_SOURCE?	[ <b>no</b> ]	+
Filesystem SIZE (MB)	[ <b>650</b> ]	#
VOLUME GROUP for new filesystem	[ <b>rootvg</b> ]	+
Remove all newly added NIM definitions and filesystems if any part of this operation fails?	[no]	+

# Making the lppsource

- LPP\_SOURCE Name - NIM does not like dot in resource names, use underbar
- LPP\_SOURCE Directory - the directory you created the install CDs into
- Create new filesystem for LPP\_SOURCE? [no] - (you already have it in /export/53, and you created a directory lppsource\_53TL6)
- backspace over the **Filesystem size** and **volume group** fields; blank them out

# Making the lppsource

To save space in lppsource, after spinning all CDs, you might:

```
cd /export/53/lppsource_53TL6/installp/ppc
```

```
mkdir save
```

```
mv *[Ee][Nn]_[Uu][Ss]* save
```

```
smitty nim_res_op / select lppsource / select lppmgr operation to trim various language,  
help, msg, loc, html filesets
```

```
mv save/* .
```

```
inutoc .
```

You have defined the lpp\_source, then you may use the lppmgr operation on it

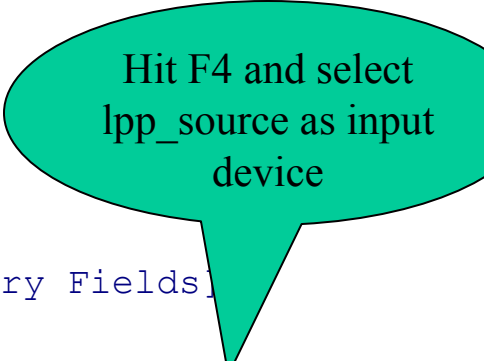
# Making the spot

smitty nim / Configure the NIM Environment / Advanced Configuration / Create Basic Installation Resources / Create a New SPOT

## Create a SPOT

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

* Resource SERVER	[Entry Fields]	
* Input device for installation images (specify the device on the resource server)	master	
* SPOT Name	[ <b>lppsource_53TL6</b> ]	+
* SPOT Directory	[ <b>spot_53TL6</b> ]	
Create new filesystem for SPOT?	[ <b>/export/53</b> ]	+
Filesystem SIZE (MB)	[ <b>no</b> ]	+
VOLUME GROUP for new filesystem	[ <b>350</b> ]	#
	[ <b>rootvg</b> ]	+
Remove all newly added NIM definitions and filesystems if any part of this operation fails?	[no]	+



Hit F4 and select  
lpp\_source as input  
device

# Making the spot

- Input device - use F4 to select the lpp\_source just created as input device
- SPOT name - any name you choose, e.g., spot\_53TL6
- SPOT directory - spot\_53TL6 directory will be created in /export/53
- Create new filesystem for SPOT? [no] (put it in the /export/53 filesystem that already exists)
- backspace over the **Filesystem size** and **volume group** fields; blank them out

# Making a minimal mksysb image

## Build up a particular nim client as desired

- Install any additional filesets desired
  - bos.alt\_disk\_install.boot\_images, bos.alt\_disk\_install.rte
  - bos.content\_list
  - bos.perf.tools, bos.perf.libperfstat, perfagent.tools, perfagent.server if licensed
- Set root password, relevant root .profile content
  - set -o vi
  - export PS1=""whoami `@`hostname ` \\$PWD # "
  - chmod u+x /.profile
- Other misc changes on client
  - edit /etc/exclude.rootvg, insert /smit.log, /smit.script, others
  - errclear 0
  - cd /var/adm/ras ; >nim.script ; >suma.log ; >bootlog ; >nimlog ; \  
>conslog ; >nimsh.log ; >bosinstlog ; >devinst.log ; >nim.installp
  - Other tunables – no -p -o tcp\_sendspace=262144 ; no -p -o tcp\_recvspace=262144 ; \  
no -p -o rfc1323=1
- At the client, Register with the nim master
  - smitty nimit, point at nim master to register on

# Making a minimal mksysb image (cont.)

## Back on the NIM master...

- Point at the nim client (just registered) and pull mksysb image from it  
smitty nim/ Perform NIM Administration Tasks / Manage Resources / Define a Resource / select mksysb

```
* Resource Name                [minimal_53TL6]
* Resource Type                 mksysb
* Server of Resource            [master]                +
* Location of Resource          [/export/mksysb/minimal_53TL6] /
Comments                        []

Source for Replication          []                +
```

-OR-

### System Backup Image Creation Options:

```
CREATE system backup image?    yes                +
NIM CLIENT to backup           [nimclientname]      +
PREVIEW only?                  no                    +
IGNORE space requirements?     no                    +
EXPAND /tmp if needed?         no                    +
Create MAP files?              no                    +
Number of BLOCKS to write in a single output [ ]                #
    (leave blank to use system default)
Use local EXCLUDE file?        yes                +
    (specify no to include all files in backup)
```

-OR-

```
EXCLUDE_FILES resource        [ ]                +
    (leave blank to include all files in backup)
```

# NIM Master setup the easy way

- Preloaded machine includes `bos.sysmgt.nim.client`, which includes `/usr/sbin/nim_master_setup` script. With CD number 1 in drive,
- `nim_master_setup -a file_system=/export -a volume_group=nimvg \`  
`-a disk='hdisk16 hdisk19'`

–installs `bos.sysmgt.nim.master` `bos.sysmgt.nim.spot`

–makes a `mksysb` image

–does initial master config

–`lsnim` command shows the following `nim` resources configured:

```
root@master / # lsnim
```

<code>master</code>	<code>machines</code>	<code>master</code>
<code>boot</code>	<code>resources</code>	<code>boot</code>
<code>nim_script</code>	<code>resources</code>	<code>nim_script</code>
<code>master_net</code>	<code>networks</code>	<code>ent</code>
<code>generic_sysb</code>	<code>resources</code>	<code>mksysb</code>
<code>resolv_res</code>	<code>resources</code>	<code>resolv_conf</code>
<code>bid_tty_ow</code>	<code>resources</code>	<code>bosinst_data</code>
<code>bid_lft_ow</code>	<code>resources</code>	<code>bosinst_data</code>
<code>530lpp_res</code>	<code>resources</code>	<code>lpp_source</code>
<code>530spot_res</code>	<code>resources</code>	<code>spot</code>
<code>basic_res_grp</code>	<code>groups</code>	<code>res_group</code>



# NIM Master setup the easy way (cont.)

- That was so easy, why do it the hard way?
  - lppsource created from all 8 CDs has more comprehensive content (bos.alt\_disk\_install.rte, perfagent.tools, for example)
  - you get to control the naming of resources
  - But if you only have a half day to make an impression, think `nim_master_setup`

# NIM Configuration

- **Setting up NIM Master**
  - Why NIM?
  - Typical Directory Structure, filesets for NIM master
  - Initial Master Config - smitty nim
  - Making the lppsouce
  - Making the spot
  - Making a minimal mksysb image
  - Or, nim\_master\_setup the easy way
- **Enabling Client Installs**
  - Define Client Machine
  - Define optional bosinst\_data resource
  - Define optional image\_data resource
  - Define optional script resource
  - Prepare for Client Install - smitty nim\_bosinst
- **Client Network Boot**

# Define Client Machine

smitty nim / Perform NIM Administration Tasks / Manage Machines / Define a Machine

## Define a Machine

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

	[Entry Fields]	
* NIM Machine Name	[sq02]	
* Machine Type	[standalone]	+
* Hardware Platform Type	[ <b>chrp</b> ]	+
Kernel to use for Network Boot	[ <b>mp</b> ]	+
Primary Network Install Interface		
* Cable Type	<b>tp</b>	+
* NIM Network	eth_9_19_51	
* Host Name	sq02	
Network Adapter Hardware Address	[0]	
Network Adapter Logical Device Name	[ <b>ent0</b> ]	
IPL ROM Emulation Device	[ ]	+/ +
CPU Id	[ ]	
Machine Group	[ ]	+
Comments	[ ]	

# Define Client Machine

- Hardware Platform Type – default is chrp, older rs6k or rspc not supported
- Kernel to use for Network Boot - set to mp (AIX 5.3 discontinued shipment of up kernel – 5.3 ships only MP 32bit or MP 64bit)
- Cable Type - most likely tp, not bnc or dix – N/A for virtual Ethernet
- Network Adapter Hardware Address - optional field
  - more flexible to specify IP parameters on SMS menus during nim client boot.
  - You must specify IP parameters if nim client and nim master are on different IP subnets
- Network Adapter Logical Device name - optional field - note this is an adapter name (entx) not an interface name (not enx or etx)
- Earlier, when configuring the server, we allowed machines to register themselves. A running AIX instance (machine or LPAR) can become a client, can define itself to this server, by doing a smitty niminit.

# Define optional bosinst\_data resource

- copy template file from spot to the /export/res, and modify as desired

```
cp /export/53/spot_53TL6/usr/lpp/bosinst/bosinst.template /export/res/bosinst.template.53TL6
```

```
cp /export/res/bosinst.template.53TL6 bosinst_sq02_53TL6
```

- Specify things like

CONSOLE = /dev/tty0 (/dev/vty0 for virtual terminal console of an LPAR)

INSTALL\_METHOD = overwrite or migrate (never found any use for "preservation")

PROMPT = no (if you specify no prompt, you must include target\_disk\_data stanzas)

BOSINST\_DEBUG = no (yes if you have to - you'll need a thinkpad running hyperterm on serial connection to /dev/tty0 to capture the scrolling debug output)

```
# target_disk_data:
#     PVID = <physical volume identifier>
#     SAN_DISKID = <ww_name//lun_id>
#     CONNECTION = <parent//connwhere>           <--- (should be able to get this from
#     LOCATION =                                 SMS - Display Configuration - lets
#     SIZE_MB =                                  try in the lab)
#     HDISKNAME =
```

Specify one type, AIX Location code for Power4 clients, PHYSLOC for Power5 or Power6 clients

```
target_disk_data:
LOCATION = 4M-08-00-8,0
```

```
target_disk_data:
PHYSICAL_LOCATION = U7311.D20.10575EA-P1-C06-T1-L12-L0
```

Avoid using HDISKNAME! These can move around, and you might (sooner or later will) be sorry!

# Define optional bosinst\_data resource

smitty nim / perform NIM administration tasks / Manage Resources / Define a Resource / bosinst\_data

Define a Resource

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

	[Entry Fields]
* Resource Name	[bosinst_sq02_53TL6]
* Resource Type	bosinst_data
* Server of Resource	[master] +
* Location of Resource	[/export/res/bosinst_sq02_53TL6]
Comments	[]
Source for Replication	[]

- Resource Name - your choice (again, no dots)
- Server of Resource - specify master
- Location of Resource - full path name to the file - typically, a NIM "resource" is a pointer to a file
- You can modify the underlying file before or after the NIM resource is defined on it

# Define optional image\_data resource

- Template file is <spot>/usr/lpp/bosinst/image.template. Copy to /export/res, and modify to taste.
- Or, better to retrieve the /image.data file from the original minimal mksysb image. This will have accurate sizes for all LVs in the minimal mksysb
- Specify things like
  - logical volume policy
    - SHRINK=no
    - EXACT\_FIT=no
  - lv\_data: (an lv\_data stanza for each logical volume in rootvg)
    - COPIES= 1 ( or 2, 3 to mirror. make sure you have enough target disk stanzas in the bosinst\_data resource)
    - LPs= nn (the number of logical partitions)
    - PP= nn (if mirroring, this is an exact 2x or 3x of LPs)
  - fs\_data: (haven't ever needed to modify an fs\_data stanza)
- IF you don't specify an image\_data resource, NIM will use the file embedded in the mksysb image. Typical use of a "side" image.data file is when mksysb is mirrored, but the new install is to be non-mirrored, or vice-versa.

# Define optional image\_data resource

smitty nim / perform NIM administration tasks / Manage Resources / Define a Resource / image\_data

Define a Resource

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

```
[Entry Fields]
* Resource Name          [image_data_minimal_53TL6]
* Resource Type         [image_data]
* Server of Resource    [master] +
* Location of Resource  [/export/res/image.data.minimal.53TL6]
Comments               []

Source for Replication  []
```

- Resource Name - you might want a **name that resembles the mksysb image** it works with
- Server of Resource - specify master
- Location of Resource - full path name to the file - typically, a NIM "resource" is a pointer to a file
- You can modify the underlying file before or after the NIM resource is defined on it



# Define optional script resource

- script can be defined as NIM resource
- two types of script resources -
  - script - runs at the end of the client install process
  - fb\_script - runs after the client install completes, after first reboot. Some things should not be done during the client process, e.g., changing IP config of the client

# optional script resource

smitty nim / perform NIM administration tasks / Manage Resources / Define a Resource / script

Define a Resource

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

	[Entry Fields]
* Resource Name	[ <b>my_nim_script</b> ]
* Resource Type	script
* Server of Resource	[ <b>master</b> ] +
* Location of Resource	[ <b>/export/res/my.nim.script</b> ]
Comments	[ ]
Source for Replication	[ ]

•You know the drill...

# Prepare for Client Install

**smitty nim\_bosinst / select target machine / Select Installation Type - mksysb /  
select the mksysb resource to use / select the SPOT to use / select the LPP\_SOURCE to use**

Install the Base Operating System on Standalone Clients

Type or select values in entry fields.

Press Enter AFTER making all desired changes.

[TOP]	[Entry Fields]	
* Installation Target	sq02	
* Installation TYPE	mksysb	
* SPOT	spot_53TL6	
* LPP_SOURCE	lppsource_53TL6	
MKSYSB	minimal_53TL6	
BOSINST_DATA to use during installation	[ ]	+
IMAGE_DATA to use during installation	[ ]	+
RESOLV_CONF to use for network configuration	[ ]	+
Customization SCRIPT to run after installation	[ ]	+
ACCEPT new license agreements?	[ <b>yes</b> ]	+
Remain NIM client after install?	[yes]	+
PRESERVE NIM definitions for resources on	[yes]	

# Prepare for Client Install

this target?

FORCE PUSH the installation? [no] +

Initiate reboot and installation now? [**no**] +

-OR-

Set bootlist for installation at the  
next reboot? [no] +

Additional BUNDLES to install [] +

-OR-

Additional FILESETS to install []

(and 21 more lines that I usually ignore)

- BOSINST\_DATA, IMAGE\_DATA, SCRIPT are files that can be defined as NIM resources optionally to be included in installs.
- ACCEPT new license agreements? tab it to yes both places on panel, don't hold up my install
- Remain NIM client after install? - leave set to yes, or the client install process will not finish correctly
- Initiate reboot and installation now? - tab to no, can't do a reboot on an LPAR that isn't running

# Prepare for Client Install

- smitty nim\_bosinst handles all NFS exports required. You should unexport any of the NIM directory structure you have exported by hand before smitty nim\_bosinst.
- When smitty nim\_bosinst completes, take a look at resources made available from server to client

```
showmount -e
```

```
export list for wlm:
```

```
/export/images/minimal_53ML2                regatta00.dsc.ibm.com
/export/53/lppsourc_53ML2/installp/ppc       regatta00.dsc.ibm.com
/export/53/spot_53ML2/usr                    regatta00.dsc.ibm.com
```

- If using bosinst\_data, image\_data, or other NIM resources, additional exports appear in the showmount output

```
ls -la /tftpboot
```

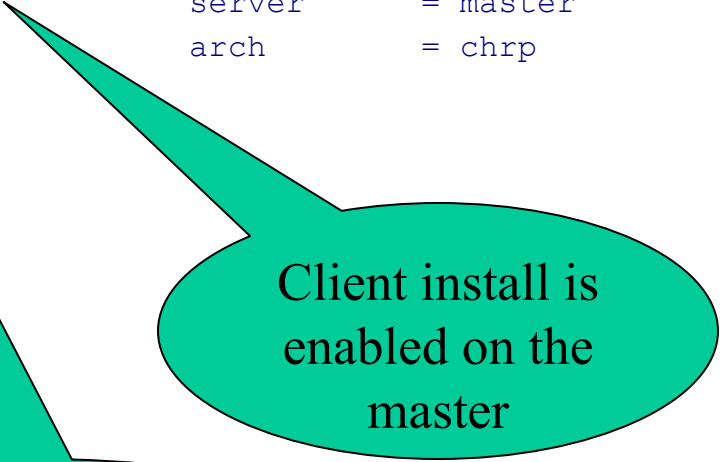
```
drwxrwxr-x  2 root    system      512 Oct 01 16:25 .
drwxr-xr-x 20 root    system     1024 Oct 01 14:48 ..
-rw-r--r--  1 root    system    7774079 Sep 18 16:01 spot_53ML2.chrp.mp.ent
lrwxrwxrwx  1 root    system      32 Oct 01 15:21 regatta00.dsc.ibm.com -> /tftpboot/spot_53ML2.chrp.mp.ent
-rw-r--r--  1 root    system     1018 Oct 01 15:21 regatta00.dsc.ibm.com.info
```

# Prepare for Client Install

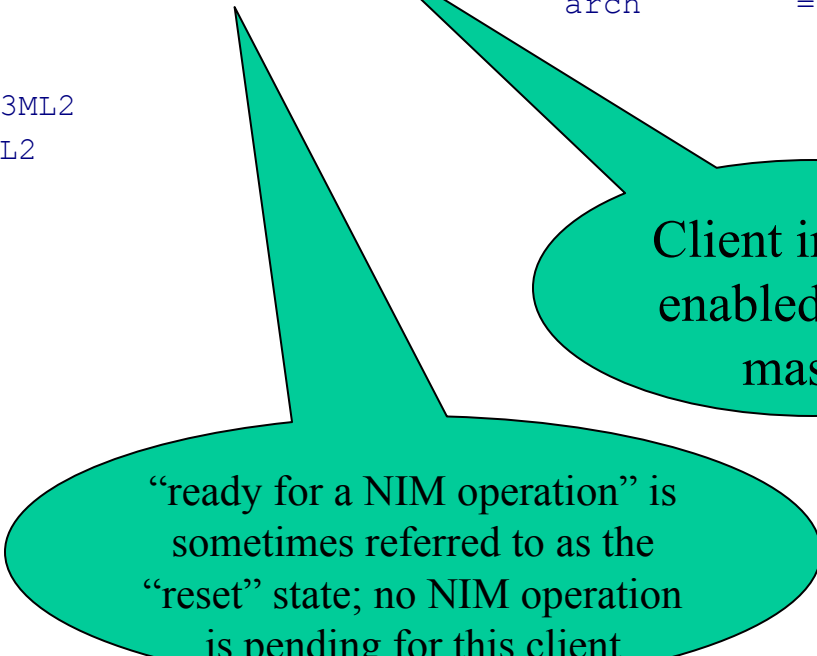
- After smitty nim\_bosinst, you can also check the status of the machine, and other NIM resources:

```
lsnim -l regatta00
wlm / # lsnim -l regatta00
regatta00:
  class           = machines
  type            = standalone
  platform        = chrp
  netboot_kernel = mp
  if1             = ether0 regatta00 0004ac7cdb89
  cable_type1     = tp
  Cstate         = BOS installation has been enabled
  prev_state      = ready for a NIM operation
  Mstate          = not running
  boot            = boot
  lpp_source      = lppsource_53ML2
  mksysb          = minimal_53ML2
  nim_script      = nim_script
  spot            = spot_53ML2
  control         = master
```

```
lsnim -l lppsource_53ML2
lppsource_53ML2:
  class           = resources
  type            = lpp_source
  Rstate          = ready for use
  prev_state      = unavailable for use
  location        = /export/53/lppsource_53ML2
  simages         = yes
  alloc_count    = 1
  server          = master
  arch            = chrp
```



Client install is enabled on the master



“ready for a NIM operation” is sometimes referred to as the “reset” state; no NIM operation is pending for this client

# Prepare for Client Install

- With each machine you enable for install, alloc\_count increases for various NIM resources
- If you have a machine enabled for install, and need to back out...
  - nim -o reset -aforce=yes <nimclienthostname>
  - nim -Fo deallocate -asubclass=all <nimclienthostname>
  - nim -o change -a cpuid="" <nimclienthostname>

# Client Network Boot

- Boot client machine (LPAR) to SMS
  - LED E1F1, and "keyboard" word prompt on console, hit number 1(or better, Boot Mode Override set to SMS)
- Remote IPL setup, IP and adapter parameters
- Select Ethernet adapter as install/boot device
- Exit from SMS, allow boot from Ethernet Adapter
- bootp request / reply, tftp of boot image from NIM master to Client
- network install of AIX via NFS



# SMS Main Menu

- On HMC, partition / operations / activate / Open terminal window / advanced / boot mode SMS / OK / OK
- Select 2, Setup Remote IPL

PowerPC Firmware

Version EM310\_048

SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.

-----  
Main Menu

1. Select Language
2. Setup Remote IPL (Initial Program Load)
3. Change SCSI Settings
4. Select Console
5. Select Boot Options

-----  
Navigation Keys:

X = eXit System Management Services

-----  
Type menu item number and press Enter or select Navigation key:

# Select Ethernet Adapter for RIPL

- Select Adapter to configure Remote IPL on. In this LPAR, there is one logical HEA port as Ethernet adapter

```
PowerPC Firmware
Version EM310_048
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

## NIC Adapters

Device	Location Code	Hardware Address
1. PORT - 17 IBM Host Ethernet Ad	U789D.001.DQDXYKN-P1-C10-T1	00145e6f43b0

---

## Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# Network Parameters

- IP parameters, Adapter Configuration, and Ping Test

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

```
-----  
Network Parameters  
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1  
1.   IP Parameters  
2.   Adapter Configuration  
3.   Ping Test  
4.   Advanced Setup: BOOTP
```

```
-----  
Navigation keys:  
M = return to Main Menu  
ESC key = return to previous screen      X = eXit System Management Services  
-----  
Type menu item number and press Enter or select Navigation key:
```

# IP Parameters

Fill in Client IP, NIM master IP, Client Gateway IP, and Subnet Mask, then ESC

```
PowerPC Firmware
Version EM310_048
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

```
-----
IP Parameters
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1
1.  Client IP Address           [9.19.51.229]
2.  Server IP Address           [9.19.51.115]
3.  Gateway IP Address          [9.19.51.6]
4.  Subnet Mask                 [255.255.255.000]
```

```
-----
Navigation keys:
```

```
M = return to Main Menu
```

```
ESC key = return to previous screen
```

```
X = eXit System Management Services
```

```
-----
Type menu item number and press Enter or select Navigation key:
```

# Network Parameters

- Now take Adapter Configuration

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

```
-----  
Network Parameters  
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1  
1.   IP Parameters  
2.   Adapter Configuration  
3.   Ping Test  
4.   Advanced Setup: BOOTP
```

```
-----  
Navigation keys:
```

```
M = return to Main Menu
```

```
ESC key = return to previous screen
```

```
X = eXit System Management Services
```

```
-----  
Type menu item number and press Enter or select Navigation key:
```

# Adapter Configuration

## •1 Set Speed and Duplex

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

```
-----  
Adapter Configuration  
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1  
1. Speed,Duplex  
2. Spanning Tree Enabled  
3. Protocol
```

```
-----  
Navigation keys:
```

```
M = return to Main Menu
```

```
ESC key = return to previous screen
```

```
X = eXit System Management Services
```

```
-----  
Type menu item number and press Enter or select Navigation key:
```

# Speed, Duplex

- Power6 Logical HEA port will offer auto / auto, or specific speed and duplex as set on Server Hardware Information
- Make selection and hit ESC

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

```
-----  
Speed,Duplex  
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1  
1. 100,full ( none ) <===  
2. auto,auto ( none )
```

```
-----  
Navigation keys:  
M = return to Main Menu  
ESC key = return to previous screen                    X = eXit System Management Services
```

```
-----  
Type menu item number and press Enter or select Navigation key:
```

# Adapter Configuration

## •2 Spanning Tree Enabled

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

### Adapter Configuration

```
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1
```

1. Speed,Duplex
2. Spanning Tree Enabled
3. Protocol

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:



# Spanning Tree Enabled

- Power Firmware builds in a 60 second delay, just in case network switch must calculate Spanning Tree.
- Try first with Spanning Tree off. Hit ESC twice back to Network Parameters

```
PowerPC Firmware
Version EM310_048
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

```
-----
Spanning Tree Enabled
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1
1.   Yes
2.   No  <===
```

```
-----
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen          X = eXit System Management Services
-----
```

```
Type menu item number and press Enter or select Navigation key:
```

# Network Parameters

## •Finally, 3 Ping Test

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

```
Network Parameters  
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1  
1. IP Parameters  
2. Adapter Configuration  
3. Ping Test  
4. Advanced Setup: BOOTP
```

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# Ping Test

- Review settings, and 1 Execute Ping Test

```
PowerPC Firmware
Version EM310_048
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

```
Ping Test
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1
Speed, Duplex: 100,full
Client IP Address: 9.19.51.229
Server IP Address: 9.19.51.115
Gateway IP Address: 9.19.51.6
Subnet Mask: 255.255.255.000
Protocol: Standard
Spanning Tree Enabled: 0
Connector Type: none
```

## 1. Execute Ping Test

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# Ping Test

- Review settings, and 1 Execute Ping Test, then hit any key

```
-----  
| Ping Success. |  
-----
```

Press any key to continue.....

# Ping Test

- From here, M to the Main Menu

```
PowerPC Firmware
Version EM310_048
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

```
Ping Test
PORT - 17 IBM Host Ethernet Adapter : U789D.001.DQDXYKN-P1-C10-T1
Speed, Duplex: 100,full
Client IP Address: 9.19.51.229
Server IP Address: 9.19.51.115
Gateway IP Address: 9.19.51.6
Subnet Mask: 255.255.255.000
Protocol: Standard
Spanning Tree Enabled: 0
Connector Type: none
```

1. Execute Ping Test

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# SMS Main Menu

- On HMC, partition / operations / activate / Open terminal window / advanced / boot mode SMS / OK / OK
- This time, number 5, Select Boot Options

PowerPC Firmware

Version EM310\_048

SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.

-----  
Main Menu

1. Select Language
2. Setup Remote IPL (Initial Program Load)
3. Change SCSI Settings
4. Select Console
5. Select Boot Options

-----  
Navigation Keys:

X = eXit System Management Services

-----  
Type menu item number and press Enter or select Navigation key:

# Multiboot

## •1 Select Install/Boot Device

PowerPC Firmware

Version EM310\_048

SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.

---

Multiboot

1. Select Install/Boot Device
2. Configure Boot Device Order
3. Multiboot Startup <OFF>

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# Select Device Type

## •6 Network devices

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

```
Select Device Type  
1.  Diskette  
2.  Tape  
3.  CD/DVD  
4.  IDE  
5.  Hard Drive  
6.  Network  
7.  List all Devices
```

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:



# Select Device

- Select 1, our only Network Adapter

```
PowerPC Firmware
Version EM310_048
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

---

## Select Device

Device Number	Current Position	Device Name
1.	-	PORT - 17 IBM Host Ethernet Adapter ( loc=U789D.001.DQDXYKN-P1-C10-T1 )

---

## Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# Select Task

- Select 2 Normal Mode Boot

Version EM310\_048

SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.

---

Select Task

PORT - 17 IBM Host Ethernet Adapter

( loc=U789D.001.DQDXYKN-P1-C10-T1 )

1. Information
2. Normal Mode Boot
3. Service Mode Boot

---

Navigation keys:

M = return to Main Menu

ESC key = return to previous screen

X = eXit System Management Services

---

Type menu item number and press Enter or select Navigation key:

# Are You Sure...

- 1 Yes Exit SMS and begin Network Boot

```
PowerPC Firmware  
Version EM310_048  
SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
```

-----  
Are you sure you want to exit System Management Services?

1. Yes
2. No

-----  
Navigation Keys:

X = eXit System Management Services

-----  
Type menu item number and press Enter or select Navigation key:

# BOOTP request/reply, tftpboot

```
BOOTP: chosen-network-type = ethernet,100,none,full
BOOTP: server    IP =          9.19.51.115
BOOTP: requested filename =
BOOTP: client    IP =          9.19.51.229
BOOTP: client    HW addr =    0 14 5e 6f 43 b0
BOOTP: gateway   IP =          9.19.51.6
BOOTP: device    /lhea@23c01410/ethernet@23e01010
BOOTP: loc-code  U789D.001.DQDXYKN-P1-C10-T1
```

```
icmp 5 : redirect
BOOTP R = 1 BOOTP S = 2
FILE: /tftpboot/sq02.dfw.ibm.com
Packet Count = 5900
```

At NIM master, to see traffic to and from client:

```
-tcpdump -l -i en0 port bootps
```

```
-tcpdump -l -i en0 host <clienthostname> and port `rpcinfo -p |grep nfs |grep tcp |tail -1 \
| awk '{print $4}'`
```

# Network Install

## Installing Base Operating System

If you used the system key to select SERVICE mode,  
turn the system key to the NORMAL position any time before  
the installation ends.

Please wait...

Approximate % tasks complete	Elapsed time (in minutes)	
14	1	16% of mksysb data restored

At nim master, see this status from client console - `lsnim -l regatta00`

# Miscellaneous Reference

## General guidelines (best practices?) for maintaining nim clients, nim master

- Keep the SPOT and lppsource up to date with the APARS applied to the machines they are to be allocated to during a mksysb restore. Example: When APAR IY12345 is applied to node machine1, the lppsource used to restore machine1 should be updated with the APAR as well if it does not already contain the filesets. The SPOT should be updated as well. nim -Fo check commands should be run against the resources as a standard health check after the updates.
- A generic "untouchable" SPOT and lppsource should be kept on the NIM master as launching points for creating new SPOTS and lppsources. These should be at a consistent maintenance level as close as possible to the level of the mksysbs being served out. These resources are not there to be used to serve out mksysbs but rather as catalysts for problem determination and to help recover from corrupt lppsources or SPOTs. These resources should not be updated themselves but rather copies should be made and the copies should be updated. This saves time during debugging and rebuilding of SPOTs and lppsources as creating the base lppsource and SPOT are extremely time intensive.
- Try to keep the levels of the mksysbs machines being served by a given SPOT and lppsource at consistent levels. This helps insure consistent, compatible code content between mksysb image, SPOT and lppsource. Example: machine1 and machine2 are at 433 ML-06 machine3 and machine4 are at 432 ML-01. It is recommended that machine1 and machine2 share a SPOT and lppsource at 433 ML-06 and that machine3 and machine4 share a SPOT and lppsource at 432 ML-01. For the best results, the SPOTs and lppsources should be at the same level or higher than the mksysb image being installed.

# Miscellaneous Reference

## General guidelines (best practices?) for maintaining nim clients, nim master

- The NIM master should be at the same level or higher than the highest level of mksysb it is serving. In the above example, the machine serving the lppsource and SPOT should be at the 433-07ML or greater.
- For a true disaster recovery scenario, a test machine should be installed with whatever mksysb image, lppsource and SPOT are to be used to restore a given machine. It is the best way to be comfortable that a mksysb image is restorable.

# Miscellaneous Reference

## Useful Commands

- **lsnim**

- **lsnim -l <machinename>**

```
# lsnim -l nim6
```

```
nim6:
```

```
class          = machines
type           = standalone
platform       = chrp
netboot_kernel = up
if1            = ethernet0 nim6 000629DC8443 ent1
cable_type1    = tp
Cstate        = BOS installation has been enabled
prev_state     = ready for a NIM operation
Mstate        = currently running
boot          = boot
bosinst_data   = bosinst_initial
installp_bundle = bundle_gnu
lpp_source     = lppsource_aix433
mkysyb        = mkysyb_minimal
nim_script     = nim_script
script        = itab_mkmaster
spot          = spot_aix433
cpuid         = 000F252D4C00
control       = master
```



# Miscellaneous Reference

## Useful Commands

- **To reset an NIM client machine**

```
nim -o reset -aforce=yes clientnode
```

```
nim -Fo deallocate -asubclass=all clientnode
```

```
nim -o change -a cpuid="" clientnode
```

- **To check / set the bootlist on a running machine**

```
bootlist -m normal -o (check)
```

```
bootlist -m normal ent0 (set first boot device to ent0 adapter)
```

- **To check levels of AIX installed on any machine:**

```
oslevel -r ; oslevel -s
```

```
instfix -i | grep ML ; instfix -l | grep SP
```

- **To see what you lack from a given maintenance level**

```
instfix -icqk 5300-06_AIX_ML | grep ":-:"
```

- **To check nfs exports from NIM master to the client for install:**

```
showmount -e
```

- **To check for correct linking of bootimage for client, info file for client:**

```
ls -la /tftpboot
```

# Miscellaneous Reference

## Troubleshooting NIM

•**BOOTP S = 1**

**FILE: /tftpboot/clientname**

**BOOTP: read-first-block failed:0 message** - We have seen the bootp request from client to master, and reply from master to client. The client also knows the boot image file name coming from the master. But the tftp of that boot image to the client is failing. We reviewed ip and nic settings on the client, stopped and restarted tftp service on the master. Ultimately, rebooting the nim master resolved this problem. Problem was resolved on another experience by stopping and restarting tftpd on the nim master:

```
stopsrc -s tftpd
```

```
lssrc -s tftpd (verify daemon is inoperative)
```

```
startsrc -s tftpd
```

This problem has also been observed in a situation where nim master was originally setup on a subnet that was not routable within the customer enterprise. Even after putting another interface of nim master on a routable subnet, **the info file built for client in the bosinst operation still gives an unroutable address for the nim master.** bootp succeeds, but tftp of the boot image fails. Support has a chancy document to modify the configuration of if1 on the master to remedy this. Might be easier to just nim -o unconfig master, then reconfigure master on the routable subnet.

# Miscellaneous Reference

- **Client hangs at LED 0611** - Indicates that some nfs resource that should be exported from the nim master is not available to the nim client. Mostly likely cause is that a parent directory was already exported to the client. the nim\_bosinst process doesn't always give errors when starting off this way. Check exports on the server, they should look something like this:

```
# exports
/export/aix433/images/mksysb.minimal -ro,root=nim6:,access=nim6:
/export/aix433/lppsource -ro,root=nim6:,access=nim6:
/export/aix433/spot/spot_aix433/usr -ro,root=nim6:,access=nim6:
/export/aix433/res/bundle.gnu -ro,root=nim6:,access=nim6:
/export/aix433/res/itab.mkmaster -ro,root=nim6:,access=nim6:
/export/aix433/res/bosinst.initial.B50 -ro,root=nim6:,access=nim6:
/export/nim/scripts/nim6.script -ro,root=nim6:,access=nim6:
```

If the exports are substantially different from these, then

power off client node  
on the nim master:

```
nim -o reset -aforce=yes clientnode
nim -Fo deallocate -asubclass=all clientnode
exportfs -ua
edit /etc/exports, remove inappropriate entries
nim_bosinst the client node again
```

**you can also get this  
led 611 when nim  
master resolves client  
hostnames in /etc/hosts.  
Entries there should be  
ipaddr fullyqualifiedname shortname**

# Miscellaneous Reference

- **Client crashes just past bootp, tftp of boot image -**

**888 102 700 0c5**

**888 102 605 0c5**

For the same reason as led 611 hang on previous page. A parent directory was nfs exported on the nim master, and the bosinst operation was unable to make appropriate exports of lppsource and spot. Historically, when this occurs, bosinst will give an obvious "WARNING: Parent directory already exported." But in this one customer scenario, we received no such warning in the smitty nim\_bosinst.

- **BOOTP Request Failed Abort**

**!20A80004!**

**!20EE000B!**

Prior to configure of nim master, customer had unknowingly removed bootps and tftp services from /etc/inetd.conf on nim master. Sure wish initial nim master config checked this....

# Miscellaneous Reference

- 0042-008 NIMState: Request denied method\_req** - These messages appear during client install when the cpuid (uname -m) of the client machine does not match the cpuid that the nim master "remembers" for this client. "lsnim -l machine | grep cpuid" on the nim master will show what uname the master retains for this client. You can change the uname value on the nim master to match the new client machine, "nim -o change -a cpuid=<newvalue> client"
- Client hangs at LED 0608** - After bootp and tftp of boot image, client hangs at 608, and causes high rate of network traffic. Change 10/100 install adapter from auto / auto to explicit rate on network, eg 10Mbps / half duplex. Power off client, boot back into SMS menus, utilities, remote ipl setup. Actually, we have found that 100Mbit and Auto works best with IBM/AIX 10/100 adapters and HP Ethernet switches. Explicitly setting the adapters to 100\_FULL\_DUPLEX led to very slow installs. **Have also seen this when another system takes the NIM master's IP address.**
- Client sends out bootp requests, server does not respond** - Found that server was missing bos.net.tcp.server, bos.net.nfs.server filesets. Oddly, bos.sysmgt.nim.spot, and bos.sysmgt.nim.master don't prereq these server filesets. And you can configure nim master, lppsource, spot, client machines, and even make the exports to the client. Install the two server filesets and reboot. To prevent this experience, we included the two server filesets into the minimal mkysb image, and the posti.mkmaster script also does a test install of these two filesets.

# Miscellaneous Reference

- **0042-001, 0042-006 nimclient: (To\_Master) rcmd Error 0** This error appeared on a nim client console during install from a nim server at bos.sysmgt.nim.server.5.1.0.25. It is believed related to the nimesis process being parent to many defunct processes. A change to the thread scope of nimesis is included in APAR IY29854. Workaround was stopsrc -s nimesis, ultimately kill -9 on nimesis processes, and a reboot of server required.
- **Validation failed: the "test method" client interface service does not exist** - Client machine was defined as chrp, should have been defined as rspc