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**Multimedia Communication Server
and IP Phone 2004**

MCS5100 and IP Phone 2004

Engineering Lab Note

> **MCS5100 SIP Phone Firmware Update**

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Abstract

This lab note describes the steps necessary to upgrade the firmware on a Nortel IP Phone 2004 from UNISlim-based firmware to Session Initiated Protocol (SIP)-enabled firmware. Among the enhancements included in the MCS5100 3.5 code release, is support for native SIP phones. Before Release 3.5, all Nortel IP phones supported by the MCS5100 connected using UNISlim and were controlled by the IP Client Manager (IPCM) server. The IPCM service provided the necessary conversion between UNISlim protocols and SIP protocols and served as an interface between the UNISlim-based IP phone and the SIP Application server.

Support for IP SIP Phones on the MCS5100 at Release 3.5 is initially limited to the IP Phone 2004 Phase 2. The IP Phone 2001, 2002, and 2007 are supported using UNISlim protocols only. As such, the IPCM service remains an integral component of the MCS5100 system to support all UNISlim-based IP Phones. After the upgrade, support for Nortel IP Phones running SIP-enabled firmware no longer requires the IPCM server.

The upgrade process from UNISlim-only firmware to SIP-enabled firmware requires both the IPCM service and a Trivial File Transfer Protocol (TFTP) server. All subsequent upgrades, from SIP-enabled firmware to a new release of SIP-enabled firmware, require a TFTP server only and no longer require the IPCM service. The MCS5100 does not provide a TFTP server.

The steps described in this lab note apply to the MCS5100 micro (two-server system) running Release 3.0.56, build858.



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1. SIP Phone Firmware

Though the SIP IP Phone firmware ships with the latest MCS 5100 release, the TFTP Server files necessary for the upgrade do not. You can download separately both the SIP firmware file and the TFTP files from the [Nortel EMS Software Distribution](#) site. The files are an ISO image that you can burn to CD.

If you have no burner available, a useful tool for extracting files from an ISO image is the free virtual CD ROM for Windows XP 2.1, which is available [here](#) at the www.softwarepatch.com Web site. Microsoft wrote the tool, and it runs on Windows XP. With this tool, you can mount an ISO image as a logical drive on a Windows workstation. After they are mounted, files within the ISO image are fully accessible, and you can copy them to a local drive.

Included in the ISO image file are the following files:

- 2004tftp.cfg
- 2004sysConfig.dat
- 2004SIP.img
- francais.lng

You must customize the 2004tftp.cfg and 2004sysConfig.dat files to suit the installation, and you must distribute all four files to one or more TFTP servers: a “master” TFTP server and one or more optional “slave” TFTP servers. The master TFTP server must contain the configuration file (2004tftp.cfg). The data (2004sysConfig.dat), language (francais.lng), and firmware (2004SIP.img) files can reside on the same TFTP server, or you can distribute them to one or more download TFTP servers. Multiple TFTP servers can be useful when you deploy mass upgrades.

The SipUpgradeConfigFile.txt file, which resides in /IMS/esm/data/esm/config/ on the MCS5100 IPCM/Prov server, provides the reference to the master TFTP server address. A template of this file is available with the MCS5100 release, but you must customize it. The SipUpgradeConfigFile.txt file also contains pointers to the IP address of the SIP Application Server (S1, S2) and its corresponding UDP Port.

The following figure provides an illustration of the upgrade process and the relationship between the associated files. The following sections provide a description of the files and the upgrade process.

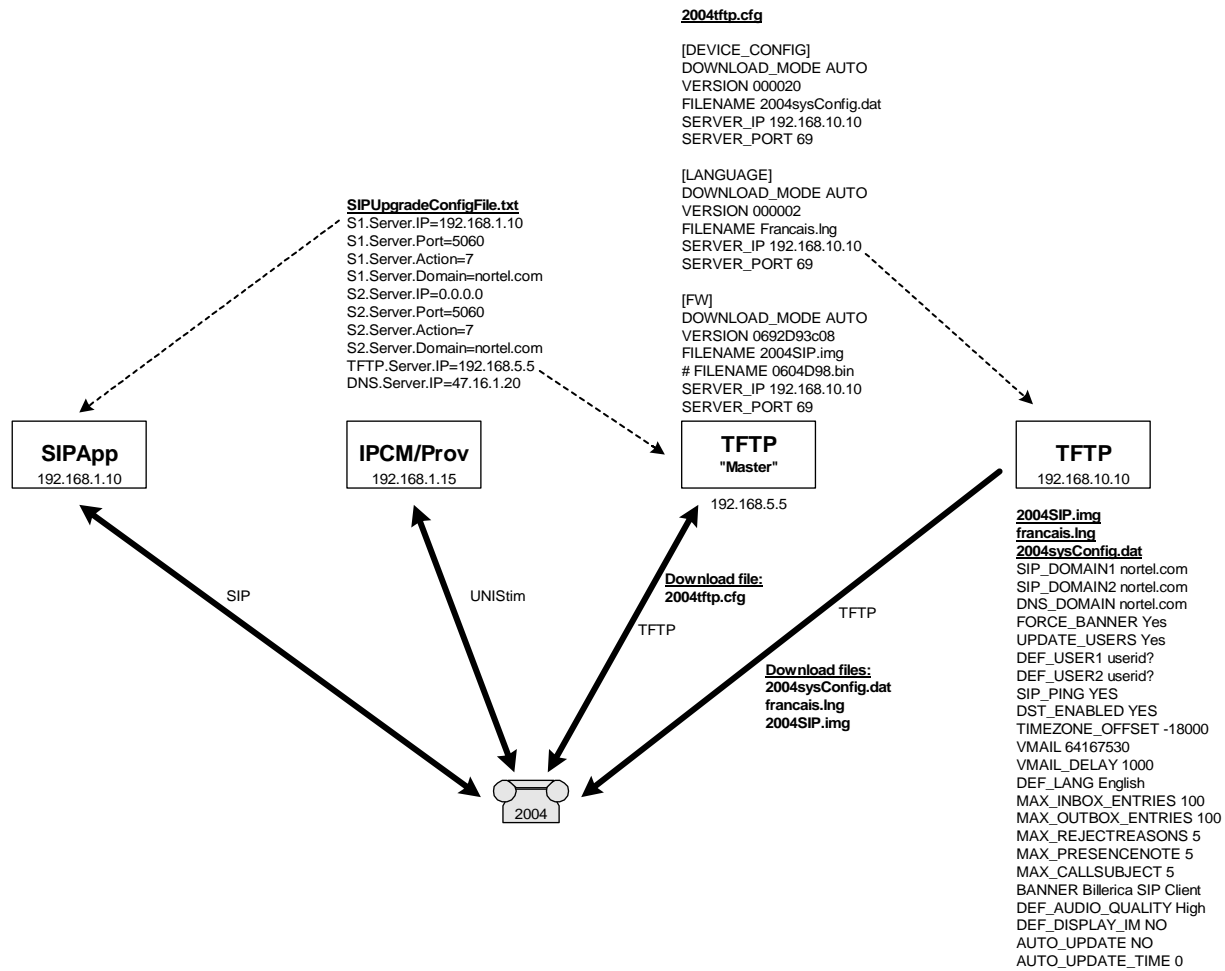


Figure 1 Upgrade process and the relationship between the associated files

2. MCS5100 Prov Server Configuration file (SipUpgradeConfigFile.txt)

The following example shows the SipUpgradeConfigFile.txt, which resides in the /IMS/esm/data/esm/config/ folder on the IPCM/Prov server. The SipUpgradeConfigFile.txt file contains pointers to the master TFTP server as well as the S1/S2 IP address and UDP Port. Server.Action refers to the protocol used by the phone (UNIStim=1, SIP=7). Also defined is the domain.

```
/IMS/esm/data/esm/config/SipUpgradeConfigFile.txt  
S1.Server.IP=192.168.1.10  
S1.Server.Port=5060  
S1.Server.Action=7  
S1.Server.Domain=nortel.com  
S2.Server.IP=0.0.0.0  
S2.Server.Port=5060  
S2.Server.Action=7  
S2.Server.Domain=nortel.com  
TFTP.Server.IP=192.168.5.5  
DNS.Server.IP=47.16.1.20
```

For UNIStim-based phones, the S1/S2 address corresponds to the Terminal Proxy Server (TPS) running on the IPCM Server. For SIP-enabled phones, the S1/S2 address will point to the SIP Application Server. For MCS5100 IP Phones, the UDP Port used for UNIStim protocols is 5000. The UDP port used for SIP protocols is 5060.

3. TFTP Server Files (2004tftp.cfg)

The following example shows the 2004tftp.cfg file, which resides on the master TFTP server. The configuration file has three sections (DEVICE_CONFIG, LANGUAGE, and FW). Each section contains a pointer to an optional download TFTP server where the corresponding data, language, or firmware files reside. If all files are to reside on a single TFTP server, (that is, on the same server that contains the configuration file [2004tftp.cfg]), then you must comment out the SERVER_IP and SERVER_PORT addresses.

2004tftp.cfg

```
[DEVICE_CONFIG]
DOWNLOAD_MODE AUTO
VERSION 000020
FILENAME 2004sysConfig.dat
# SERVER_IP 0.0.0.0
# SERVER_PORT 69
```

```
[LANGUAGE]
DOWNLOAD_MODE AUTO
VERSION 000002
FILENAME Francais.lng
# SERVER_IP 0.0.0.0
# SERVER_PORT 69
```

```
[FW]
DOWNLOAD_MODE AUTO
VERSION 0692D93c08
FILENAME 2004SIP.img
#FILENAME 0604D98.bin
# SERVER_IP 0.0.0.0
# SERVER_PORT 69
```

Each section contains a DOWNLOAD_MODE and VERSION parameter. The DOWNLOAD_MODE parameter controls whether the corresponding download is forced or conditional. A value of FORCED forces the corresponding file to be downloaded, regardless of the VERSION. For example, you can use a value of FORCE in the FW section to force a downgrade of phone firmware. Use DOWNLOAD_MODE = AUTO with the VERSION value. At initialization, an IP phone running SIP-enabled firmware queries the TFTP server for the various VERSION values. If a VERSION value is greater than the value cached on the phone, then a data update occurred and a download takes place of the corresponding file defined on the FILENAME parameter.

The VERSION number in the DEVICE_CONFIG section is any six-digit alphanumeric value. Any change to the 2004sysConfig.dat file (described next) should coincide with an increment of the VERSION value in the DEVICE_CONFIG section. The incremented value indicates that new data is available and a download takes place of the 2004sysConfig.dat file the next time the phone boots.

The VERSION number in the LANGUAGE section is ignored. Rather, the language file timestamp determines whether a more recent file is available for download. Ensure that the language file timestamp is appropriately dated.

The VERSION value in the FW section must match the firmware version ID, provided by Nortel, of the corresponding firmware file. New firmware files should have a version ID that is alphanumerically greater than

older firmware files. If the version ID is alphanumerically greater than the value cached in the phone, the firmware file is downloaded.

4. TFTP Server Files (2004sysConfig.dat)

The following example shows the 2004sysConfig.dat file. As discussed previously, this file can reside on the master TFTP server (if you use only a single TFTP server) or on a separate TFTP server. Use the data file to customize the SIP phone. The file does not apply to phones running UNISim-based firmware.

```
2004sysConfig.dat
SIP_DOMAIN1 nortel.com
SIP_DOMAIN2 nortel.com
DNS_DOMAIN nortel.com
FORCE_BANNER Yes
UPDATE_USERS Yes
DEF_USER1 userid?
DEF_USER2 userid?
SIP_PING YES
DST_ENABLED YES
TIMEZONE_OFFSET -18000
VMAIL 64167530#
VMAIL_DELAY 1000
DEF_LANG English
MAX_INBOX_ENTRIES 100
MAX_OUTBOX_ENTRIES 100
MAX_REJECTREASONS 5
MAX_PRESENCENOTE 5
MAX_CALLSUBJECT 5
BANNER Billerica SIP Client
DEF_AUDIO_QUALITY High
DEF_DISPLAY_IM NO
AUTO_UPDATE NO
AUTO_UPDATE_TIME 0
```

Most of the fields are self-explanatory. Use the DEF_USER1 field to prompt users for their user ID at initial login. The user ID should be a generic value, not a unique user ID for a specific user. You can also provision, for example, the SIP domain, voice mail number, and display banner.

The AUTO_UPDATE field controls whether the phone sends daily queries to the TFTP server to check for updates. If the value is YES, the AUTO_UPDATE_TIME field becomes relevant and specifies the seconds after midnight (with a random offset up to one hour to avoid mass simultaneous queries), after which the phone queries the TFTP server for automatic updates. The AUTO_UPDATE field simply provisions the phone to send periodic queries to the TFTP server. Parameters provisioned in the 2004tftp.cfg file govern the actual download of new data (configuration, language, and firmware), as discussed previously (DOWNLOAD_MODE, VERSION, language file timestamp). Coordinate any manual changes to the 2004sysConfig.dat file with an increment of the VERSION parameter in the DEVICE_CONFIG section of the 2004tftp.cfg file to trigger the download of the modified 2004sysConfig.dat file.

5. Upgrading to SIP-enabled firmware

The upgrade from UNISlim-only firmware to SIP-enabled firmware requires both the IPCM service and a TFTP server. After the upgrade with SIP-enabled firmware, all subsequent upgrades require only a TFTP server and no longer require the IPCM service.

Although the firmware file is on the TFTP server, the initial firmware download, converting from UNISlim-based firmware to SIP-enabled firmware, originates directly from the IPCM/Prov server. Firmware files reside in /IMS/uftp/data on the IPCM/Prov server. The firmware download from the IPCM/Prov server uses UNISlim encapsulated in Reliable UDP (RUDP). All subsequent firmware downloads originate from the TFTP server and use TFTP-encapsulated in UDP.

The following procedure describes the steps necessary to upgrade a UNISlim-base phone to a SIP-enabled phone:

Step 1: Download and distribute TFTP/Firmware files

Download the SIP IP Phone firmware and the corresponding TFTP Server files from the [Nortel EMS Software Distribution](#) Web site. Distribute the files to a TFTP server. Customize the 2004tftp.cfg and 2004sysConfig.dat files as described in earlier section. Rename the SIP-enabled firmware file (0692D93.bin) to 2004SIP.img if necessary.

Step 2: Customize the SipUpgradeConfigFile.txt files

Customize the SipUpgradeConfigFile.txt files that reside in /IMS/esm/data/esm/config/ on the IPCM/Prov server, as described in earlier section.

Step 3: Provision the IP Client Manager

From the System Management Console (SMC), provision the IP Client Manager. Lock and Modify the IPCM Service. From the IP Client Manager tab, provision the following:

- Provision the version ID of the SIP-enabled Firmware (for example, D93 [0692D93.bin]).

- Provision the version ID of the SIP Transitional Firmware (for example, D97 [CT12D97.bin]). The Transitional Firmware is downloaded before the SIP-enabled firmware to provide a reliable flash file on the phone. After the Transitional Firmware download is completed, the phone immediately reboots and continues the upgrade process by downloading the SIP-enabled firmware.

- Check the Enable 2004 SIP Upgrade option. If this option is unchecked, UNISlim-based firmware is downloaded.

In the following example, the Phase 2 UNISlim-based firmware is D98 (0604D98.bin). The UNISlim-based firmware continues to apply to IP Phone 2001 and IP Phone 2002. Apply the changes and Unlock the IPCM service.

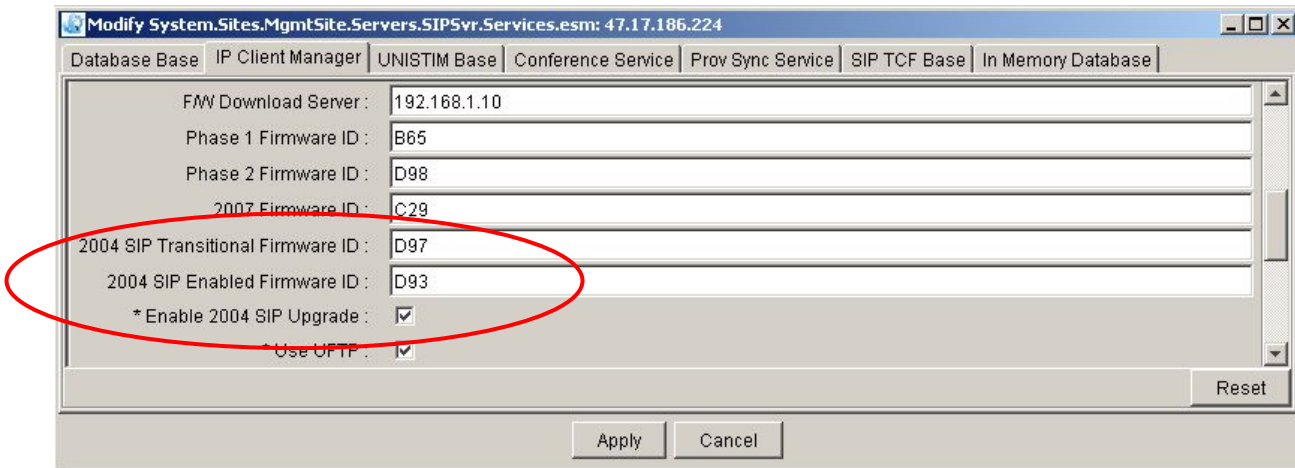


Figure 2 IP client manager tab

Step 4: Reboot the 2004 IP Phone

Assuming you have an existing phone running UNISstim-based firmware, provision the phone with the IPCM server IP address (S1/S2) and the appropriate UDP Port (5000). On the phone, select Config, select Display Version, and then select FirmW. The Transitional Firmware (CT12D97.bin) is downloaded from the IPCM server to provide an interim reliable flash file. After the download is completed, the phone immediately reboots and continues the upgrade process by downloading the SIP-enabled firmware (0692D93.bin), again from the IPCM server.

After downloading the SIP-enabled firmware, the phone again reboots. It then queries the TFTP server and downloads the 2004tftp.cfg file. As discussed previously, the values in the 2004tftp.cfg file (VERSION and DOWNLOAD_MODE) dictate the next steps. If new versions exist of the data file (2004sysConfig.dat), the language file (francais.lng), or the firmware file (2004SIP.img), then the corresponding files are downloaded. Because this is the first time connecting to the TFTP server, download the data and language files. Do not download the firmware file because it already downloaded from the IPCM server and the VERSION number in the 2004tftp.cfg file should not be alphanumericly greater than the value cached in the phone.

After the files are downloaded, the phone connects to the SIP Application server and you the MCS5100 Login screen appears. The TFTP server manages all subsequent firmware upgrades using the VERSION and DOWNLOAD_MODE options.

With SIP-enabled firmware, you can configure the phone to communicate using SIP or UNISstim protocols. Control the use of SIP or UNISstim protocols by provisioning the appropriate UDP Port and Server.Action on the phone.

For SIP protocols:

S1.Server.IP=192.168.1.10

S1.Server.Port=5060

S1.Server.Action=7

For UNISstim protocols:

S1.Server.IP=192.168.1.10

S1.Server.Port=5000

S1.Server.Action=1

After the upgrade with SIP-enabled firmware, the IP phone defaults to SIP protocols. The UDP Port is set to 5060 and the Server.Action is set to 7. If configured to use SIP, the IPCM service is no longer necessary.

6. Reverting back to UNISStim-based firmware

Upgrade again to UNISStim-based firmware by using the TFTP server. Refer to the example below from the 2004tftp.cfg file on the TFTP server:

```
[FW]
DOWNLOAD_MODE FORCED
VERSION 0692D93c08
#FILENAME 2004SIP.img
FILENAME 0604D98.bin
# SERVER_IP 0.0.0.0
# SERVER_PORT 69
```

Using the above example, you force a download to a previous firmware. Because the `DOWNLOAD_MODE = FORCED`, you download the corresponding file regardless of the `VERSION` field. Thus, the firmware `VERSION` need not be alphanumerically greater than the previous version. Using this example, you revert to a UNISStim-base firmware, 0604D98.

After you revert to UNISStim-based firmware, incorrect provisioning of a SIP-enabled phone can cause the first attempt to connect to the TPS on the IPCM server to fail. Specifically, its UDP Port and Server.Action can reflect SIP-enabled values:

```
S1.Server.IP=192.168.1.10
S1.Server.Port=5060
S1.Server.Action=7
```

These values cache on the phone. To use the UNISStim-based firmware, you must provision the phone as a UNISStim-based phone, specifically modifying the Port and Action fields:

```
S1.Server.IP=192.168.1.10
S1.Server.Port=5000
S1.Server.Action=1
```

After you run UNISStim-based firmware, upgrading back to SIP-enabled firmware again requires the IPCM server.

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