Nortel™ i2002™/i2004™/1120/1140

User's Guide for Asterisk™

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http://www.rejmi.net/

For chan_unistim 1.0.0.5 and/or Asterisk 1.6

Illustration 1: i2004   *Illustration 2: Nortel 1120*

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Nortel™ i2002™/i2004™/1120/1140

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Table of Contents

Introduction

This booklet is an *end-user* guide to using Nortel Networks[1] i2002, i2004, and 1120/1140 VOIP telephone sets with an Asterisk-based PBX[2]. It is not an engineering or configuration document; these are provided by Nortel Networks and by the Asterisk PBX community.

Asterisk (see http://asterisk.org/) is a fantastic invention, and the leading example of a new category of PBX or telephone system, called an "open source PBX". It was developed partly in reaction to the previous generation of "proprietary" PBX systems (including the ones from Nortel!) which gave the telephone system vendors all the power and the users none. Want voice mail? Pay extra. Want this or that feature? Pay extra. Want this other feature? Sorry, not available at any price. How frustrating it was! Asterisk is at the other extreme: you can make Asterisk do almost anything because, as its inventor Mark Spencer puts it, "It's only software!" Asterisk is implemented as an (impressive) software package that runs on ordinary server or desktop computers, so you don't have to buy an expensive telephone system to run it on. Asterisk is open source, so your administrator (or a software developer working for them) can modify it in any way they want. There are dozens of free and commercial add-ons for Asterisk.

You may have heard the term VOIP, standing for Voice Over IP. Some people think of commercial services like Skype® or Vonage® when they hear the term, but VOIP is much older than these services, and much more than them. At heart, VOIP simply means that voice data is being sent over a TCP/IP network. People have been doing this on the Internet for over twenty years and, in fact, much of the traditional home and business telephone traffic in western countries is already carried on private TCP/IP networks set up by the traditional telephone companies. Voice over IP is just so much easier than using the older technologies it replaces!

Most of the VOIP telephones used with Asterisk use the "SIP" network communications language or "protocol". SIP (Session Initiation Protocol) is a publicly-documented protocol, and there are dozens of handsets that use SIP. The Nortel Telephone sets documented here do not understand SIP (although it is available as an option for some models, their use with SIP is not included in this manual). These phone sets were designed to work with proprietary Nortel telephone systems such as "BCM" (Business Communications Manager) and "Succession". Perhaps you're reading this book because your system is being migrated from one of those to Asterisk. In these systems, network communication is handled using a protocol named "UNISTIM", or Universal IP Stimulus. UNISTIM was invented by Nortel and is not publicly documented. This means that somebody had to figure out how UNISTIM works. That somebody is Cedric Hans, and the program he wrote is called "chan_unistim". This program is free and open source like Asterisk itself; in fact, in 2007 it became a part of Asterisk (versions 1.6 and higher). This book presumes that your administrator has already taken care of making sure that chan_unistim is installed and configured in your Asterisk system.

This lack of protocol documentation also means that some of the features you may be used to are not

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1 Nortel Networks was previously called Northern Telecom, and before that it was called Northern Electric, back when they made rotary telephones as a Canadian subsidiary of Western Electric, part of AT&T. Nortel rose to fame and power during the Internet boom, and fell with it during the crash, losing a lot of shareholders a lot of money. But through it all, they kept designing and making good telephone sets, like the ones described here. Many of the terms in this book are trademarks or claimed trademarks of Nortel Networks Inc.

2 PBX stands for Private Branch Exchange; I'll use the term to mean any in-house (or in-company) telephone system.

yet available with UNISTIM. Blame Nortel for this (and, if you're interested in the "politics" of this, see the paper <u>Why hardware documentation matters so much and why it is so hard to get</u> by Theo de Raadt of the OpenBSD project). However, despite these obstacles and issues, you'll see in this book that Asterisk with UNISTIM phones provides a totally usable telephone system!

Like any other business telephone system...

You will find most of the basic functions the same but, as always, "the buttons are in a different place," meaning that you may have to learn some new ways of getting the phone to work for you. This guide will help you find your way around. In the process you'll be learning some things that apply to any telephone set using the Asterisk PBX as well as some things that only apply to this particular type of telephone set; I'll try to help you keep those straight so that if your telephone set gets replaced later you'll know which skills you can take with you (some of the other phone sets are not yet as well documented on Asterisk).

Illustration 3: The i2004 in Charcoal Gray, NTDU82

Getting Started: Installing The Telephone (Administrator May Have Done This)

Normally your Administrator may do this for you. Otherwise follow these easy steps, similar to "their" Quick-Start Guide. If your phone comes with a Nortel Quick-Start Guide, you should use that as it is slightly more specific than the following directions:

Unpack the phone and make sure you have all of the following pieces:

– main telephone unit

– base or "footstand" (on i200x; the 1120/1140 ship with this installed)

– handset and curly cord for handset

– network cable

– AC adapter if required (see below)

For 1120/1140, start by opening the footstand carefully. There is a latch behind the bottom of the phone and a release near the top of the phone. XXX explain better. Once you have this spread out, unlatch and release the base cover (See Figure XX).

Start by routing the power cable and curly handset cable through the opening in the footstand. You don't strictly have to do this now, but it's a one-minute job now and a very frustrating ten-minute job if you try to do it after you've assembled the stand onto the phone, so do it now.

FIGURE routing the cables.

Some organizations will have separate voice and data networks, so be sure you plug into the correct network port!

Your telephone set needs power, which it can get in one of two ways:

– from the provided AC power adapter;

– via "Power Over Ethernet," or POE for short. POE is more convenient because you only have one cable to connect, not two. On the other hand, it requires a specially-built network connector (hub or switch or special cabling) at the other end.

If your administrator didn't tell you which way to power your phone, try plugging the telephone into the specified network port. If it doesn't start booting up in a few seconds (see Initial Configuration below), then you'll know you need to use the power adapter.

If using a power adapter, make sure you have the correct one! The i200x and the 1120/1140 use very different supplies, but they have the same plug! At the very least putting the wrong supply will not work; at worst, it may destroy the phone and/or the power supply; this could get very expensive!

Another networking choice is whether to use the "Built-in switch". This allows your telephone and your desktop computer to share a single network cable. In this scenario you plug the cable from your network into the top-most network port, and the cable to your computer into the network port below it (see figure). Be aware that some of the i200x models only provide 10/100 network speed, which is plenty for VOIP but not so good if you have a Gigabit (10/100/1000) network in place.

Once you have all the cables that you're going to use routed through the footstand, it's time to assemble the footstand onto the telephone set.

FIGURE assembling the footstand

Note: if you want to mount your i2004 telephone set on the wall, you can order the *Nortel Wall Mount for Nortel I2004, M3903, M3904, M3905*, Model # NTMN15CA70E6, from your friendly neighborhood Nortel dealer. The 1120/1140 footstand doubles as a wall mount.

Initial configuration (Administrator May Have Done This)

To reconfigure the phone set, you must get its attention very early on in its boot cycle. When you apply power to the i200x telephone set, after about four seconds the Message Waiting light will flash, along with most of the indicators on the LCD panel. On the 1120/1140 phones, the lights will come on for about sixty seconds, the the phone will play a little tune. In either case, a second or two after that, the words "Nortel" or "Nortel Networks" will appear.

You have **one second** from the appearance of these words to interrupt the boot by pressing all four soft buttons under the LCD panel, in order, from left to right. About the best way that works all the time is to hold your finger over the left button and, as soon as the words Nortel Networks appear, slide it to the right across all four buttons. If you see a message containing the software version or about "Starting DHCP", you were too slow. Cycle the power off and on again, and try again.

If you were quick enough, you'll now see the prompt

USE DHCP? 0=None, 1=Yes

If you're using partial or full DHCP, press 1. You have to use the (BKSP) soft key if there is a zero showing, because there's only room for one digit. Then press (CONT) for continue.

You then have to press 0 for full DHCP or 1 for Partial DHCP. Full DHCP is when your DHCP server has been set up to give out a special Nortel-specific string containing all the "contact information" for the telephone sets to find the Asterisk server.

If you're not using DHCP, you can now start entering the phone set's IP address in response to "S1 Server IP", using the "*" key for ".". So 192.168.1.100 would be entered as

192*168*1*100 (CONT).

Now, for no DHCP or partial DHCP, you will be prompted similarly for the Asterisk Server's IP address and Unistim Port number (5000 is a good choice) and XXX whatever else it takes.

When you finish, the phone set will continue booting and try to contact the Asterisk server. If it works you should be rewarded with a welcome screen (see "Normal Usage" below. If you get a message about "not registered in unistim.conf", or a blank screen, or "server unreachable", see "Troubleshooting" below.

Using Your Telephone

Controls and Buttons

There are a lot of buttons on these phones, and they're in different locations on each of the four models. Standard features are listed in Table 1.

Name	Image	Meaning
Dialpad		Standard telephone dialpad
Volume Up/Down and Mute		Ringer volume/sound volume; mute cuts off sound
Bookmarks		All but last are speed dial; last functions like Hands Free
Left/Up/Down/Right navigation		See "Call History"

Table 1: Controls

These phones can be obtained with "international symbol" buttons or plain text buttons. If your phone has symbols and you prefer buttons with words, you can obtain replacement buttons from Nortel or from third parties such as Takson (http://www.taksontech.com/). Table 2 is a list of all the buttons.

Text	Image	Meaning
Copy		
Directory		
Expand		
Goodbye/Hangup		Disconnect call
Handsfree		
Hold		Place call on hold
Msg/Inbox		History of incoming calls
Quit		
Services		
Shift/Outbox		History of outbound calls

Table 2: Buttons

Initial Display

When your phone is up and running, it should display the welcome screen. The contents are largely set by the administrator, but normally the "main screen" contains:

- the company or system name (only twelve letters on the i200x, 24 on the 1120/1140, so "Dionysius & Terrapin And Partners" will need to be shortened), plus the date and time;

- your name and/or extension number;

- the telephone set's IP or network address (you normally don't need this, but it's nice to be able to "ping" your phone from your computer or elsewhere on the network for troubleshooting purposes).

The contents of the four or six line key buttons at the sides of the LCD panel will vary. Obviously designed by a computer geek, these buttons are numbered counter-clockwise from the lower right (see figure).

The first button (colored light green on most sets) is the line button. The present version of chan_unistim only supports one line per telephone set, so it is always assigned to this button. Pressing it is like a shortcut for hands-free; it basically grabs the line or answers an incoming call.

The other five lines will usually be assigned to various shortcuts such as direct access to your voice mail, speed dials, pager access, Asterisk demos, video games, or whatever.

Calling Internally

To make an inside call, you normally just pick up the handset, or press the Line 1 key for hands-free, and then dial the internal extension, and press (CALL). As a shortcut, you can just dial a number and press Call. You should quickly either get a ringing sound or a busy signal, and an indication on-screen of your call's progress and duration (at this time it says Duré for Duration; this has apparently not been translated because the LCD has only four character spots where that has to appear).

Calling Outside

To make an outside call, pick up the handset or press one of the hands-free keys. You may have to dial 8 or 9 for outside local calls and 1 or 011 for outside long-distance, but you might not have to; it all depends on how your Asterisk administrator has configured the "dial plan" in the configuration file (extensions.conf). Your administrator will give you this information.

Answering a Call

To answer an incoming call, just pick up the handset or press one of the hands-free keys. Speak normally as you would on any telephone.

During the course of the call you may need to place the other party on hold, or transfer them to another extension. This is described below.

Call on Hold

To place a call on Hold, just press the Hold button (FIGURE). You can then press the TRANS softkey and transfer (as below), or, if you want to hang up your handset without terminating the call, press the Hands Free button before you do. *If you just press Hold and then hang up, the call will be dropped.*

i2002/i2004 Note: There is no separate Hands Free button on these phones, so if you answered or originated the call by picking up the handset, the only way to put someone on hold while you look around for something is to press the hold button and then set the handset down beside the phone.

Transferring a Call

To transfer a call, press the (TRAN) soft key. You should get a dial tone; dial the extension to which you wish to transfer the call. When the called party answers, you can inform them of the incoming call and then hang up.

Call Park

To place a call in "park" so that another telephone system user can pick it up, XXX

Multi-way calls

XXX

Voice Mail

Message Waiting

If your administrator has configured this, your phone will display a red light in the upper right (1120/1140) or a flashing red light at the top (i200x).

To access your voice mail, you may be able to use the "Msg/Inbox" button (1120/1140), press one of the Soft Keys marked for Voice Mail, or you may have to dial a special number such as 700.

Asterisk voice mail identifies itself as such, and requires that you enter the password (initially set by the administrator). From here on it is prompt-based, like most modern voice mail systems.

General Asterisk Features

Soft Keys Configuration

The four or six soft keys on either side of the screen are completely configurable by the Administrator, but you can't change them from your set (yet). If there is a particular shortcut you'd like to see there, it's between you and your administrator. It's common to have one button that picks up your line, one for your mailbox, and the rest be speed-dials with one of several icons beside them.

Things you can change

Buttons that don't work yet

There are quire a few buttons that don't work yet. They're harmless. Support for them may get added as clever developers figure out how to make them work with Asterisk.

Moving Your Telephone

Unlike some older telephone systems, there is nothing set-specific about the port your telephone is plugged into. There is a non-changeable number stored inside the telephone when it is built, called the MAC Address[3]; Asterisk's chan_unistim uses this to identify your particular telephone set. You should be able to move your telephone set to any location you like, as long as you can plug it into a port on the same network. Some organizations will have separate voice and data networks, so be sure you plug into the correct network port! Check with the administrator if in doubt.

If you need to pack up your i200x phone for shipping and decide to remove the base or "footstand", be careful. Press the slider bar at the back of the phone, carefully spread the back away and, when it seems almost off, push down so the two clips disengage (See Figure XXX). Oh, you weren't careful enough? If you break it, the replacement part can be ordered as Nortel part number P0886045 (for the i2004).

If you need to pack up an 1120/1140, press the slider and gently "close" the footstand so it is parallel to the front of the case. Be VERY careful when opening it after this; you have to press the release button and the slider button at almost the same time, and gently unfold the base until the phone is at the angle you want.

Troubleshooting

Phone completely dead

There are several possible causes:

Bad hardware; get your administrator to replace it.

Power and/or network cables not plugged in fully; make sure they're seated all the way in.

Network outage or bad cable; check with your administrator. Try another network cable or port if available.

In any case, you can try rebooting your phone by removing the power source for ten seconds and watching to see how it reboots.

Phone flashes red light then says "Server unreachable, starting in NN seconds", over and over

The phone is not able to contact the Asterisk server. Either the server is down, or the network cable isn't working or isn't plugged in.

You can hear the other person but they can't hear you, or vice versa

This is either bad hardware in your phone or, more likely, a configuration issue. Contact your administrator.

"Sorry, this phone is not registered in unistim.cfg. MAC = xxxxxxxxxxx"

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3   Nothing to do with Macintosh computers, the MAC or **M**edia **A**ccess **C**ontroller address is the "network hardware" address; every Mac, PC, server, laptop, printer, etc., that is networkable is assigned one or more such address, and they are supposed to be unique world-wide. This number is printed on the bottom of your telephone looking something like MAC 00 12 34 56 78 9A BC – a "hexadecimal number" with numeric digits and letter A-F - and may show up in UNIX or Linux (if you run a combined network) if you type "arp -a" in a terminal window.

Like it says, your phone is not configured yet. Your administrator needs to edit the named configuration file and then to "unistim reload" in Asterisk Console mode, or equivalent in the GUI. It may be helpful to copy your phone's 12-digit hexadecimal MAC address from this message and include that with your request.

Diagnostics

There is a small number of diagnostic self-tests you can run inside the phone. Not all of them work in all versions of the phone. *Some of these may lock-up your phone requiring a power-cycle.* These all start by pressing the "push-ups" sequence Mute-Up-Down-Up-Down-Up-Mute then a single key:

Key	Description	Note
0	Display firmware revision	Displays a number like 6.20 in the text area
1	RAM check	Locks up the phone
2	DTIC check	Whatever that is
3	EEPROM check	
4	Transmit/Receive levels	
5	Loopback test	
6	Unassigned?	
7	Display built-in f/w version	
8	TCM BERT test	Whatever that is
9 + RELEASE	Reset	
*2	RUDP on/off	
*0	Display downloaded firmware version	

More About Asterisk

Asterisk is a terrific system and, unlike most telephone systems, the developers don't try to keep secrets about how it works or how to do things. Asterisk can run on almost any small computer[4]; you don't

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4   Asterisk runs on almost any AMD/Intel PC, Macintosh (running Linux), Arm-based computer (Thecus/IOData, some LinkSys routers, etc.), running almost any operating system (Linux, OpenBSD/NetBSD/FreeBSD, and sometimes

have to buy expensive special hardware to run it[5]. The programmer's source code for Asterisk is freely available, and there is a large community of people that can help you with Asterisk. You can, without spending any money at all, set up your own system and learn enough about Asterisk to help your administrator, or even to become an Administrator (some people find it a lot of fun to administer their own Asterisk installation at home). If you want to start learning more about Asterisk, you should read the book *Asterisk: The Future of Telephony*. You can buy this book (Second Edition) at bookstores or online, or you can download the PDF for free from *AsteriskDocs.org.*

Asterisk can be administered either by editing text-based "configuration files" - the geek way – or by using one of several Web-based "GUI adminstration" tools for Asterisk. You can start either way, but if you really want to learn Asterisk well, you will someday need to get down to the raw configuration files.

O'Reilly also publishes a book called VOIP Hacks, though I believe it's not exclusively about Asterisk. You can also get a lot of geek-level information on Asterisk and VOIP at several "Wiki" sites around the Internet, including the newer O'Reilly "etel wiki" at http://etel.wiki.oreilly.com/wiki/index.php/ (particularly my article there for administrators, http://etel.wiki.oreilly.com/wiki/index.php/UsingNorteli2000Phones) and the more established http://www.voip-info.org/wiki (particularly http://www.voip-info.org/wiki-Asterisk+UNISTIM +channels).

Microsoft Windows). Asterisk is developed on Linux so that system has the most complete support.
5   Though it's often a good idea to buy one or more of Digium's "line cards" to connect phone lines and/or analog phone sets; this is discussed in the Asterisk book mentioned above.

My Settings

This page is for you to record your settings and any other useful information. You may wish to photocopy this page so you won't have to scribble all over it if these settings change. Your administrator may provide copies of this page with some or all of the information filled in.

User of this phone (name):	
My number or extension:	
Phone System Administrator:	
Administrator's extension:	
My IP Address (for troubleshooting):	
My Network Port (if known):	
To make an internal call:	
To make a local call:	
To call internationally:	
Other Settings or notes:	