TELULAR CORPORATION
Product Specification

Phonecell SX6P CDMA
200 Series

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1.0 Overview

1.1. Purpose and Scope

This document contains specifications for the Phonecell SX6P cdma2000-1XRTT series 200 fixed wireless phones. The scope of this document is to specify the unit's top-level features and functions.

1.2. Introduction

The Phonecell SX6P cdma2000-1XRTT phone is an integrated unit comprised of an attached handset, keypad, LCD display, and a CDMA cellular radio. Its appearance is similar to that of a standard phone.

1.3. Summary of Capabilities

- Supports call-waiting, three-way calling, call-forwarding and call-transfer as defined in IS-2000A
- SMS text messaging via multi-tap keypad
- Call Logs – Missed, Received and Dialed
- Speed dial function
- 20 digit address dial buffer, 36 digit supplementary service dial buffer
- Automatic End-of-Dialing
- 99 entry phone book
- Caller Identification (if available on the network)
- Supports single-key voice mail access
- Feature programming with nonvolatile memory to store parameters
- Integrated handset, keypad and LCD display
- Monitor phone feature
- R-UIM (optional)
- 1XRTT high speed packet data

1.4. Cellular Network Usage

The Phonecell SX6P phone operates on a standard cdma2000-1X network in the 800 MHz frequency band. An 8K EVRC vocoder is supported. Over-the-air activation (OTASP/OTAPA) is supported. The unit is fully compliant with CDMA Development Group (CDG) Phase 1 and Phase 2 requirements.

1.5. Power Supply

The phone is powered by a remote external power supply. An optional internal battery is available for operation of the unit during conditions of primary AC power failure.

2.0   User Interface

In the paragraphs below, some of the parameters are programmable. For a detailed description of how to program the parameters, refer to "Product Operation Requirements, SX6P cdma2000-1X, Fixed Wireless Phone" (POR), Telular document number 90021301.

2.1.   Hook Operations

2.1.1. Recognition of Seizure (Off-Hook)

The phone recognizes an off-hook by the handset as a request for service. The phone will return dial tone to the handset or speaker when it is ready to accept address signals. To avoid the effects of hook-switch bounce, the off-hook condition will not be recognized for a minimum duration of 200 ms.

2.1.2. Recognition of Release of Seizure (On-Hook)

The phone recognizes release of line seizure after the amount of time for the maximum duration of a hookflash has elapsed (see paragraph 2.4).

2.2.   Tone Generation

Tones are composed of one or two superimposed single frequency tones. Tones and cadences set as defaults in the phone are consistent (where possible) with those commonly used on landlines in North America. A menu selection provides dial tone commonly used in Latin America, Eastern Europe, China, Nicaragua, or India.

2.2.1. Service Dial Tone

When the phone finds service on a cellular carrier network that the phone is registered with, standard dial tone is generated within 100 ms of recognition of line seizure.

2.2.2. Non-Registered Dial Tone

A non-registered dial tone is generated when service is found on a foreign network .

2.2.3. No-Service Tone

A no-service tone is generated when the phone has not detected cellular service.

2.2.4. Other Tones and Announcements

The phone maintains an open audio path when in a call or call setup in order to receive progress tones and/or announcements provided by the cellular carrier or Telephone Company when connected. Typical indications from the network may include:

Subscriber-not-available announcement

Audible ring tone (ring tone heard by calling party)

Subscriber-busy tone

System-busy tone (also known as reorder tone and congestion tone)

Special Information Tone (SIT)

Call-waiting tone

Action-acknowledgment tone

2.2.5. Reorder Tone

In the event of an outgoing call setup failure, the phone presents the current dial tone to the user

when it recognizes the failure. The outgoing call can be retried immediately by the user upon hearing the dial tone.

2.2.6. Receiver Off Hook (ROH) Tone
If the handset is left off hook for a programmed period of time with no dialing or call activity, an ROH tone is presented to notify the user to hang up the phone. The ROH tone is quite loud and is applied such that the full amplitude is not presented immediately, but steps up to full amplitude over a 10 to 20 second time period.

2.2.7. Post Receiver Off-Hook Operation
After the ROH tone duration has elapsed, the phone can stop or continue the ROH tone, depending on the setting of the post ROH option. If post ROH is enabled, the phone checks periodically to see if the handset is on-hook. If the handset is on-hook, the phone returns to its normal operation. If post ROH is disabled, the ROH tone continues until the handset is returned to on-hook status.

2.2.8. Error Alert Tone
As a response to certain incorrect user actions, the phone generates an error alert tone.

Table 1 - Default Error Alert Tone Configuration

Frequency	Default: 950/1400/1800 sequential (three tones)
Audio Gain	Default: -6 dB *
Cadence	Tone 1 on T1, off
	Followed by tone 2 on T2, off
	Followed by tone 3 on T3, off
	All tones off
	Default: T1= T2 = T3 = 340 ms

* relative to Rx Audio Gain setting

2.2.9. DTMF Tones
When the phone handset or speaker is off-hook, DTMF tones corresponding to the keypad key pressed will be generated. For compatibility with ANSI T1.401-1988, the minimum inter-digit interval shall be 45msec, the minimum pulse duration shall be 50msec, and the minimum duty cycle shall be 100msec.

2.3. Dialing

2.3.1. Dialing Buffer
The phone has a 20-digit buffer for address dialing.

2.3.2. Recognition of Address Signaling
The phone removes dial tone within 100 ms after the start of the first address signal.

2.3.3. End of Address Signaling

The phone originates the call after the first of any of the following conditions is satisfied:

Recognition of a previously dialed phone number (zero-delay dialing).

> The recognition of previously dialed telephone numbers is a heuristic algorithm that will build a list of the most frequently dialed numbers over a period of time. This list is not permanent; it is erased if the phone loses power. If erased, the list is rebuilt based upon the user's current dialing activity when the phone is powered on.

> This feature is enabled by default, but can be programmed to be disabled.

A programmable time has elapsed after last address signaling activity (auto send delay). The default value is set to 3 seconds.

Hookflash (see paragraph 2.4).

Redial

Speed Dial

Phone Book Dial

2.4. Hookflash

During a dialing sequence (before a call is connected), a hookflash will initiate the call immediately. While in a call, the phone transmits a "SEND" command to the cellular carrier equipment after a hookflash. If the handset is off-hook and an incoming call alert is received, the phone answers the incoming call when a hookflash is performed.

Table 2 - Hookflash Recognition Duration

Duration minimum	240 ms
Duration maximum	1000 ms

2.5. In-Call DTMF Signaling

While in a call, the phone performs out-of-band DTMF signaling, which will convey to the cellular carrier infrastructure any use of the following dialed digits:

<div align="center">1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *, #</div>

The phone transmits over-the-air messages that the cellular infrastructure uses to create the tones.

2.6. Alerts

2.6.1. On-Hook Call Alert (Ring Type)

When the phone receives a call and the handset is on-hook, the LCD displays the incoming call, and a ring signal is produced using the built-in speaker. The ring signal may be disabled.

When a call is answered by either the handset going off-hook, or by using the speakerphone, the phone ceases the ringing signal within 100 ms.

2.6.2. Off-Hook Call Alert (Ring Tone)

The phone provides an off-hook call alert to the speaker or handset if there is an incoming call while the phone is in a call or is dialing a call.

When the phone is in a call or dialing a call, the off-hook call alert ceases within 100 ms of the

end of a hookflash.

2.6.3. Ring Volume

The volume of the ring signal is adjustable in approximately 3dB steps over a four step range. The ring signal may also be silenced.

2.6.4. One-Minute Alert

A short beep tone alerts the user after every minute of a call. This alert may be disabled.

2.6.5. Service Alert

An alert sounds when the phone loses or gains service, including entering or leaving a service area when the phone is on a mobile platform. This alert may be disabled.

2.6.6. Alarm Tone

The alarm tone may be selected from a list of available tones.

2.6.7. Voicemail and Text Message Alert

An audible alert will be generated when a message is waiting and the Phone is on-hook. If the Phone is off-hook, or there are no messages, the alert will not sound. The volume is field programmable. Note that availability of this feature is network dependent.

Table 3 - Voicemail Alert Configuration Table

Frequency	1 kHz
Cadence	T1 = 250 ms on, T2 = 100 ms off, T3 = 100 ms on, T4 = 250ms off. This cadence is presented twice per period.
Period	Every 5 seconds
Volume	High: 0 dB *
	Low: -6 dB *
	Off

* relative to nominal volume setting

2.7.   Vertical Service Codes

The Deskphone will transmit Vertical Service Codes (usually in the format of "*XX") to the network as described in TIA/EIA-664. These are used for advance calling features such as call forwarding and three party conference calling. Note that each carrier will decide on which codes it will support in its network.

2.8.   Speakerphone Feature

2.9.   Monitor

The Deskphone has a monitor feature. This feature will send the handset earpiece audio to a speaker in the Deskphone. The handset microphone will be disabled while using this feature. Pressing the Monitor Phone key while the handset is on-hook will activate the monitor feature. All dialing features, including redial, will operate normally, except the audio is presented at the speaker instead of the handset. When the handset goes off-hook, the audio is then sent to the handset, and the handset microphone is enabled.

While in a call, pressing the Monitor Phone key will activate monitor mode and send handset earpiece audio to the speaker and disable the handset microphone. Lifting the handset will terminate the monitor feature.

Note that there is no microphone other than the one in the handset. This is not a speakerphone.

2.10. Phone Book

The phone has memory available to store up to 99 names and associated directory numbers. While in the phone book, pressing the star (*) key will enter a backspace, the pound (#) key will enter a blank space, and the MSG key will toggle between upper and lower case letters. Multiple presses of a key will cycle through its several letters and number.

Instructions to view, add to, and edit the phone book entries are given in the Product Operation Requirements document and the User's Manual. Instructions to dial from the phone book are also given.

2.10.1. Speed or Memory Dialing

The phone provides a speed or memory-dialing feature. This allows automatic dialing of a phone number by simply pressing a single key or two keys. Any entry in the phone book can be used.

Instructions for speed dialing are given in the Product Operation Requirements document and the User's Manual.

2.11. Call Logs

The phone has three call logs: Missed calls, Outgoing calls and Incoming calls. Each log will store a maximum of ten numbers. The phone must remain on-hook to enable display of the logs. Taking the handset off-hook, or not entering a key for one minute will cancel the operation.

The call logs may be viewed or erased. Calls may be dialed from the log entries.

The length of the last call may be displayed, as well as total air time that the phone has used since the last air time calculation was cleared. (Note that this air time may not agree with air time calculated by the carrier.)

2.12. Multiple Language Support

The SX6P-200C Deskphone supports the following languages: English and Spanish.

2.13. Time/Alarm Functions

An alarm may be set, one time or repeating daily. The date and time format may be changed.

2.14. Panel Display and Controls

2.14.1. LCD Display

The phone contains a display that is pixilated. The display resolution will be 64 pixels high by 132 pixels long. The display will contain a top row of icons and three additional character rows below the icons. The icon row will contain the following from left to right: antenna with bars, roam indicator, alarm bell, message envelope, speaker, off hook, and battery charge level indicator. All icons will have the ability to flash along with all other characters on the other three rows. The rows below the icon row will be 16 characters wide and will be able to display alphanumeric and special characters. The display will also have adjustable contrast. The date and time may be displayed in the middle character row. A reverse contrast "P" shown at the end of the first character row indicates that the enhanced privacy mode is enabled.

2.14.2. Panel Controls

2.14.2.1. MENU
The Menu key accesses the Deskphone's menus.

2.14.2.2. MSG
The Message key is used to access voicemail or to send an SMS message. It is also used to toggle between upper and lower case letters when writing to the address book or SMS text.

2.14.2.3. CLR
The Clear key will clear an entry, erase a digit during entry, or go back one menu level.

2.14.2.4. STO
The Store key is used to store (or otherwise complete) an entry.

2.14.2.5. Keypad
The keypad has the digits 0 through 9 and special characters hash/pound (#) and star (*). It is used for all data entry.

2.14.2.6. Flash
The flash key can be used instead of the hook switch to produce a hookflash.

2.14.2.7. Redial
Pressing the redial key will cause the last dialed number entered to be dialed.

2.14.2.8. Up/Down Keys
When off-hook, the Up/Down keys control the volume of the earpiece in the handset or the speaker. The available range is ±6 dB of the nominal output level. Each adjustment is 2 dB.

2.14.2.9. Mute
Pressing the mute key will cause the audio at the handset or speaker (whichever is active) to be muted.

2.14.2.10. Monitor Phone
Pressing this key will activate/deactivate the monitor phone function.

2.14.2.11. Power On/Off
Pressing this key will turn the SX6 on/off.

2.14.2.12. Hold
While in an active call, the user can press this button to place the call on hold. The display will change from Active to Hold. To reactivate the call, press the HOLD button again and the display will change from Hold to Active.

3.0 Additional Information

3.1. Audio Performance

The audio performance specifications apply to both the handset and the speaker.

3.1.1. Noise

The phone has idle channel noise no greater than 30 dBrnC.

3.1.2. Frequency Response

The frequency response of the phone is 300 – 3400 Hz at –3 dB points.

3.1.3. Output Level

The audio output level can be programmed by the user to be Low, Normal, or High. The factory default setting is Normal.

The analog output circuitry should not cause clipping.

3.1.4. Input Level

The input level is not adjustable by the user.

3.2. Wireless Number Portability

The Deskphone supports Wireless Number Portability as described in TIA/EIA-41-D-PH3. Both the Mobile Directory Number and the Mobile Station Identifier are programmable.

3.3. Service Options

The Deskphone supports the following service options.

Table 4 – Supported Service Options

Service Option Class	Supported
EVRC Voice Service	3
Markov Calls (Rate Set 1)	32798
Markov Calls (Rate Set 2)	32799
Mobile Station Loopback	2,9

4.0 Air Interface Specifications

The Deskphone operates on a cdma2000-1X or IS-95 network per 3GPP2 specifications. The unit will operates on Band Class 0.

4.1. Band Class 0 Configuration

4.1.1. Operational Frequencies

Deskphone-to-base operational frequency range: 824 to 849 MHz.

Base-to-Deskphone operational frequency range: 869 to 894 MHz.

4.1.2. RF Power Output

The Deskphone complies with 3GPP2 C.S0011-0 (TIA-98-E) Band Class 0 Mobile Station Class III equipment. The nominal transmitter power output at the antenna connector is <0.2 W (23 dBm).

4.1.3. Receiver Sensitivity

Receiver sensitivity (0.5% Frame Error rate) measured at the antenna connector is equal to or better than -109 dBm across the receive band.

4.2. Over-the-Air Activation

The Deskphone supports Over-The-Air Service Programming (OTASP) and Over-The-Air Parameter Administration (OTAPA) as per TIA/EIA/IS-683A.

4.3. Vocoders

The Deskphone supports the 8K EVRC (Service Option 3) vocoder.

5.0 Power Specifications

5.1. Electrical Requirement

5.1.1. Power Dissipation
The maximum pulse input power of the Deskphone with full RF power is ≤ 9 W.

Average DC power input in standby (idle) state: ≤ 0.2 W at a DC input voltage of 5 volts

Average DC power input in call active state: ≤ 2.9 W at a DC input voltage of 5 volts.

5.1.2. DC Input Voltage
The Deskphone operates with a DC input voltage range of 5.0 volts nominal.

5.2. Recommended Power Supply
An external power supply is included with the Deskphone. Telular recommends that no other power supply be substituted for the one supplied with the Deskphone.

5.3. Battery
The Deskphone can accept an optional 1500 ma/H, NiMH battery, provided solely by Telular. This will provide a nominal 3-hour talk time, or a nominal 120 hours of standby time. With the optional battery installed, the Deskphone will automatically switch to battery operation when the loss of AC power is detected. When AC power is available, the battery will automatically recharge itself.

5.4. DC Input Voltage Interrupts
The Deskphone resets itself automatically if the DC input voltage is interrupted. There is no loss of programming information or features.

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Environmental Specifications and Regulatory Requirements

5.5. Environmental Requirements

5.5.1. Operating Temperature
−10º C (14º F) to +50º C (122º F)
Up to 95% relative humidity (non-condensing)

5.5.2. Storage Temperature
−40º C (-40º F) to +60º C (140º F)
Up to 95% relative humidity (non-condensing)

5.6. EMC Requirements

5.6.1. RF Emissions
The Deskphone meets the requirements of 47 CFR Part 15, Class B, for conducted and radiated emissions.

5.7. FCC Requirements
The Deskphone complies with 47 CFR, Part 22 (Band Class 0).

5.8. CDMA Development Group (CDG) Requirements
The Deskphone conforms to CDG Stage 1 and CDG Stage 2 requirements on Lucent, Motorola, and Nortel infrastructure.

6.0 Mechanical Specifications

6.1. Physical Dimensions
The phone measures 2.81" (71.3 mm) in height, 7.11" (180.5 mm) in width, and 8.54" (217.0 mm) in depth.

6.2. Weight
The phone weight (without external power supply components and internal batteries) does not exceed 1.6 pounds (0.73 kg).

6.3. Enclosure
The enclosure is pictured below. It is made of ABS plastic that meets the UL 94-V2 flammability specification. The color of the enclosure is charcoal gray.

6.4. Mounting
The phone is normally set horizontally on a flat surface. If desired, it may be mounted vertically on a wall by means of two wall screws (not included). The antenna elements must be vertical while in use.

External Connectors

7.1. Power Supply Connection

The Deskphone has 7-pin mini-DIN power supply connection. The table below shows the mini-DIN connector pinout.

Table 5 – Mini-DIN Pinout

Pin Number	Description
1	Debug RXD
2	Do Not Connect
3	Do Not Connect
4	Do Not Connect
5	Debug TXD
6	+5V DC
7	External Configuration
8	Signal Ground

7.2. Antenna

The Deskphone has a female 50-ohm TNC connector to connect an antenna. A dipole antenna must point directly upward while the unit is in use. Any antenna must be in a vertical polarization configuration for proper operation. An antenna cable, if used, should be kept as short as possible.

7.3. R-UIM Card

The phone has a compartment accessible to the user for a 3/5-volt miniature Removable User Identity Module; however, the R-UIM holder is an optional feature.