U.S. Department of Justice

Federal Bureau of Investigation
Washington, D.C. 20535

October 3, 2012

MR. ALAN BUTLER
ELECTRONIC PRIVACY INFORMATION CENTER
SUITE 200
1718 CONNECTICUT AVENUE, NW
WASHINGTON, DC 20009

Subject: CELL SITE SIMULATOR DEVICES

FOIPA No. 1182490-000

Dear Mr. Butler:

The enclosed documents were reviewed under the Freedom of Information/Privacy Acts (FOIPA), Title 5, United States Code, Section 552/552a. Deletions have been made to protect information which is exempt from disclosure, with the appropriate exemptions noted on the page next to the excision. In addition, a deleted page information sheet was inserted in the file to indicate where pages were withheld entirely. The exemptions used to withhold information are marked below and explained on the enclosed Explanation of Exemptions:

Section 552		Section 552a
☐ (b)(1)	☐ (b)(7)(A)	☐ (d)(5)
☐ (b)(2)	☐ (b)(7)(B)	☐ (j)(2)
☑ (b)(3) The National Security Act of 1947	☑ (b)(7)(C)	☐ (k)(1)
	☐ (b)(7)(D)	☐ (k)(2)
	☑ (b)(7)(E)	☐ (k)(3)
	☐ (b)(7)(F)	☐ (k)(4)
☑ (b)(4)	☐ (b)(8)	☐ (k)(5)
☐ (b)(5)	☐ (b)(9)	☐ (k)(6)
☑ (b)(6)		☐ (k)(7)

1015 page(s) were reviewed and **39 page(s)** are being released.

☐ Document(s) were located which originated with, or contained information concerning other Government agency(ies) [OGA]. This information has been:

☐ referred to the OGA for review and direct response to you.
☐ referred to the OGA for consultation. The FBI will correspond with you regarding this information when the consultation is finished.

☐ In accordance with standard FBI practice and pursuant to FOIA exemption (b)(7)(E) [5 U.S.C. § 552 (b)(7)(E)], this response neither confirms nor denies the existence of your subject's name on any watch lists.

For your information, Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA. See 5 U.S. C. § 552(c) (2006 & Supp. IV (2010). This response is limited to those records that are subject to the requirements of the FOIA. This is a standard notification that is given to all our requesters and should not be taken as an indication that excluded records do, or do not, exist.

☑ You have the right to appeal any denials in this release. Appeals should be directed in writing to the Director, Office of Information Policy (OIP), U.S. Department of Justice,1425 New York Ave., NW, Suite 11050, Washington, D.C. 20530-0001. Your appeal must be received by OIP within sixty (60) days from the date of this letter in order to be considered timely. The envelope and the letter should be clearly marked "Freedom of Information Appeal." Please cite the FOIPA Request Number assigned to your request so that it may be easily identified.

☐ The enclosed material is from the main investigative file(s) in which the subject(s) of your request was the focus of the investigation. Our search located additional references, in files relating to other individuals, or matters, which may or may not be about your subject(s). Our experience has shown when ident, references usually contain information similar to the information processed in the main file(s). Because of our significant backlog, we have given priority to processing only the main investigative file(s). If you want the references, you must submit a separate request for them in writing, and they will be reviewed at a later date, as time and resources permit.

☑ See additional information which follows.

Sincerely,

David M. Hardy
Section Chief
Record/Information Dissemination Section
Records Management Division

The enclosed documents represent the first interim release of information responsive to your Freedom of Information Act (FOIA) request.

Enclosure(s)

EXPLANATION OF EXEMPTIONS

SUBSECTIONS OF TITLE 5, UNITED STATES CODE, SECTION 552

(b)(1) (A) specifically authorized under criteria established by an Executive order to be kept secret in the interest of national defense or foreign policy and (B) are in fact properly classified to such Executive order;

(b)(2) related solely to the internal personnel rules and practices of an agency;

(b)(3) specifically exempted from disclosure by statute (other than section 552b of this title), provided that such statute(A) requires that the matters be withheld from the public in such a manner as to leave no discretion on issue, or (B) establishes particular criteria for withholding or refers to particular types of matters to be withheld;

(b)(4) trade secrets and commercial or financial information obtained from a person and privileged or confidential;

(b)(5) inter-agency or intra-agency memorandums or letters which would not be available by law to a party other than an agency in litigation with the agency;

(b)(6) personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy;

(b)(7) records or information compiled for law enforcement purposes, but only to the extent that the production of such law enforcement records or information (A) could be reasonably be expected to interfere with enforcement proceedings, (B) would deprive a person of a right to a fair trial or an impartial adjudication, (C) could be reasonably expected to constitute an unwarranted invasion of personal privacy, (D) could reasonably be expected to disclose the identity of confidential source, including a State, local, or foreign agency or authority or any private institution which furnished information on a confidential basis, and, in the case of record or information compiled by a criminal law enforcement authority in the course of a criminal investigation, or by an agency conducting a lawful national security intelligence investigation, information furnished by a confidential source, (E) would disclose techniques and procedures for law enforcement investigations or prosecutions, or would disclose guidelines for law enforcement investigations or prosecutions if such disclosure could reasonably be expected to risk circumvention of the law, or (F) could reasonably be expected to endanger the life or physical safety of any individual;

(b)(8) contained in or related to examination, operating, or condition reports prepared by, on behalf of, or for the use of an agency responsible for the regulation or supervision of financial institutions; or

(b)(9) geological and geophysical information and data, including maps, concerning wells.

SUBSECTIONS OF TITLE 5, UNITED STATES CODE, SECTION 552a

(d)(5) information compiled in reasonable anticipation of a civil action proceeding;

(j)(2) material reporting investigative efforts pertaining to the enforcement of criminal law including efforts to prevent, control, or reduce crime or apprehend criminals;

(k)(1) information which is currently and properly classified pursuant to an Executive order in the interest of the national defense or foreign policy, for example, information involving intelligence sources or methods;

(k)(2) investigatory material compiled for law enforcement purposes, other than criminal, which did not result in loss of a right, benefit or privilege under Federal programs, or which would identify a source who furnished information pursuant to a promise that his/her identity would be held in confidence;

(k)(3) material maintained in connection with providing protective services to the President of the United States or any other individual pursuant to the authority of Title 18, United States Code, Section 3056;

(k)(4) required by statute to be maintained and used solely as statistical records;

(k)(5) investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for Federal civilian employment or for access to classified information, the disclosure of which would reveal the identity of the person who furnished information pursuant to a promise that his/her identity would be held in confidence;

(k)(6) testing or examination material used to determine individual qualifications for appointment or promotion in Federal Government service he release of which would compromise the testing or examination process;

(k)(7) material used to determine potential for promotion in the armed services, the disclosure of which would reveal the identity of the person who furnished the material pursuant to a promise that his/her identity would be held in confidence.

FEDERAL BUREAU OF INVESTIGATION
FOIPA
DELETED PAGE INFORMATION SHEET

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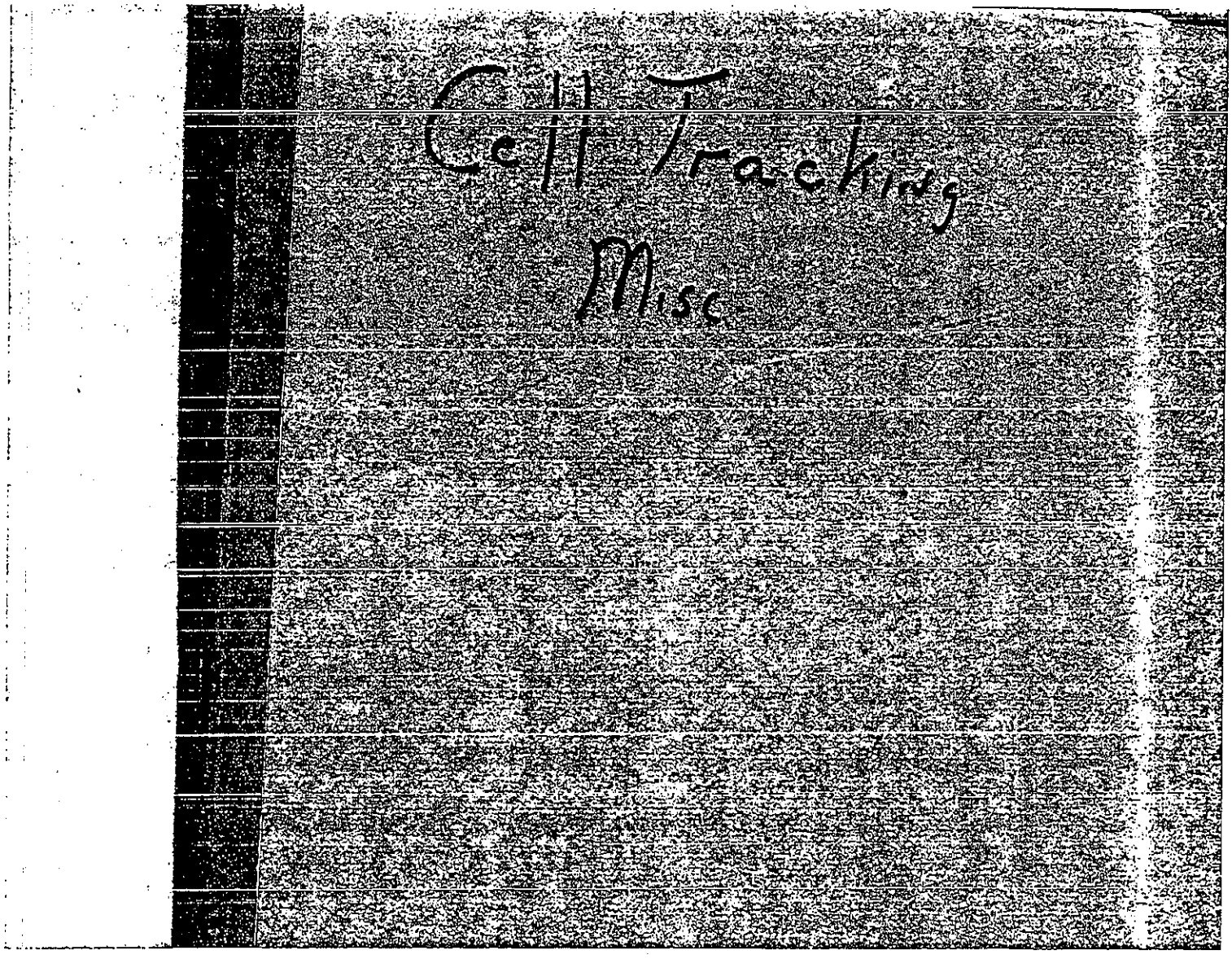
Cell Tracking
Misc.

CDMA Glossary A-Z

Access Attempt
A sequence of one or more access probe sequences on the Access Channel containing the same message. See also access probe and access probe sequence.

Access Channel
A Reverse CDMA Channel used by mobile stations for communicating to base stations . The Access Channel is used for short signaling message exchanges such as call originations, responses to pages, and registrations.

Access Channel Message
The information part of an access probe conssiteing of the message body, length field, and CRC.

Access Channel Preamble
A sequence of all-zero frames sent at the 4800 bps rate preceeding an Access Channel message. It aids the base station receiver in detecting and syncronizing the Access Probe.

Access Channel Request Message
An Access Channel message that is autonomously generated by a mobile station.

Access Channel Response Message
An Access Channel message that is generated to reply to a message received from a base station.

Access Channel Slot
The assigned time interval for an access probe. An access channel slot consists of an integer number of frames. The transmission of an access probe is performed within the boundaries of an Access Channel slot.

Access Probe
One Access Channel transmission consisting of a preamble and a message. The transmission is an integer number of frames in length and carries one Access Channel message.

Access Probe Sequence
A sequence of one or more access probes. The transmitted power escalates during an access probe sequence from a prescribed minimum power until acknowledged by the base station, or until a presribed maxixum power is reached. One or more repetitions of an access probe sequence constitute an access attempt.

Acknowledgement
A link layer response by a mobile station or a base station confirming that a signaling message was received correctly.

Action time
The time at which an action implied by a signaling message should take place.

Active set
The set of pilots associated with the CDMA Channels containing Forward Traffic Channels assigned to a particular mobile station.

Aging
A mechanism through which the mobile station maintains in its Neighbor Set the pilots that have been recently sent to it from the base station and the pilots whose drop timers have recently expired.

A-key
A concealed 64-bit pattern stored in the mobile station. It is used to generate and update the mobile station's shared secret data, which is used for authentication. See also authentication and shared secret data.

Analog Paging Channel

A forward analog control channel that is used to page mobile stations and send orders.

Analog Voice Channel
A channel on which a voice conversation occurs and on which brief digital messages may be sent from a base station to a mobile station or from a mobile station to a base station.

Application Layer
The application layer of the IS-95 air interface provides control of the cellular telephone system. Signaling messages originate and terminate at the application layer. See also Layering, Physical layer and Link layer.

Area Propatation Model
A propagation model in which median transmission loss calculations are based on generalized characteristics of the area surrounding the transmitter and receiver, as well as the intervening area. Features such as local environment, terrain roughness, building density are used to modify a median transmission loss equation in order to adopt it to the service area.

Authentication
A procedure used by base stations to validate a mobile station identity at system access and other times, and by mobile stations to validate a base station identity when ordered to update the shared secret data.

Autonomous Registration
A method of registration in which the mobile station registers without an explicit command from the base station.

Base Station
A fixed station used for communicating with mobile stations. Depending upon the context, the term base station may refer to a cell, a sector within a cell, an MSC, or other part of the cellular system. It is sometimes used loosely in the standards to mean any land side functionality. See also Mobile Switching Center.

BCH Code
See Bose-Chaudhuri-Hocquenghem Code.

BER
See bit error rate.

Bose-Chaudhuri-Hocquenghem Code (BCH Code)
A large class of error-correcting cyclic codes. For any positive integers m, $m > 3$, and $t < 2^{m-1}$, there is a binary BCH code with a block length n equal to $2^m - 1$ and $n - k < mt$ parity check bits, where k is the number of information bits. The BCH code has a minimum distance of at least $2t + 1$.

Bit Error Rate (BER)
Numerically equal to the number of errored bits divided by the total number of bits. Care should be taken when reporting or interpreting "bit error rate" in systems that use encapsulated data or otherwise add overhead to the payload bits. It is normally not meaningful in the CDMA context because whole frames are erased, or not, according to the result of the frame quality check. See Frame Error Rate and Message Error Rate.

Blank and burst
The pre-emption of an entire Traffic Channel frame's primary traffic by signaling traffic or secondary traffic.

Blocking
Failure of a telecommunication system to provide service in response to a call attempt. Blocking in a CDMA system can be due to hard causes, such as lack of a necessary resource, or to soft causes, such as excessive interference in an air interface.

bps
Bits per second.

Calling rate
The number of originations per unit time in a designated service area. See also Erlang load.

Candidate set
The set of pilots that have been received by the mobile station with sufficient strength to be successfully demodulated, but have not been placed in the Active Set by the Base station. See also Active Set, Neighbor Set, and Remaining Set.

CDMA
See Code Division Multiple Access.

CDMA Channel
The set of channels transmitted between the base station and the mobile stations within a given CDMA frequency assignment. See also Forward CDMA Channel and Reverse CDMA Channel.

CDMA Channel Number
An 11-bit number identifying the center of the CDMA frequency assignment.

CDMA Frequency Assignment
A 1.23 MHz segment of spectrum centered at a discrete frequency identified by the CDMA channel number. The allowable channels are centered on one of the 30 kHz channels of the AMPS system.

Cell
Loosely, one or more collocated base stations. They can service different angular sectors, different frequencies, or both.

Cell Site
The physical location of a cell's radio equipment and supporting systems. This term is also used to refer to the equipment located at the cell site.

CELP
See Code Excited Linear Prediction

Chip
Informal term used to refer to either a binary element of a spreading sequence, or to the time interval that it occupies, or 1/1.2288 MHz = 813.8 ns, or, at the speed of light, a distance of c/f = (0.3 m/ns)/1.2288 MHz = 244.1 meters.

Channel Coder
A device that adds redundancy to digital data before transmission for the purpose of reducing the end-to-end error rate. See also Convolutional Coder.

Channel Decoder
A device that performs error correction on coded data by exploiting the redundancy introduced by the channel coder. See also Viterbi Decoder.

Clone
A fraudulent subscriber station created by copying a MIN-ESN pair from a legitimate subscriber's over-the-air transactions.

Code Channel
One of the orthogonal subchannels of a CDMA Forward CDMA Channel. Code channel zero is the pilot channel. Code channels 1 through 7 may be assigned to either Paging Channels or Traffic Channels. Code channel 32 may be assigned to either the Sync Channel or to Traffic Channels.

Code Division Multiple Access
A technique for spread-spectrum multiple access digital communication that creates channels through the use of noise-like carrier waves.

Code Excited Linear Prediction (CELP)

A technique of voice coding that makes use of linear prediction filters excited by a stimulus looked up from a pre-stored table, based on its similarity to the residue from the LPC filter solution.

Code Symbol
: A symbol from a finite alphabet that is the output of an error-correcting-code encoder. Information bits enter the encoder and code symbols leave the encoder. The alphabet may be binary, or may have larger dimensionality.

Codec
: A combination of encoder and decoder, frequently used in the context of speech codec, meaning both components of the speech coding and decoding process, operating in full duplex mode.

Convolutional Code
: An error-correcting code that is generated by finite-field division of the data sequence, regarded as a polynomial over a finite field, by a generator polynomial. Such a division resembles a discrete convolution.

Coverage Area
: A geographical area in which a mobile will receive satisfactory signal-to-noise ratio (E_b/N_0) in both forward and reverse links. Evaluation of coverage for a CDMA system must take into account the effects of soft handoff and multipath, as well as signal strength.

CRC
: See Cyclic Redundancy Code.

Cyclic Redundancy Code (CRC)
: A class of linear error detecting codes that generate a parity check bits as the remainder of a polynomial division of the data, regarded as a polynomial, by a generator polynomial. They are often based on a BCH code, used only for its error detection capability.

Data Burst Randomization
: The pseudo-random process that determines which power control groups are transmitted by a mobile station when its transmitted bit rate is less than full rate.

dBc
: The ratio, in dB, of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the same signal, to the total power of the signal. For a CDMA signal, the signal power is measured in a 1.23 MHz bandwidth.

dBm
: Power measured in dB relative to one milliwatt.

dBW
: Power measured in dB relative to one Watt.

Deinterleaving
: The process of unpermuting the symbols that were permuted by an interleaver.

Dim-and-Burst
: The process by which primary rate traffic is forced to a lower-than-maximum rate and transmitted together with signaling or secondary traffic in the same frame.

Distance-Based Registration
: An autonomous registration method in which the mobile station registers whenever it enters a cell whose distance from the cell in which the mobile station last registered exceeds a given threshold.

Ducting
: Guiding of electromagnetic radiation by refraction due to index gradients in the atmosphere.

E_b
: The energy of an information bit. E_b is measured in Joules, or equivalently in Watts per Hertz.

Effective Antenna Elevation (Base Station)

The height of the radiation center of the base station antenna above the average elevation of the ground midway between the base station and the mobile. Particular ranges of distance are invoked by the Federal Communications Commission to define height above average terrain (HAAT) for various services.

Effective Antenna Elevation (Mobile Station)

The height of the radiation center of the mobile station antenna above the ground.

Effective Isotropic Radiated Power (EIRP)

The transmitted power multiplied by the antenna gain referenced to an ideal isotropic radiator. EIRP is larger that ERP in the same direction by the gain of an ideal dipole relative to an isotropic radiator, which is 2.1 dB.

Effective Radiated Power (ERP)

The transmitted power multiplied by the antenna gain referenced to a half-wave dipole.

EIRP

See Effective Isotropic Radiated Power.

Electronic Serial Number (ESN)

A 32-bit number assigned by the mobile station equipment manufacturer, uniquely identifying the mobile station equipment.

Encoder Tail Bits

Fixed value bits appended to a block of data in order to flush a convolutional encoder so that it is left in a known state. Leaving the encoder in a known state aids the decoding.

Erlang

A dimensionless unit of telephone traffic intensity. It is numerically equal to the calling rate times the average holding time. It is named for the Norwegian telephone engineer who first popularized the concept.

Erlang B

Also called *Lost Calls Cleared* model. A mathematical model of telephone traffic blocking in which blocked calls are not queued. The Erlang B blocking probability for N resources, calling intensity y Erlangs, is

$$P = \frac{y^N/N!}{\sum_{k=0}^{N} y^k/k!}$$

Cf. Erlang C Model and Poisson Blocking Model.

Erlang C

Also called *Lost Calls Delayed* model. A mathematical model of telephone traffic blocking in which blocked calls are queued. It is similar to the Poisson Blocking Model, with which it is sometimes confused. The Erlang C blocking probability for N resources, calling intensity y Erlangs, is

(Need to figure out Erlang C Formula!)

ERP

See Effective Radiated Power.

ESN

See Electronic Serial Number.

Fade Timer

A timer kept by the mobile station as a measure of Forward Traffic Channel continuity. If the fade timer expires, the mobile station drops the call.

FEC

See Forward Error Correction

FER

See Frame Error Rate

Flash

An indication sent on a CDMA Traffic Channel indicating that the user directed the mobile station to invoke special processing.

Flat Fading

Radio signal fading characteristic of a multipath environment where the delay spread is less than the reciprocal bandwidth of the signal. Under these circumstances the fading is uniform across the bandwidth of the signal, and thus is essentially just an amplitude change. Also known as frequency-independent fading. Cf. Frequency Selective Fading, Rayleigh Fading, Ricean Fading.

Foreign NID Roamer

A mobile station operating in the same system (SID) but a different network (NID) from the one in which service was subscribed. See also Foreign SID roamer.

Foreign SID Roamer

A mobile station operating in a system (SID) other than the one in which service was subscribed. See also Foreign NID roamer.

Forward CDMA Channel

A CDMA Channel from a base station to mobile stations. The Forward CDMA Channel comprises one or more code channels that are transmitted on a CDMA frequency assignment using a particular pilot PN offset. The code channels are associated with the Pilot Channel, Sync Channel, Paging Channels, and Traffic Channels. The Forward CDMA Channel always includes a Pilot Channel and may include a Sync Channel, up to seven Paging Channels, and up to 63 Traffic Channels. The total number of code channels, including the Pilot Channel, cannot exceed 64.

Forward Error Correction (FEC)

A technique for improving performance of a digital communication channel that applies an error-correcting code in the transmitter and performs correction in the receiver without feedback to the transmitter. "Forward" here refers to the lack of feedback, not the transmission direction.

Forward Traffic Channel

A code channel used to transport service option (usually voice) and signaling traffic from the base station to the mobile station.

Frame

A basic timing interval in a CDMA system. For the Access Channel, Paging Channel, and Traffic Channels, a frame is 20 ms in duration. For the Sync Channel a frame is 80/3 = 26.666 ms in duration.

Frame Category

A classification of a received Traffic Channel frame based upon transmission data rate, the frame contents (primary traffic, secondary traffic, or signaling traffic), and whether there are detected errors in the frame.

Frame Erasure Rate

Ratio of erased frames to total frames. Care should be used to distinguish between frame erasure rate and frame error rate. They are similar, but not identical. Erased frames usually are counted as errored frames, but not all errored frames are erased, that is, some may be undetected by the receiver.

Frame Error Rate (FER)

Ratio of errored frames to total frames. For purposes of this calculation, erased frames count as errored.

Frame Offset

A time skewing of Traffic Channel frames from System Time in integer multiples of 1.25 ms. The maximum frame offset is 18.75 ms.

Frame Quality Indicator

The CRC check applied to 9600 bps and 4800 bps Traffic Channel frames.

Frequency Selective Fading

Radio signal fading characteristic of a multipath environment where the delay spread is greater than the reciprocal bandwidth of the signal. Under these circumstances the fading is non-uniform across the bandwidth of the signal. The multipath produces deep notches in the spectrum, and thus strong distortion of the time-domain signal shape. Cf. Flat Fading, Rayleigh Fading, Ricean Fading.

Fresnel Radius

The radius r of the circle formed by the intersection of the first Fresnel zone with a plane perpendicular to the line of sight between the transmitting and receiving antennas. In meters it is given by

$$r = 548\sqrt{\frac{d_1 d_2}{f(d_1 + d_2)}},\ d_1,\ d_2 \text{ in km and } f \text{ in MHz}$$

Fresnel Zone

1. The region in space between successive ellipsoids of revolution whose foci are the transmitting and receiving antennas. The ellipsoids are defined as the locus of points such that the sum of distances to the transmitting and receiving antennas differs from the line-of-sight distance by an interger number of half-wavelengths.

2. The area formed by the intersection of the regions of definition 1 with a plane perpendicular to the line of sight between the transmitting and receiving antennas.

CDMA Glossary G-M

Global Challenge Procedure

An exchange of information between a mobile station and a base station for the purpose of authenticating the mobile station identity. The base station broadcasts a challenge and each mobile station responds with its unique response when performing a system access. Cf. Unique Challenge-Response Procedure.

Global Positioning System (GPS)

A US government satellite system that provides location and time information to users. See Navstar GPS Space Segment / Navigation User Interfaces ICD-GPS-200 for specifications.

GPS

See Global Positioning System.

Handoff

The act of transferring control of a mobile station from one base station to another. See also Soft Handoff, Hard Handoff.

Handover

Synonym for Handoff.

Hard Handoff

A handoff characterized by a temporary disconnection of the Traffic Channel. Hard handoffs occur when the mobile station is transferred between disjoint Active Sets, the CDMA frequency assignment changes, the frame offset changes, or the mobile station is directed from a CDMA Traffic Channel to an analog voice channel. Cf. Soft Handoff.

Hash Function

A mathematical function used by the mobile station to select one out of N available resources. The hash function ensures statistically uniform use of the resources.

Height Above Average Terrain (height AAT)
See Effective antenna elevation.

HLR
See Home Location Register.

Home Location Register (HLR)
The database in a wireless communication network that contains registration and user profile information for the system subscribers.

Home System
The system which is transmitting a system identification (SID) which is recognized by the mobile station as its Home SID, normally the system in which service was subscribed (see System Identification).

Idle Handoff
The act of transferring reception of the Paging Channel from one base station to another, when the mobile station is in the Mobile Station Idle State.

Implicit Registration
A registration achieved by a successful transmission of an origination or page response on the Access Channel.

IMSI
See International Mobile Subscriber Station Identity.

Interleaving
The process of reordering code symbols for transmission. Interleaving decorrelates channel fading between adjacent symbols as they enter the decoder, thereby improving the effectiveness of the code.

International Mobile Subscriber Station Identity (IMSI)
A method of identifying stations in the land mobile service as specifed in ITU-T Recommendation E.212.

kHz
Kilohertz (10^3 Hertz).

ksps
Kilosymbols per second (10^3 symbols per second).

Layering
A conceptual structuring of communication protocols. A layer is defined in terms of its communnication protocol to a peer layer in another entity, and the services it provides to the next higher layer in its own entity.

Layer 1
See Physical layer.

Layer 2
See Link layer.

Layer 3
See Application layer.

LFSR
See Linear Feedback Shift Register

Linear FeedbackShift Register (LFSR)

A logic circuit that produces pseudo-random binary sequences. They are used to produce the Short Code and Long Code that are used for spreading and for other purposes in the CDMA system. See the LFSR page for more details.

Linear Predictive Coding

A low bit rate coding technique for analog signal sources, usually speech, that models the production process by a filter whose parameters change slowly with time. It is a component of CELP coders. See Code Excited Linear Prediction.

Link Layer

The link layer of the IS-95 air interface provides for the reliable transmission and reception of signaling messages, including error detection, partial duplicate detection and loss. See also Layering, Physical layer, and Application layer.

Log Normal Distribution

The distribution of a random variable whose logarithm follows a normal distribution. A log-normal distribution is characterized by two parameter: its median and its standard deviation. The logarithm radix is often taken as 10, so that both the median and the standard deviaion are conveniently measured in decibel values, *m* and *s*. The density function of such a log-normal variable *X* is then:

$$p_X(x) = \frac{10}{\sqrt{2\pi}\ln(10)\sigma x}\exp\left\{-\frac{[10\log(x)-m]^2}{2\sigma^2}\right\}$$

In the dB measure this is

$$p_Y(y) = \frac{1}{\sqrt{2\pi}\sigma}\exp\left\{-\frac{(y-m)^2}{2\sigma^2}\right\}$$

where *Y = 10 log X.*

Long Code

A maximal length sequence with period 2^{42}-1. A unique phase of the long code identifies each mobile station. It is used for data scrambling on the Forward CDMA Channel, spreading on the Reverse CDMA Channel, and other purposes. See also Maximal length sequence.

Long Code Mask

A 42-bit binary number that creates the unique long code phase. See also public long code, private long code, public long code mask, and private long code mask.

LPC

See Linear Predictive Coding.

LSB

Least significant bit.

Maximal Length Sequence (m-sequence)

A periodic binary sequence of period 2^n-1, *n* a positive integer, with no internal periodicities and other curious mathematical properties [Golomb]. A maximal length sequence can be generated by either of two equivalent linear feedback shift register configurations (see LFSR).

Mcps

Megachips per second (10^6 chips per second).

MER

See Message Error Rate

Message

In IS-95, a data structure consisting of a length field, message body (or *payload*), and CRC for detection of errors.

Message Error Rate

Ratio of errored messages to total messages. This is a concept having limited value because an errored message may be incorrectly fragmented or coalesced with a neighboring message by the receiver, making the message counts incorrect.

MHz

Megahertz (10^6 Hertz).

MIN

See Mobile Identification Number.

Mobile Assisted Handoff (MAHO)

A means of initiating handoff based on signal quality measurements performed by the mobile station and reported to the base station.

Mobile Identification Number (MIN)

The 34-bit number that is a digital representation of the 10-digit directory number assigned to a mobile station.

Mobile Station

A subscriber station in the Domestic Public Cellular Radio Telecommunications Service, normally intended to be used while in motion or during halts at unspecified points. The category my include both true mobile stations, handheld portable stations, fixed stations, and other devices.

Mobile Station Class

A code that defines mobile station maximum transmitter power, slotted operation capability, and dual-mode CDMA/AMPS capability.

Mobile Station Identification Number (MSIN)

A part of the E.212 IMSI identifying the mobile station within its home network. See ITU-T Recommendation E.212.

Mobile Switching Center (MSC)

A configuration of equipment designed to provide interconnection services among wireless subscriber stations, and between wireless subscriber stations and the public switched telephone network via one or more base stations under its control.

Mobile Telephone Switching Office (MTSO)

An out-of-fashion synonym for Mobile Switching Center.

Modulation Symbol

A symbol from a discrete alphabet that identifies a unit of modulation. In the Forward CDMA Channel, the modulation symbols are binary, each one representing one interleaved binary symbol from the rate 1/2 convolutional encoder. In the Reverse CDMA Channel the modulation symbols are six-bit entities comprised of interleaved bits from the rate 1/3 encoder; the six bits select one of the 64-Walsh functions for transmission.

MOS Mean Opinion Score

The result of a subjective voice quality test, often used to compare speech codec algorithms, where listeners associate a one to five quality score to speech samples. The arithmetic mean for a large number of samples is the resulting MOS number. Care must be used when comparing MOS scores taken in different tests, as the results for any particular cohort depend very much on the mix of algorithms under test.

ms

Millisecond (10^{-3} second).

MSB

Most significant bit.

MSC

See Mobile Switching Center

MSIN

See Mobile Station Identification Number.

MTSO

See Mobile Telephone Switching Office.

Multiplex Option

One of the alternative designs of the multiplex sublayer. Multiplex options permit tailoring such characteristics as the data rate set, frame structure, frame partitioning rules, and rate decision rules for special applications.

Multiplex Sublayer

One of the conceptual layers of the system that multiplexes and demultiplexes primary traffic, secondary traffic, and signaling. The multiplex sublayer resides between the physical layer and the link layer in the conceptual protocol stack.

CDMA Glossary N-S

NAM

See Number assignment module.

Neighbor Set

The set of pilots associated with the CDMA Channels that are probable candidates for handoff. Normally the Neighbor Set consists of the pilots associated with CDMA Channels that cover geographical areas near the mobile station. See also Active Set, Candidate Set, and Remaining Set.

Network

A network is a logical subset of the base stations in a cellular system, as identified by a SID. The network is identified by a unique (SID, NID) pair. A network can be as small or as large as needed, but must be totally contained within a single system.

Non-Autonomous Registration

A registration method in which the base station initiates registration. See also Autonomous Registration.

Non-Slotted Mode

An operation mode of the mobile station in which the mobile station continuously monitors the Paging Channel.

ns

Nanosecond (10^{-9} second).

Null Traffic Channel Data

One or more frames of 16 '1's followed bu eight '0's sent at the 1200 bps rate. Null traffic channel data is sent when no service option is active and no signaling message is being sent. Null traffic channel data serves to maintain the connectivity between the mobile station and the base station.

Number Assignment Module

A set of MIN-related parameters stored in the mobile station. The NAM encapsulate the mobile station's network identity. Multiple NAMs are sometimes provided in a mobile stations so that, for example, the mobile can have local identities in adjoining service areas. Use of the NAM is not specified in IS-95, beyond identifying those semi-permanent station numeric indicators that should be stored in it [IS-95, Appendix F].

OLC

See Overload class.

Ordered Registration
A registration method in which the base station orders the mobile station to send registration related parameters.

Overhead Message
A message sent by the base station on the Paging Channel to communicate base-station-specific and system-wide information to mobile stations.

Overload Class (OLC)
The means used to control system access by mobile stations, typically in emergency or other overloaded conditions. Mobile stations are assigned one (or more) of sixteen overload classes. Access to the CDMA system can then be controlled on a per class basis by persistence values transmitted by the base station.

Overload Control
A means to restrict reverse analog control channel accesses by mobile stations. Mobile stations are assigned one (or more) of sixteen control levels. Access is selectively restricted by a base station setting one or more OLC bits in the Overload Control Global Action Message.

Paging
The act of seeking a mobile station in order to deliver an incoming call.

Paging Channel
A forward communication channel used by a base station to communication to a mobile station when it is not assigned to a traffic channel.

Parameter-Change Registration
A registration method in which the mobile station registers when certain of its stored parameters change.

Parity Check Bits
Bits added to a sequence of information bits to provide error detection, correction, or both.

Persistence
A probability measure used by the mobile station to determine if it should transmit in a given Access Channel Slot.

Physical Layer
The part of the communication protocol between the mobile station and thebase station that is responsible for the transmission and reception of data. The physical layer in the transmitting station is presented a frame by the multiplex sublayer and transforms it into an over-the-air waveform. The physical layer in the receiving station transforms the waveform back into a frame and presents it to the multiplex sublayer above it.

Pilot Channel
An unmodulated, direct-sequence spread spectrum signal transmitted continuously by each CDMA base station. The Pilot Channel allows a mobile station to acquire the timing of the Forward CDMA Channel, provides a phase reference for coherent demodulation, and provides a means for signal strength comparisons between base stations for determining when to handoff.

Pilot PN Sequence
A pair of modified maximal length PN sequences with period 2^{15} used to spread the Forward CDMA Channel and the Reverse CDMA Channel. Different base stations are identified by different pilot PN sequence offsets.

Pilot PN Sequence Offset Index
The PN offset in units of 64 PN chips of a pilot, relative to the zero offset pilot PN sequence.

Pilot Strength
The ratio of received pilot energy to overall received energy. See also E_c/I_o.

PN Sequence.

Pseudonoise sequence. A periodic binary sequence approximating, in some sense, a Bernoulli (coin tossing) process with equiprobable outcomes.

Point to Point Propagation Model

A propagation model in which median transmission loss calculations are based on specific characteristics and terrain profile of the path along the great circle between the transmitter and receiver.

Poisson Blocking Model

Also called *Lost Calls Held* or *Molina* model. A mathematical model of telephone traffic blocking in which blocked calls persist for their normal holding time, even though unserviced. It is similar to the Erlang C blocking model, with which it is sometimes confused. The Poisson blocking probability for N resources, callinsity y Erlangs, is

$$P = e^{-y} \sum_{k=N+1}^{\infty} y^k / k!$$

Power Control Bit

A bit sent in every 1.25 ms interval on the Forward Traffic Channel to signal the mobile station to increase or decrease its transmit power.

Power Control Group

A 1.25 ms interval on the Forward Traffic Channel and the Reverse Traffic Channel. See also Power Control Bit.

Power-Down Registration

An autonomous registration method in which the mobile station registers on power-down.

Power-Up Registration

An autonomous registration method in which the mobile station registers on power-up.

Privacy

Protection of traffic by means of encryption or other means specifically applied for that purpose.

Propagation Loss

The total reduction in radiant power density between the transmitting antenna and the receiving antenna. Propagation loss includes both spreading (free-space diffraction) loss and attenuation loss. For non-line of sight situations it also includes diffraction loss around obstacles. It does not include antenna gain or feeder loss. Sometimes called *isotropic* propagation loss.

Rayleigh Distribution

The single-parameter probability distribution given by

$$F_R(r) = 1 - \exp\left(-\frac{r^2}{2\sigma^2}\right)$$

or the equivalent density

$$p_R(r) = \frac{r}{2\sigma^2}\exp\left(-\frac{r^2}{2\sigma^2}\right)$$

Rayleigh Fading

The deep fading process characteristic of narrowband radio signals in a severe multipath propagation environment. The probability distribution of complex amplitude tends toward a bandlimited Gaussian, which has a Rayleigh distribution of amplitude. Cf. Flat Fading, Frequency Selective Fading, Ricean Fading.

Receive Objective Loudness Rating (ROLR)

A perceptually weighted transducer gain of telephone receivers relating electrical excitation from a reference generator to sound pressure at the earphone. The receive objective loudness rating is

normally specified in dB relative to one Pascal per millivolt. See IEEE Standard 269-1992, IEEE Standard 661-1979, ITU-T Recommendations P.76 and P.79.

Registration
The process by which a mobile station makes its presence known to a base station to facilitate call delivery.

Registration Zone
A collection of one or more base stations treated as a unit when determining whether a mobile station should perform zone-based registration.

Release
A process that the mobile station and base station use to inform each other of call disconnect.

Reverse CDMA Channel
The CDMA Channel from the mobile station to the base station. From the base station's perspective, the Reverse CDMA Channel is the sum of all mobile station transmissions on a CDMA frequency assignment.

Reverse Traffic Channel
A Reverse CDMA Channel used to transport user and signaling traffic from a single mobile station to one or more base stations.

Rice (or Rician) Distribution
The probability distribution of the amplitude of a signal composed of a steady component plus independent IID quadrature Gaussian processes. It is applicable when a signal arrives at a receiver by both a line of sight path and by multiple indirect paths. This two-parameter distribution can be represented as

$$p_R(r) = \frac{r}{\sigma^2}\exp\left[-\frac{(r^2+a^2)}{2\sigma^2}\right]I_0\left(\frac{ra}{\sigma^2}\right)$$

where I_0 is the modified Bessel function of the first kind and order zero and a is the amplitude of the steady component. Note that this reduces to a Rayleigh distribution for $a = 0$.

Rician Fading
The fading process characteristic of radio signals when there is a strong line-of-sight signal path and multiple non-direct signal paths. The probability distribution of complex amplitude tends toward a bandlimited Gaussian with a nonzero mean, which has a Rician distribution of amplitude. Cf. Rayleign Fading, Flat Fading, Frequency Selective Fading.

Roamer
A mobile station that is operating in a cellular system other than its home system.

ROLR
See Receive Objective Loudness Rating.

Sector
Normally one angular segment of the coverage area of a cell, served by one base station. Also used to denote any non-traditional partitioning of the service area, such one strand of a cable-based delivery system.

Service Option
A specific type of user traffic supported by a cellular system. The major service options are speech codecs, facsimile, and various types of data. Service options may be negotiated between base and mobile stations during call setup.

Serving MSC
The MSC which currently has the mobile station obtaining service at one of its cell sites within its coverage area.

Shared Secret Data (SSD)
A bit pattern stored in the mobile station and known by the base station. SSD is used to support the authentication procedures and voice privacy. Shared Secret Data is maintained during power off.

Signal-to-Noise Ratio (SNR)
The dimensionless ratio $E_b/(N_0+I_0)$, or energy per bit divided by the noise-plus-interference power spectral density. It is usually stated in dB.

Signaling
The information exchanged between the mobile station and the network, or within the network, for the purposes of service provision (e.g., connection establishment).

Slot Cycle
A periodic interval at which a mobile station operating in the slotted mode monitors the Paging Channel.

Slotted Mode
An operation mode of the mobile station in which the mobile station monitors only selected time slots on the Paging Channel when in the Mobile Station Idle State. The primary purpose of slotted mode is power conservation.

SNR
See Signal to Noise Ratio.

Soft Handoff
A handoff occurring while the mobile station is in the Mobile Station Control on the Traffic Channel State. This handoff is characterized by commencing communications with a new base station on the same CDMA frequency assignment before terminating communications with the old base station. Cf. Hard Handoff.

Symbol
See Code Symbol.

System Identification (SID)
A number uniquely identifying a cellular system

CDMA Glossary T-Z

Timer-Based Registration
A registration method in which the mobile station registers whenever a counter reaches a predetermined value. The counter is incremented an average of once per 80 ms period.

Time Reference
A reference established by the mobile station that is synchronous with the earliest arriving multipath component used for demodulation.

TOLR
See Transmit Objective Loudness Rating.

Traffic Channel
A communication path between a mobile station and a base station used for user and signaling traffic. The term Traffic Channel implies a Forward Traffic Channel and Reverse Traffic Channel pair. See also Forward Traffic Channel and Reverse Traffic Channel.

Transmit Objective Loudness Rating (TOLR)
A perceptually weighted transducer gain of telephone transmitters relating sound pressure at the microphone to voltage at a reference electrical termination. It is normally specified in dB relative to

one millivolt per Pascal. See IEEE Standard 269-1992, IEEE Standard 661-1979, ITU-T Recommendations P.76 and P.79.

Transcoder
A device that transforms signals from one type of digital representation to another.

Unique Challenge-Response Procedure
An exchange of information between a mobile station and a base station for the purpose of authenticating the mobile station identity. The procedure is initiated by the base station and is characterized by the use of a challenge-specific random number. Cf. Global Challenge Procedure.

Visited System
The cellular system that is providing service to a roaming mobile station.

Visitor Location Register (VLR)
The database used by a visited system to maintain information about recently-served roaming subscribers.

Voice Privacy
The process by which user voice transmitted over a traffic channel is afforded a modest degree of cryptographic protection against air-interface eavesdropping.

Walsh Function, or Walsh Code
One of a set of orthogonal waveforms, based on the Walsh-Hadamard matrices. Walsh functions are used for two purposes in CDMA. In the forward link they are used as orthogonal cover to create independent transmission channels. In the reverse link they are use as orthogonal modulation.

Zone-Based Registration
An autonomous registration method in which the mobile station registers whenever it enters a zone that is not in the mobile station's zone list.

[redacted] SOP

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1930 Model A Ford

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07DEC05 [redacted] (Proposed)

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Standard Operating Procedure (SOP) for Case Squads requesting Cell Phone Tracking assistance during *"Exigent Circumstances"*

Definition: Exigent Circumstances - An emergency exists that involves the immediate danger of death or serious physical injury to a person. Our threshold for utilizing the below procedure is that the situation demands immediate action to prevent death or serious bodily injury.

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Step 1. [redacted]

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Step 2. [redacted]

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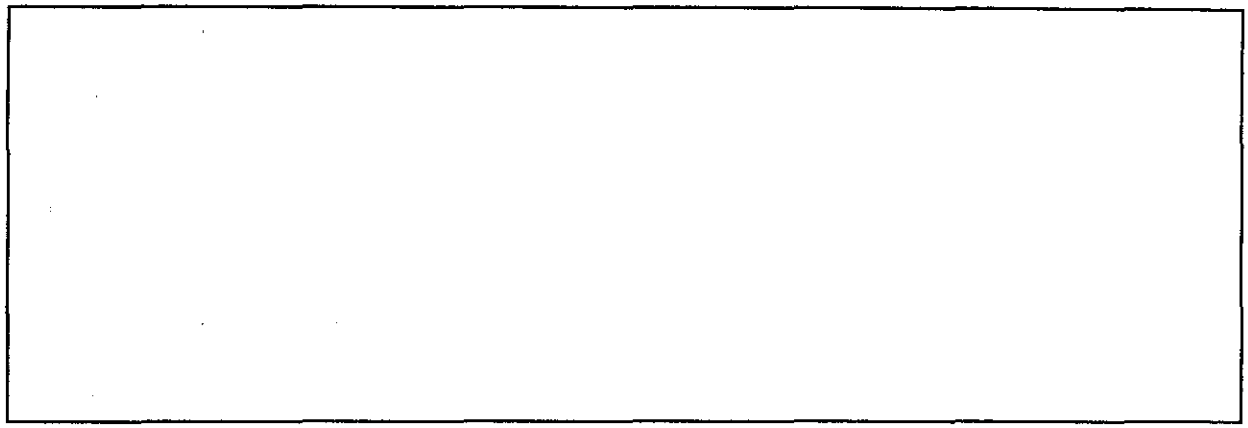

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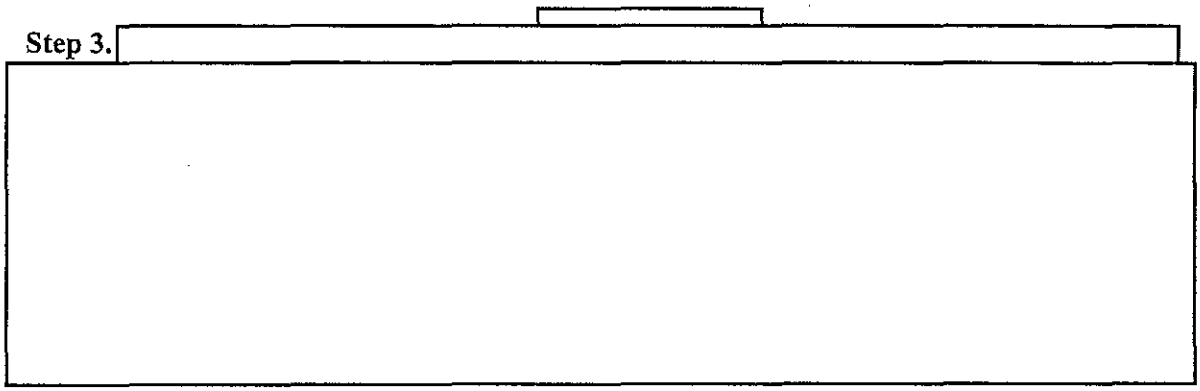
Step 3.



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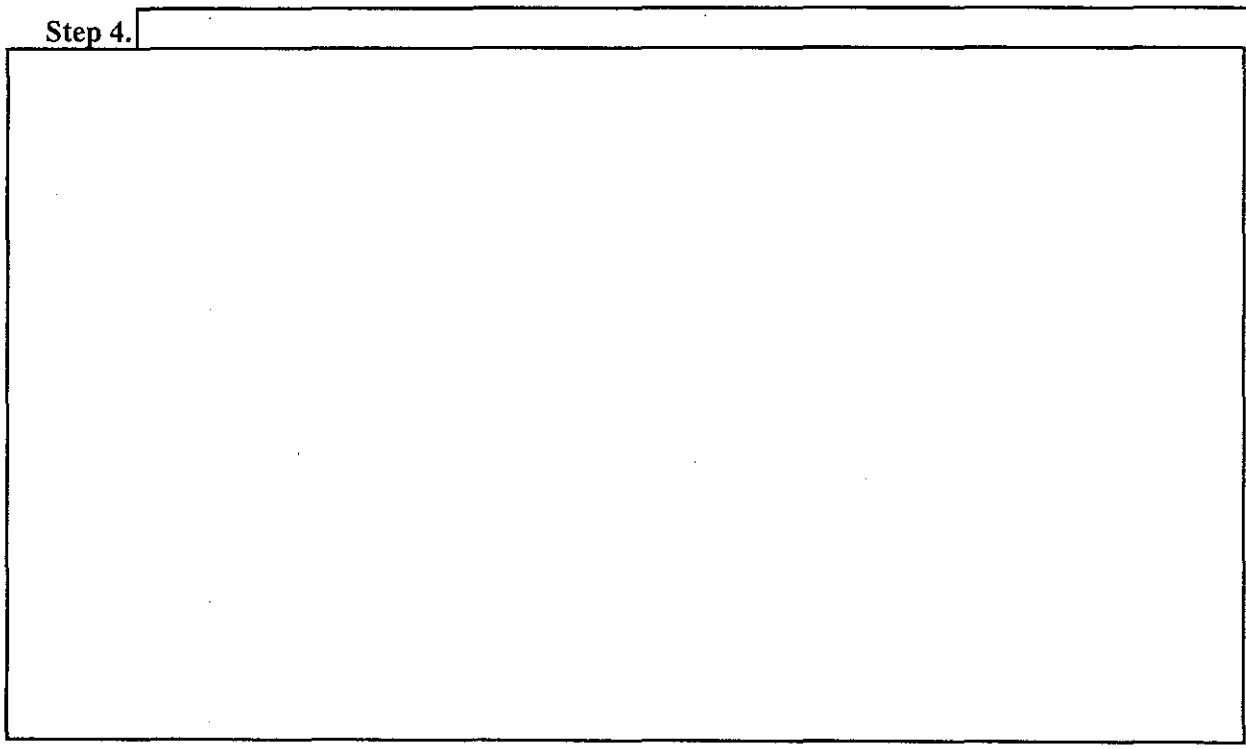
Step 4.



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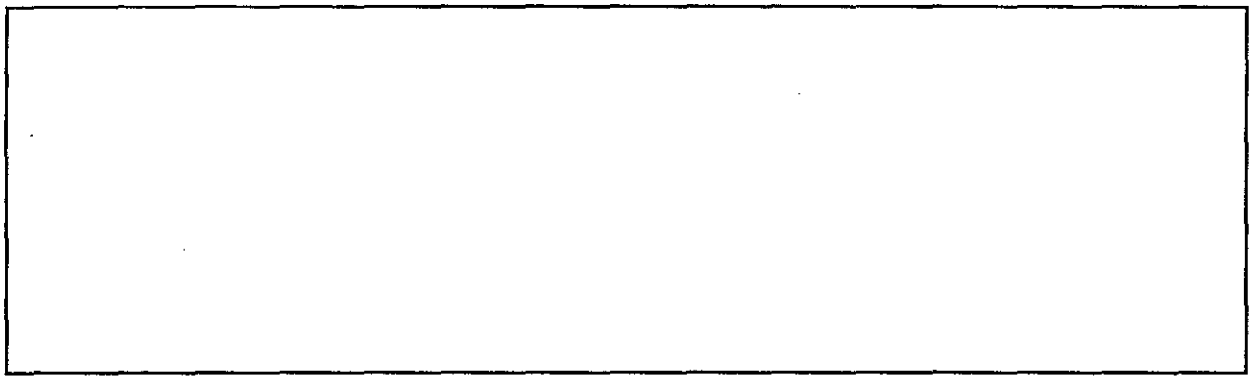

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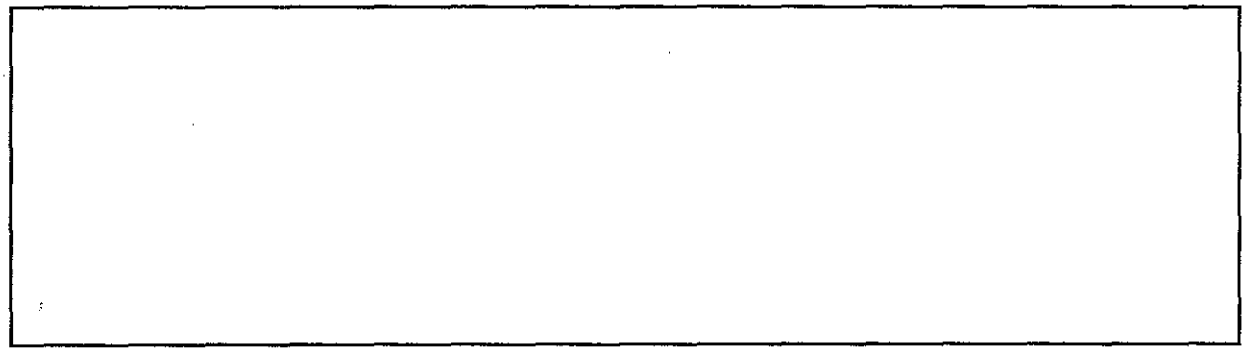

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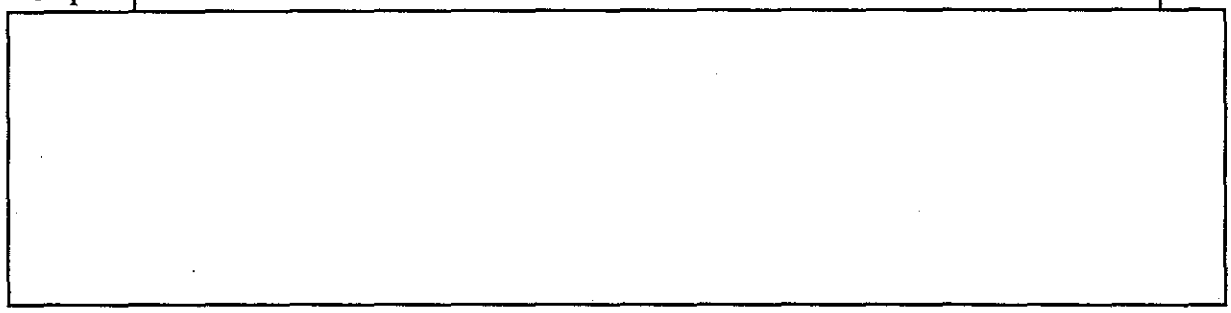

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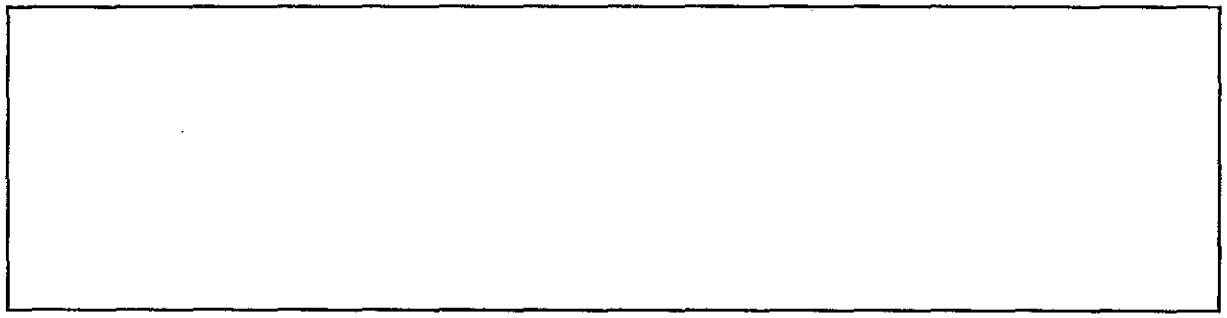
Step 6.



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Step 7. [redacted] b7E

Step 8. [redacted] b7E

Step 9. [redacted]

Step 10. [redacted] b7E

Step 11. [redacted]

*** **Recommendations:** Any case squad that foresees the use of Cell Tracking should:

a. Be familiar with the sample Pen Register/2703(d) Orders.
b. Pro-actively meet with their perspective AUSA's and discuss the specifics of the Order. b7E
c. Ensure squad members are familiar with the use of the [redacted] Pen Registers.

Revision: 10/26/2005 [redacted] b6 b7C

GSM Cell Phone Tracking For Dummies

[redacted]

Prior to tracking, answer the following questions:

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[redacted]

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STEP 1

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STEP 2

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STEP 3

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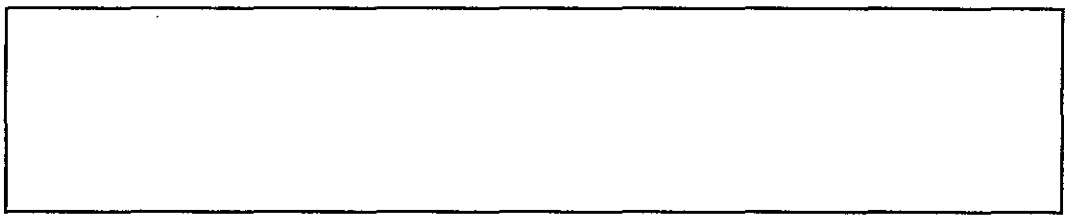
STEP 4



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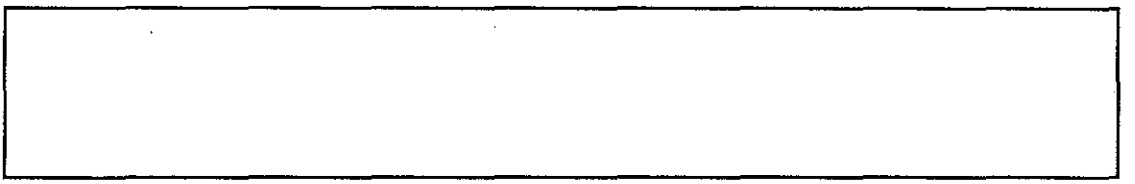
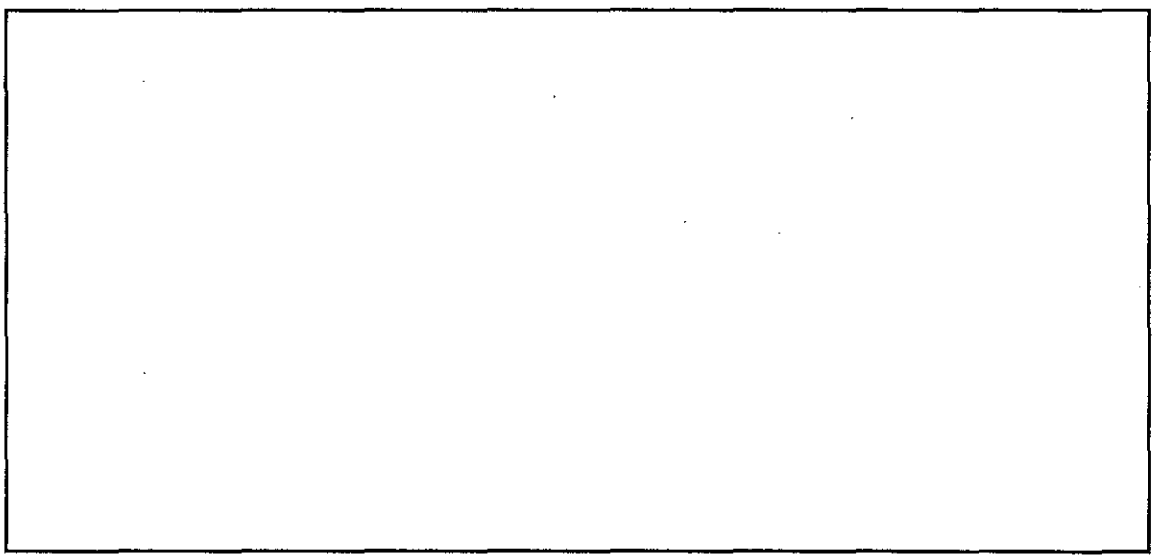
STEP 5



STEP 6



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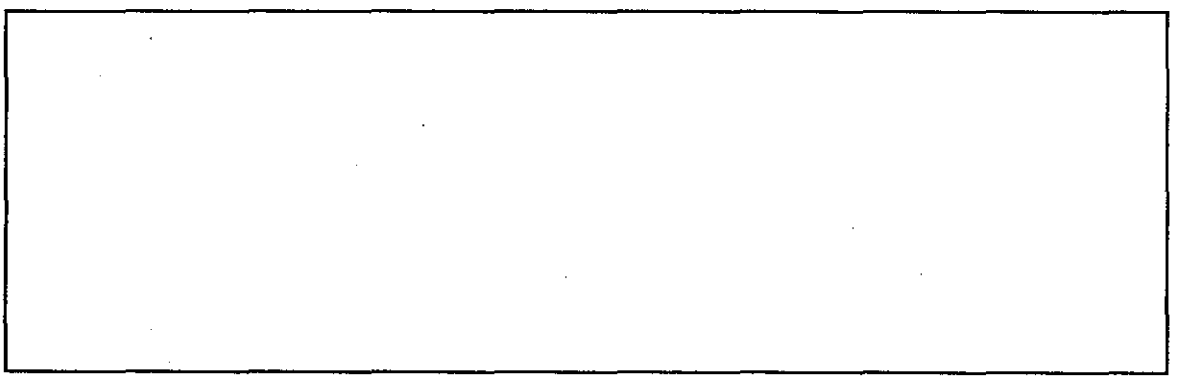
STEP 7



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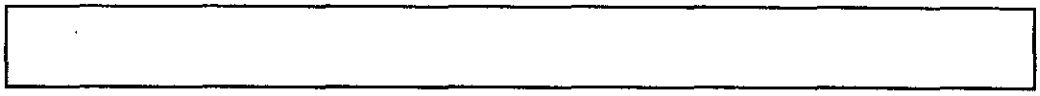
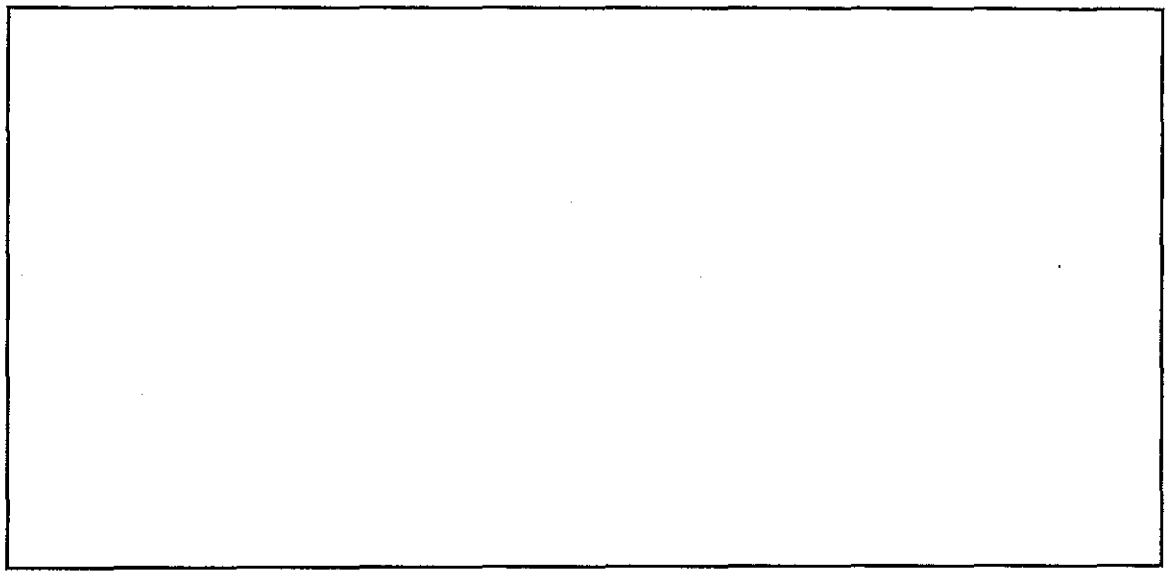


STEP 8



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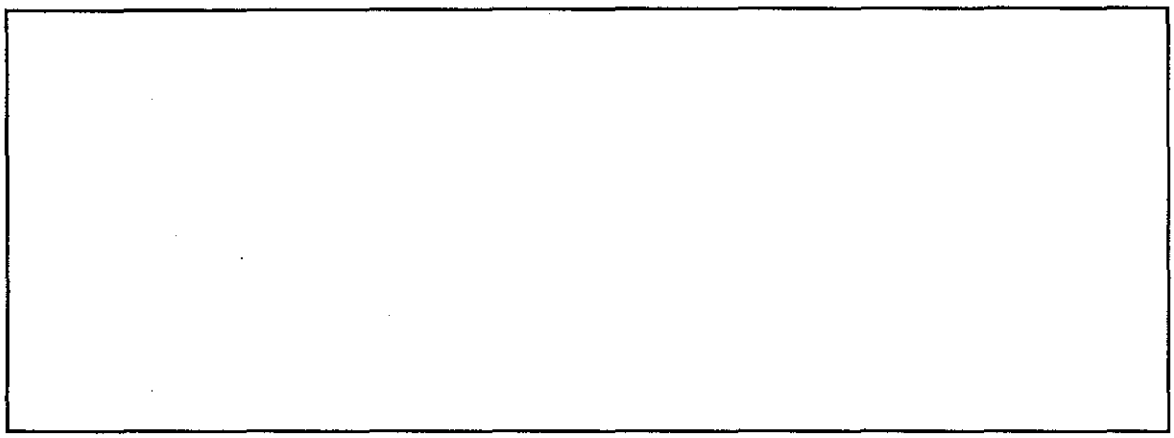

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STEP 9

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Important Reminders:

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Revision: 10/26/2005 [redacted] b6 b7C

CDMA Cell Phone Tracking For Dummies

[redacted]

CDMA TECHNOLOGY IS RESPONSIBLE FOR APPROXIMATELY 50% OF THE CELL PHONE BUSINESS IN THIS COUNTRY. THIS APPLIES PRIMARILY TO SPRINT, VERIZON, VIRGIN (PREPAID PHONE) AND A FEW OF THE SMALLER CELL PHONE COMPANIES [redacted] b3 b7E

[redacted]

Prior to tracking, answer the following questions:

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STEP 3

STEP 4

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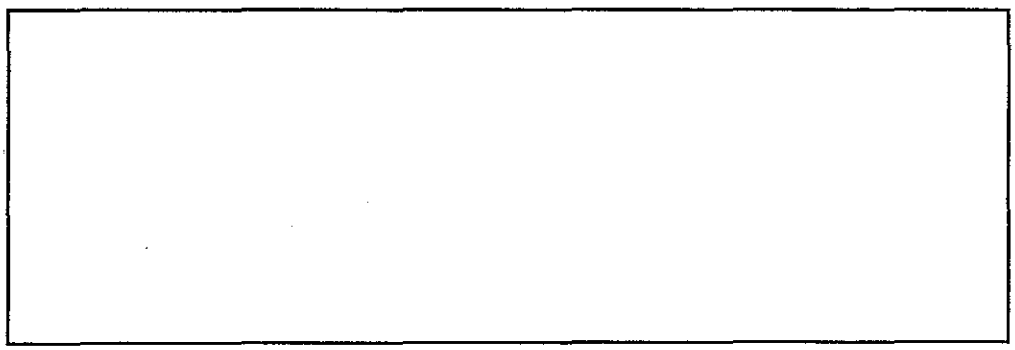
STEP 5



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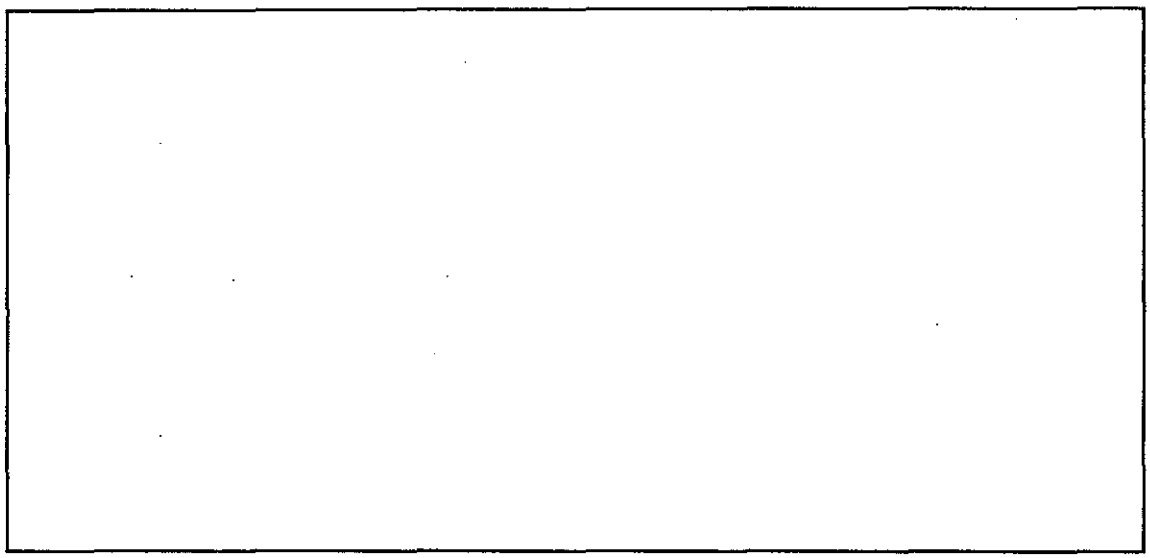
STEP 6



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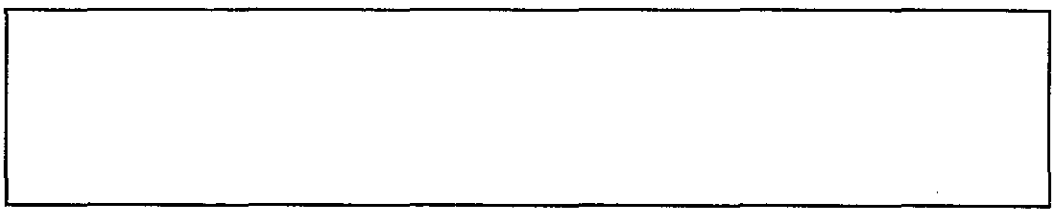
STEP 7



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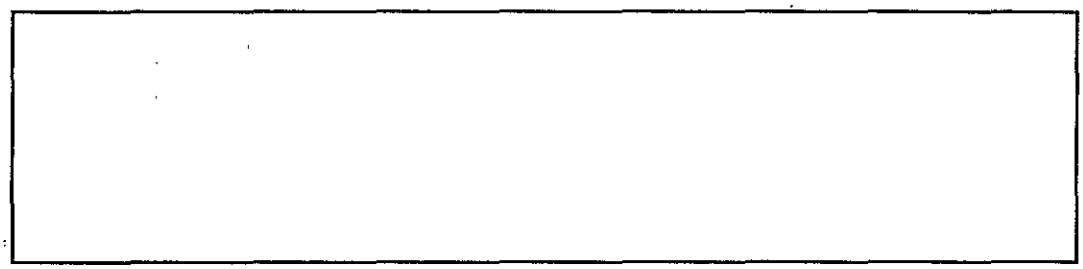

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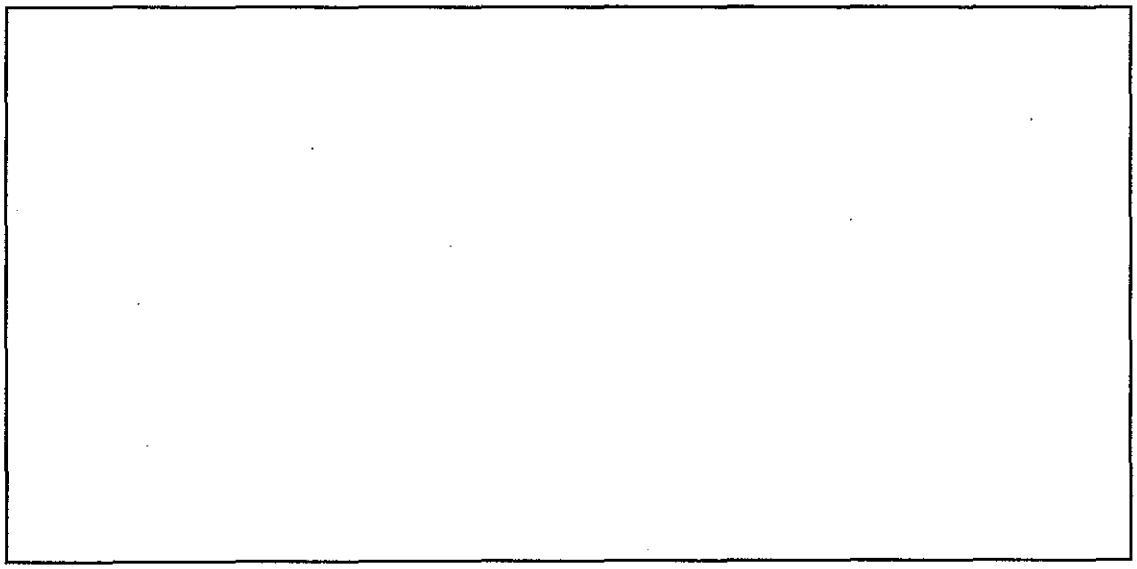
STEP 8



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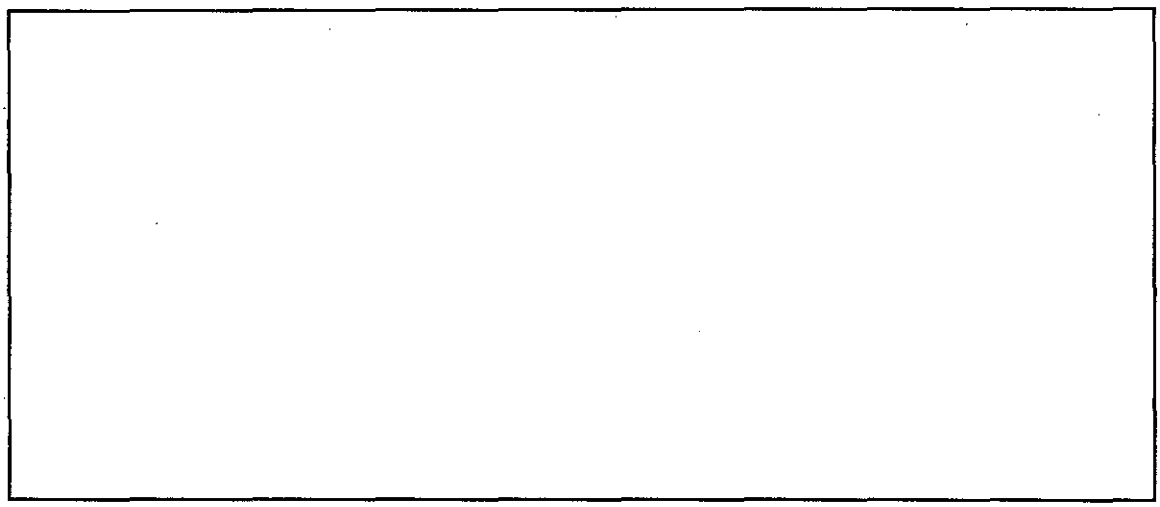
STEP 9



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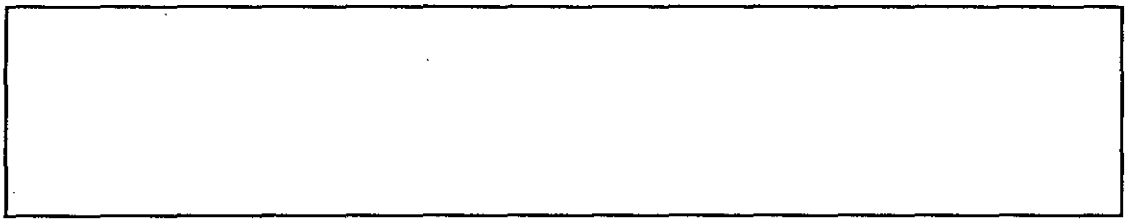
STEP 10



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STEP 11

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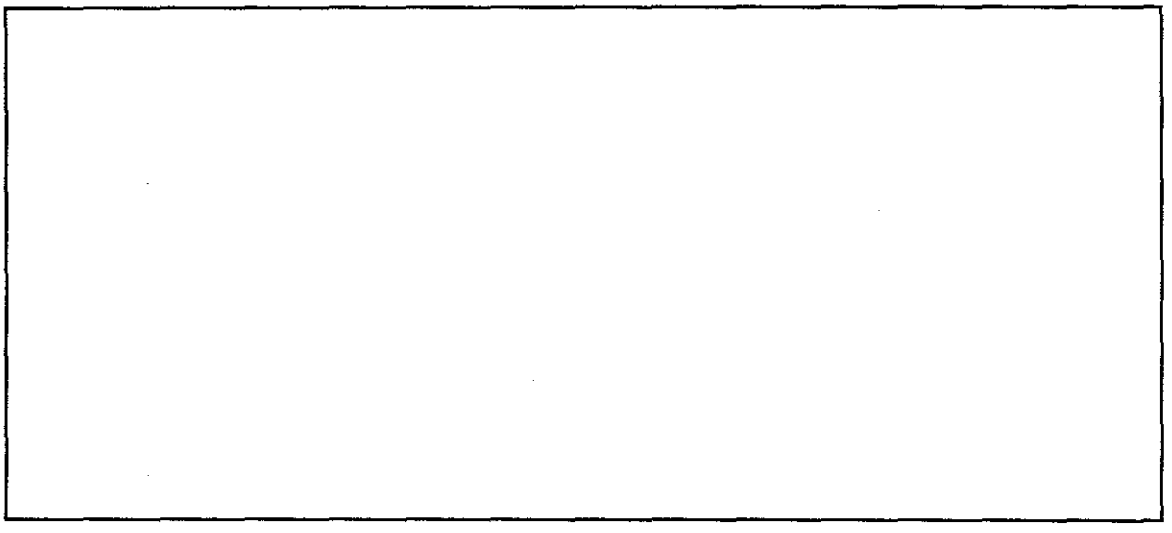
STEP 12

STEP 13



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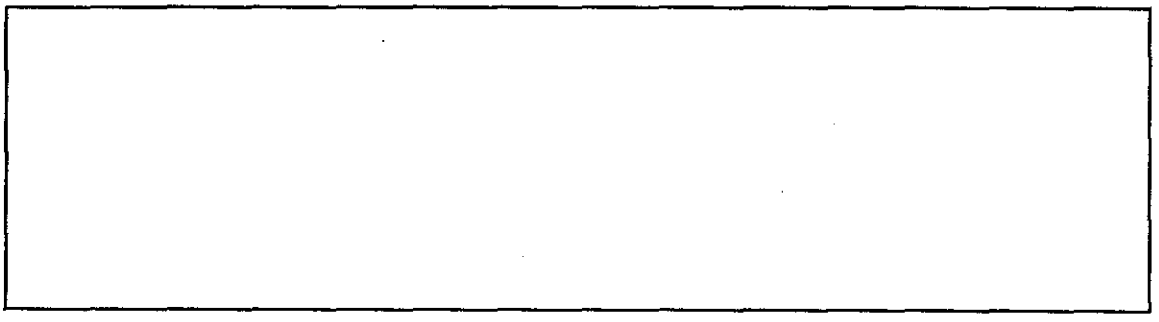

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Important Reminders

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ADDED INFORMATION:

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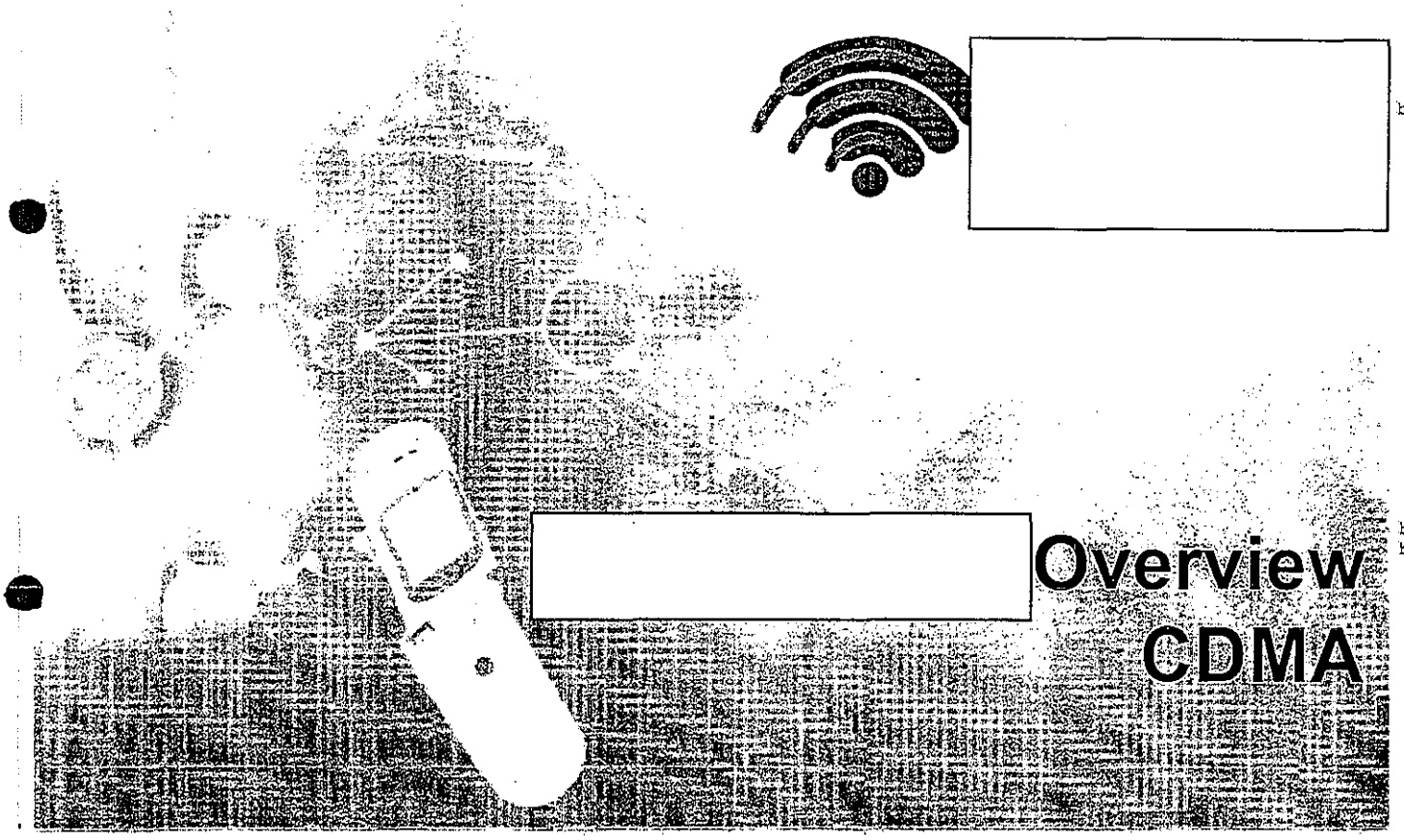

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Overview
CDMA

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Who uses CDMA?

From our technology matrix, Sprint and Verizon use CDMA in addition to many smaller regional operators

TECH	NATIONWIDE SERVICE PROVIDERS
CDMA	verizon wireless, Sprint
TDMA/ Analog	cingular fits you best
GSM	T-Mobile, cingular fits you best
iDEN	NEXTEL

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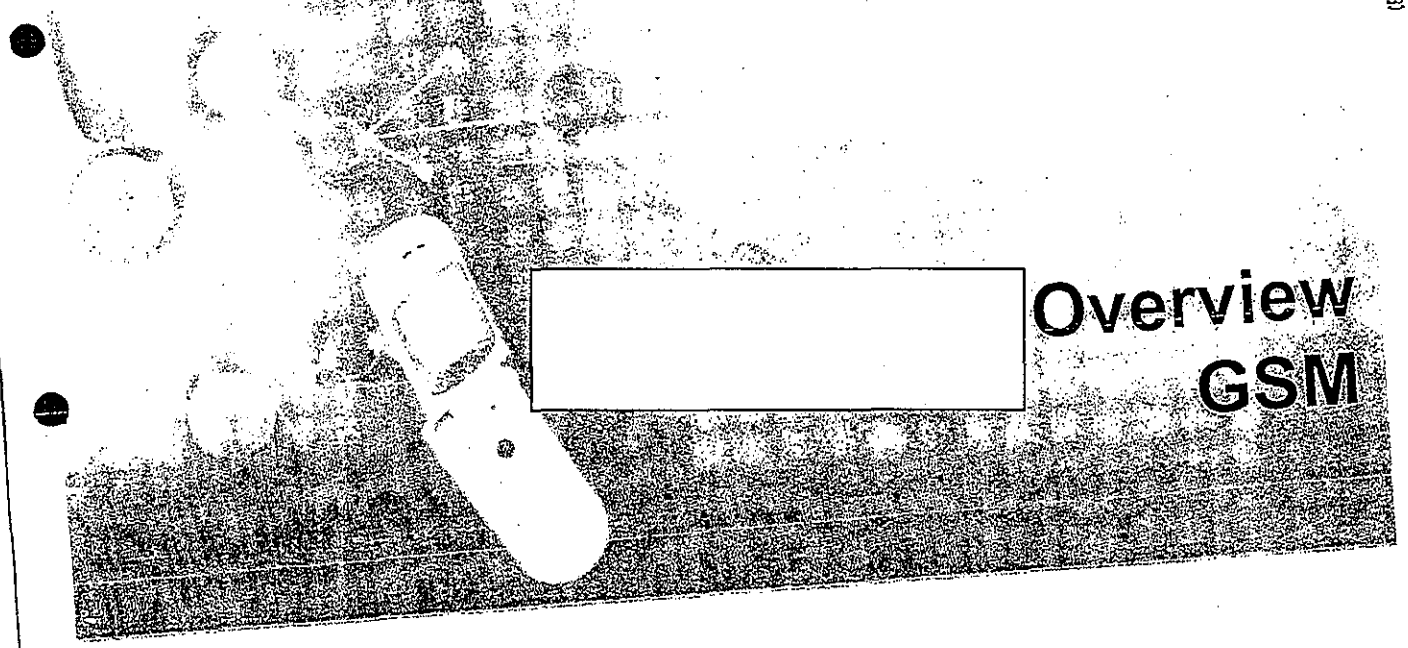

Overview GSM

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Who uses GSM?

From our technology matrix, Cingular and T Mobile use GSM technology. In addition, majority of non- U.S. carriers operate with GSM technologies

TECH	NATIONWIDE SERVICE PROVIDERS
CDMA	verizon wireless, Sprint
TDMA/ Analog	cingular fits you best
GSM	T-Mobile, cingular fits you best
iDEN	NEXTEL

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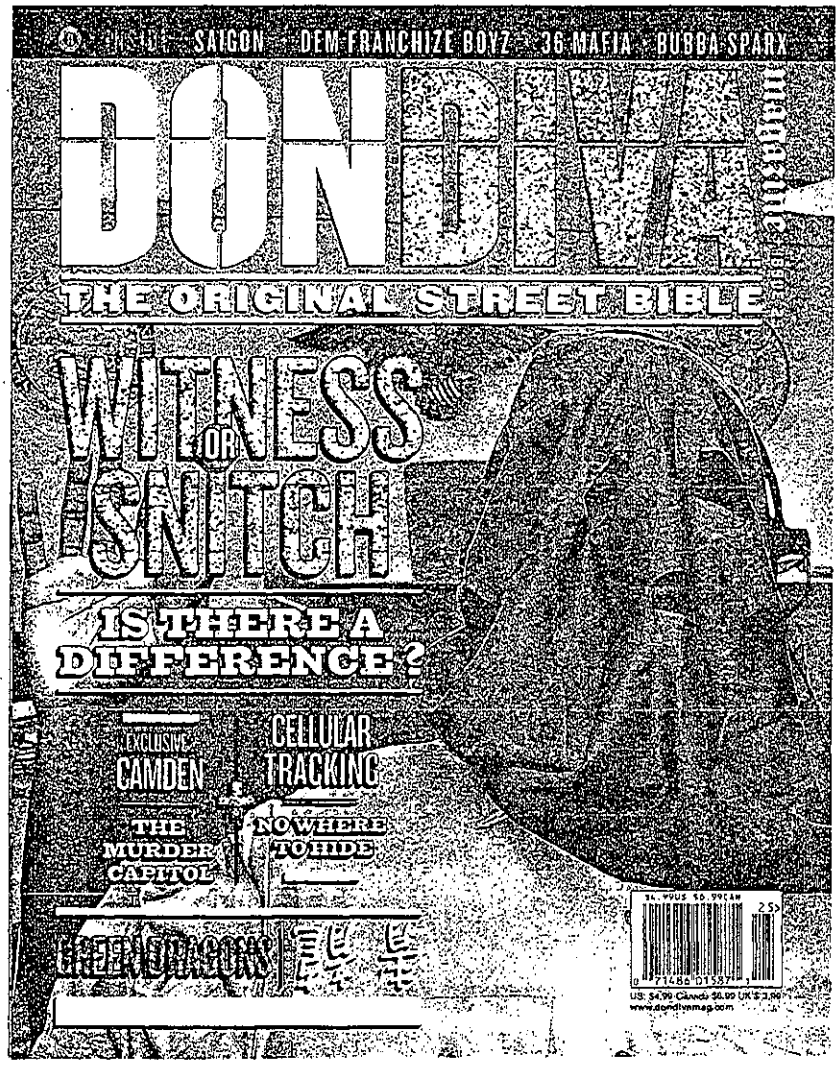
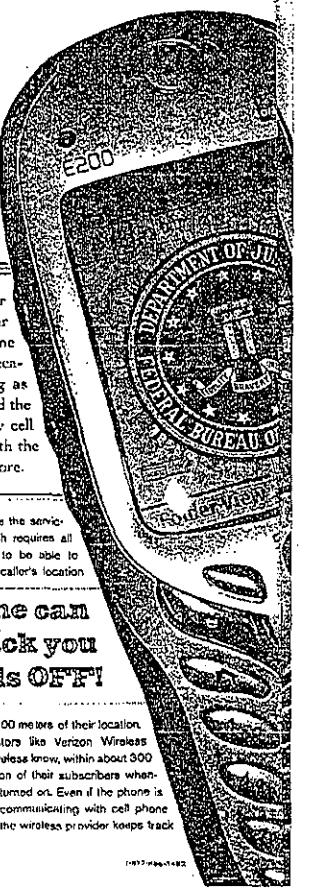
16 Blocks



NEWSYOUCANUSE | ISSUE: 25 | 2006

CELLULAR SURVEILLANCE!

The Feds know where you are right now!



In 2006 carrying a cell phone is as common as carrying your ID. When cell phones were first introduced to the consumer market in 1983, the only people you would see carrying one were professionals like doctors and lawyers and of course your occasional drug dealer- this was back when cell phones were as big as bricks. At this time these people were the only ones who could afford the $3,995 to buy the phone and the inevitable $1000 cell bill. Today cell phones themselves are cheap and the bills are even cheaper and with the advent of prepaid cell phones you don't even need good credit anymore.

Why have cell phones become so easily accessible in our society? Is it really all about corporate competition bringing down the prices of cell phone plans, that are making cell phones so convenient and easy for everyone to get their hands on? If you believe in the idea of Conspiracy Theory then you are more likely to believe that cell phones have been made more readily available to ANYONE because it benefits big brother.

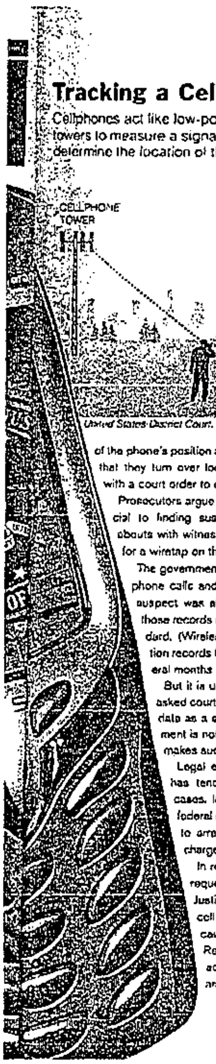
Most Americans carry cell phones, but many may not know that government agencies can track a persons movements through the signals that emanate from their cell phone.

Beginning in October of 2001, the Federal Communications Commission required cellular carriers to make cell phones Global Positioning System* (GPS) enabled. (GPS- A system of satellites, computers, and receivers that is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver. Basically some shit that track exactly where you are on earth.) This was done in an effort to enhance the services of 911, which requires all cellular carriers to be able to pinpoint a 911 caller's location

Your cell phone can be used to track you even when it is OFF!

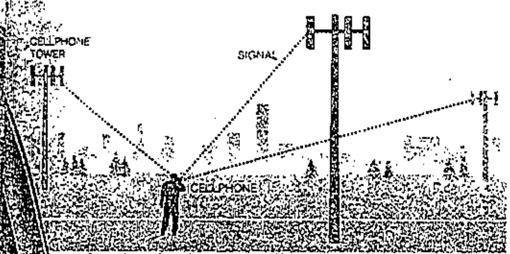
to within 50 to 300 meters of their location.

Cellular operators like Verizon Wireless and Cingular Wireless know, within about 300 yards, the location of their subscribers whenever a phone is turned on. Even if the phone is not in use it is communicating with cell phone tower sites, and the wireless provider keeps track



Tracking a Cellphone

Cellphones act like low-power radio transmitters. By using multiple cell towers to measure a signal transmitted by the phone, providers can determine the location of that phone with an accuracy of about 300 yards.



United States District Court, Southern District of Texas — The New York Times

of the phone's position as it travels. The operators have said that they turn over location information when presented with a court order to do so.

Prosecutors argue that having such information is crucial to finding suspects, corroborating their whereabouts with witness accounts, or helping build a case for a wiretap on the phone.

The government has routinely used records of cellphone calls and caller locations to show where a suspect was at a particular time, with access to those records obtainable under a lower legal standard. (Wireless operators keep cellphone location records for varying lengths of time, from several months to years.)

But it is unclear how often prosecutors have asked courts for the right to obtain cell-tracking data as a suspect is moving. And the government is not required to report publicly when it makes such requests.

Legal experts say that such live tracking has tended to happen in drug-trafficking cases. In a 2003 Ohio case, for example, federal drug agents used cell tracking data to arrest and convict two men on drug charges.

In recent months there have been four requests from the U.S. Department of Justice to track people through their cell phones with not showing probable cause." (Probable Cause- Reasonable grounds for belief that an accused person may be subject to arrest or the issuance of a warrant.)

Of the four such motions made, judges in New York, Texas and Maryland denied the Department of Justice's requests, stating that the government lacked statutorial authority to track cell phone location without a warrant.

In the New York and Texas cases, the courts approved FBI requests for other information from the wireless carriors, including logs of numbers a cell phone user called and received calls from. Court orders for that information require law enforcement agencies to show only that the information is relevant to an ongoing investigation.

But the FBI also sought cell-site locations, which the courts said amounted to the ability to monitor someone's movements. The judges ruled that such information requires law enforcement to show "probable cause" that a crime has been or is being committed.

But most recently, on Dec. 20, 2005 a fourth judge, in New York, ruled in the government's favor, finding that the USA Patriot Act and federal wiretapping laws allow police to track cell phone signals without showing probable cause.

What does this all mean to you? The bottom line is this. The technology in your cell phone makes it possible for the government to track your whereabouts in real time. If they have the technology it would be in your best interest to assume that they are using. Whether it is legal and constitutional is of no consequence- do you really have the money or time to test it. Not only do you need to watch what you say on the cell phone you need to be mindful of where you take it! You've been warned.

GPS Ain't All Bad!

The basic concept behind GPS is a great thing. The technology makes it possible for you to remotely track your children in the event they are abducted or get lost. There are dozens of devices popping up using GPS technology that can be purchased for as little as $50 that may save the life of your child. GPS also allows 911 operators to locate you in an emergency when you call them from your cell phone. Companies like On-Star use GPS to track vehicles' whereabouts and allows motorists to summon emergency help or to ask directions. So the Technology used and was intended is beneficial to all of us, it's the misuse and invasion of privacy that we must concern ourselves with.

3.1.3.1005