IS 95 AND CDMA 2000 BASE STATION CALL PROCESSING

Overview

- Call Processing – Definition
- Difference between call processing in IS 95 and CDMA 2000
- Call Processing States
- Call Processing – On field

CALL PROCESSING…?

- Can be defined as the sequence of operation by switching system from the acceptance of the incoming call to the disposition of the call.
- The end-to-end sequence of operation performed by the network.
- In data transmission, the operation requires to complete all the phases of information transfer transaction.

CALL PROCESSING STATES

- **Mobile Initialization State**

- The mobile selects a serving system, mode of operation, and synchronizes to the selected system

- **Mobile Idle State**

- The mobile monitors Page Channel Messages

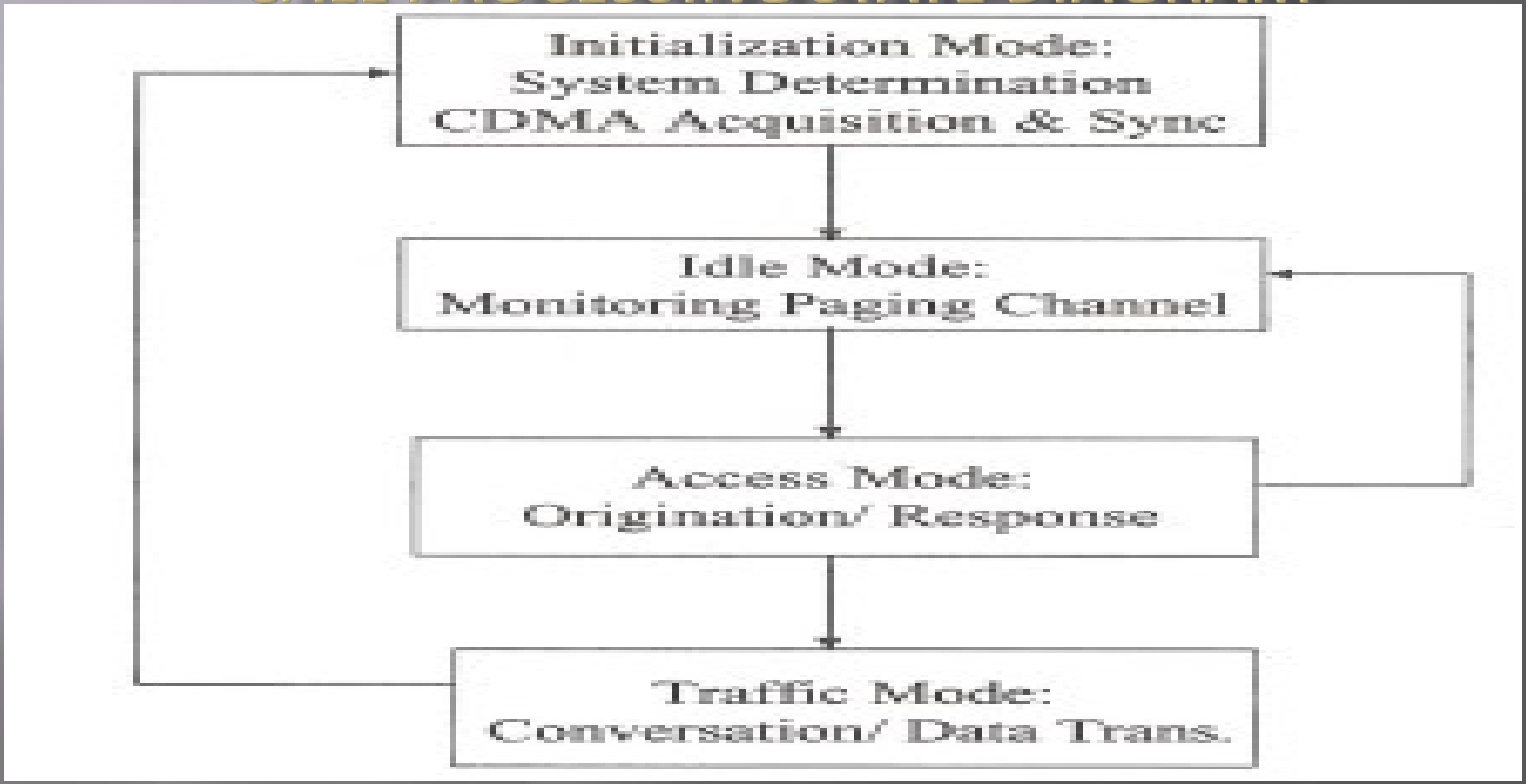
- **Mobile System Access State**

- The mobile sends a message to the base station on the Access channel.

- **Mobile Traffic Channel State**

- The mobile communicates with the base station using the Forward and Reverse traffic channel.

CALL PROCESSING STATE DIAGRAM



IS-95 Vs CDMA 2000

- **Air-Interface Messages.**
  - Some new messages are defined.
  - Some existing messages have additional fields.
- **Mapping of Existing 2G channels.**
  - Names of the channels have been abbreviated and replaced.
  - For classification and recognition of the channels.

New channels in 3G-1X.

- Reverse Pilot Channel, R-PICH.
- Forward Quick Paging Channel, F-QPCH.
- Forward Supplemental Channel, F-SCH.
- Reverse Supplemental Channel, R-SCH.

AQUIRE SYSTEM

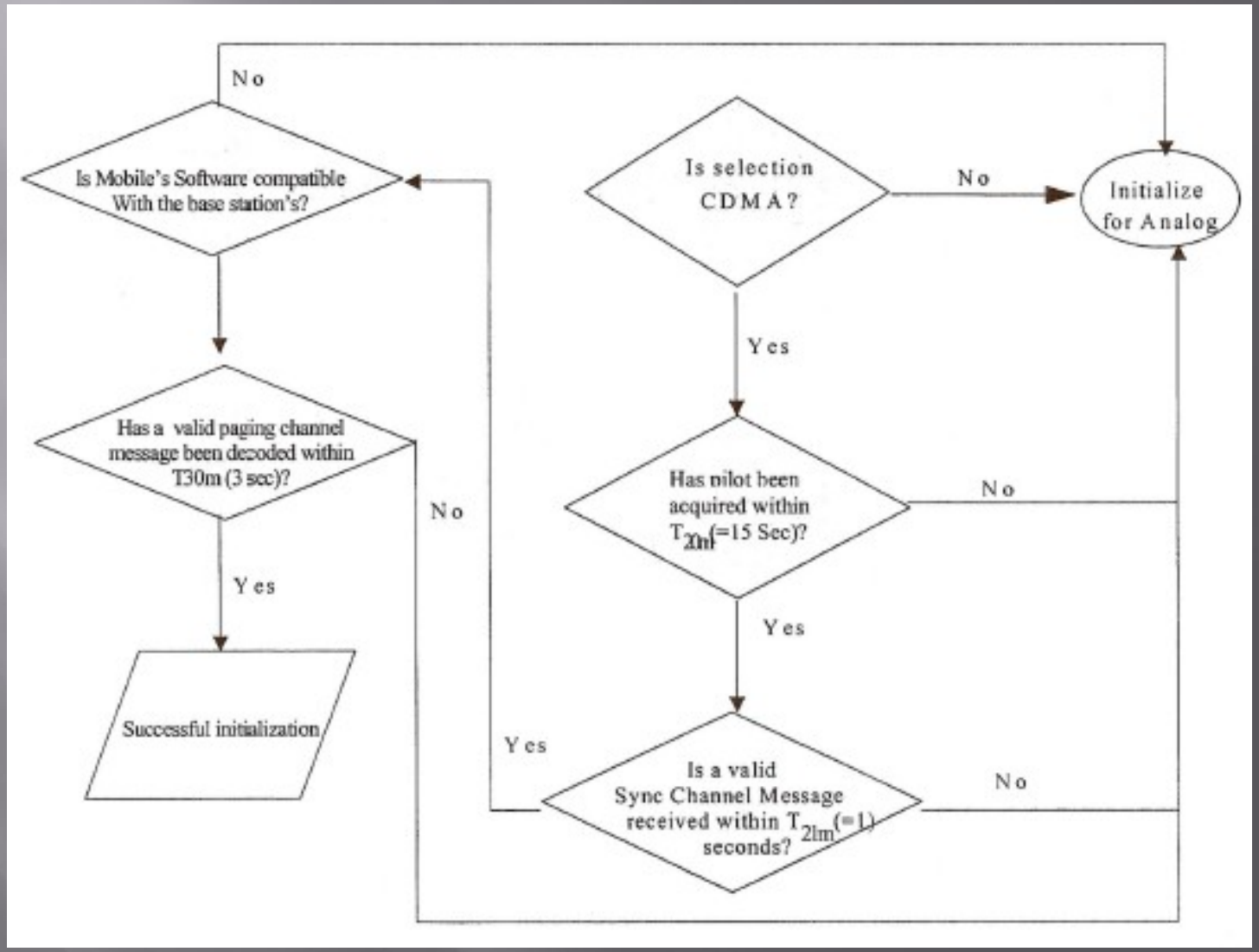
- **System Determination Sub state.**
  - Scans for a pilot channel on first CDMA channel.
  - If not found scans on the next preferred CDMA channel.
- **Pilot Channel Acquisition Sub state.**
  - Search for Short PN codes.
  - Returns to the System Determination Sub state after 15 sec.
- **Sync Channel Acquisition State.**
  - Decodes the Walsh code32 to obtain the timing information from the base station.
- **Mobile Timing Change Sub state.**

- Sets the internal timings by using the Sync Channel information.

Sync Channel Messages

Field	Length (bits)
MSG_TYPE ('00000001')	8
P_REV	8
MIN_P_REV	8
SID	15
NID	16
PILOT_PN	9
LC_STATE	42
SYS_TIME	36
LP_SEC	8
LTM_OFF	6
DAYLT	1
PRAT	2
CDMA_FREQ	11

Initialization State Flow Chart



Mobile Station – Idle State

- The primary duty - listen to the Primary Paging Channel based on the instruction read from the Sync channel message.
- Misnomer – even though the mobile is busy, it appears to be idle to user.
- Any interruption – Idle state to system access state.

What does the mobile do being in this Idle State?

- Mobile constantly turn parts of itself on and off.
- ‘On’ - perform vital functions.
- ‘off’ - save power so that the battery lasts longer.

This periodic on and off of the mobile transceiver is called slotted mode of operation.

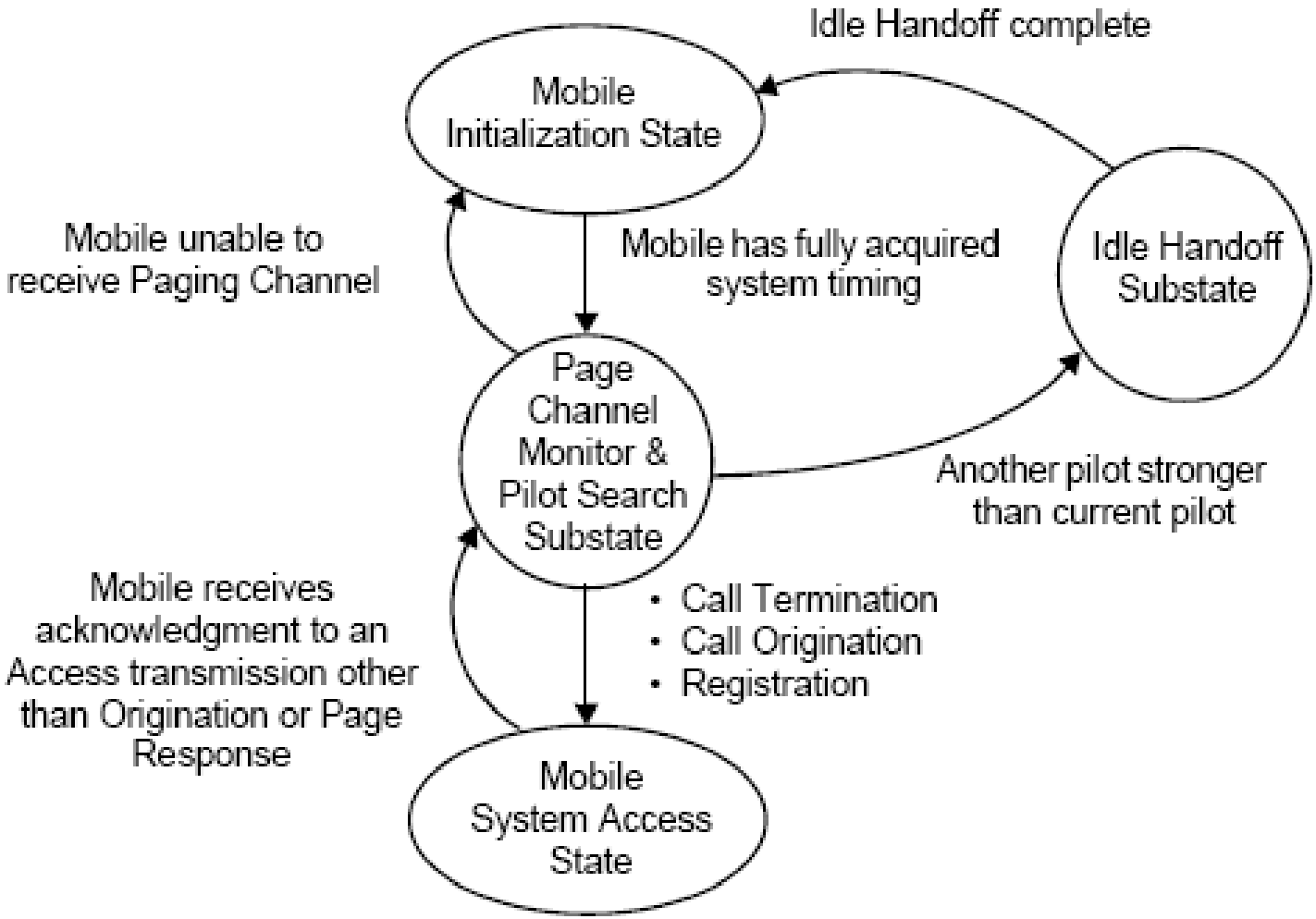
Note:

The mobile can operate in the slotted mode only in the idle state and moreover, the base-station controls the period of the slot cycle which is 1.28 seconds.

Idle Procedures

- Paging Channel monitoring procedures
- The mobile station performs acknowledgement procedures
- The mobile performs Registration procedures
- In idle state the mobile can perform an idle handoff
- Origination operation
- Message Transmission
- Response to page Messages
- Power down operation whenever the user directs the mobile to do so

Mobile – Idle state



Why Slot cycle or slotted mode?

- The purpose of the slot cycle is to permit the phone to keep the receiver turned off most of the time (increase battery life) as the receiver consumes quite a lot of power
- When the mobile first registers with a base station, the base station and mobile determine which paging channel and what phase of the slot cycle that mobile will use. Thereafter, the phone wakes periodically, turns its receiver on briefly to see if it has an incoming call or if there is other traffic from the cell it must respond to, and if there is nothing then it shuts the receiver down again and waits until the next slot time.
- The advantage of a longer slot cycle is that the phone spends longer time in 'off' state and thus the battery will last longer. It also means there is more capacity on the paging channel. At the same time, the advantage of a shorter slot cycle is that the phone gets more chances to receive the page, and will receive the page sooner.

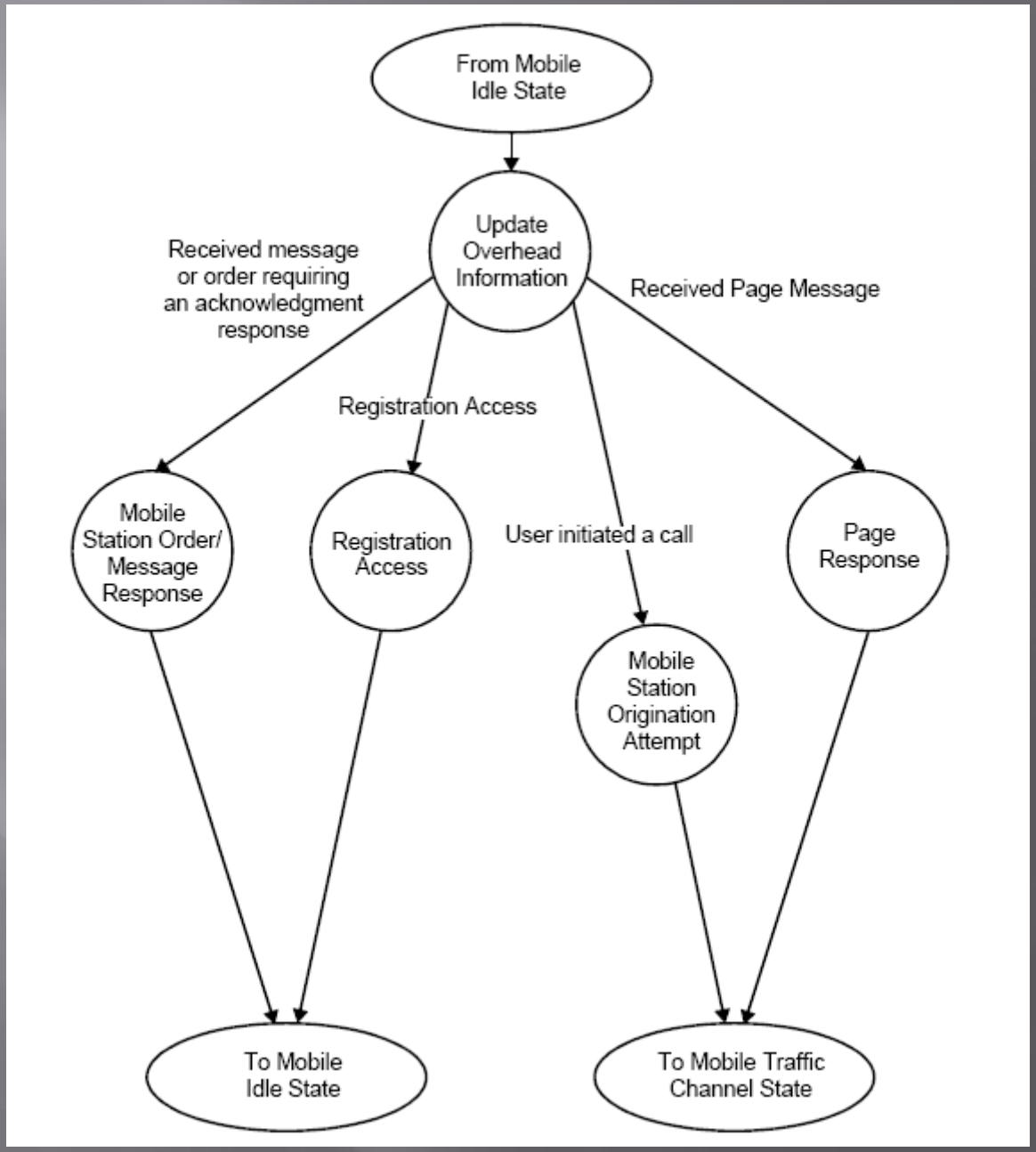
Example of an incoming call:

When an incoming call arrives at a base station for a given mobile, the phone system of the caller generates the sound of a phone ringing as a comfort tone back to the caller (this tone comes in Alert With Information Message), and the base station waits until the slot time for the called mobile. When it comes around, the cell sends a message to the phone telling it that there is an incoming call. This causes the phone to waken and set up the call, and to begin to ring. If the phone doesn't respond to the page, the cell may try again on the next slot.

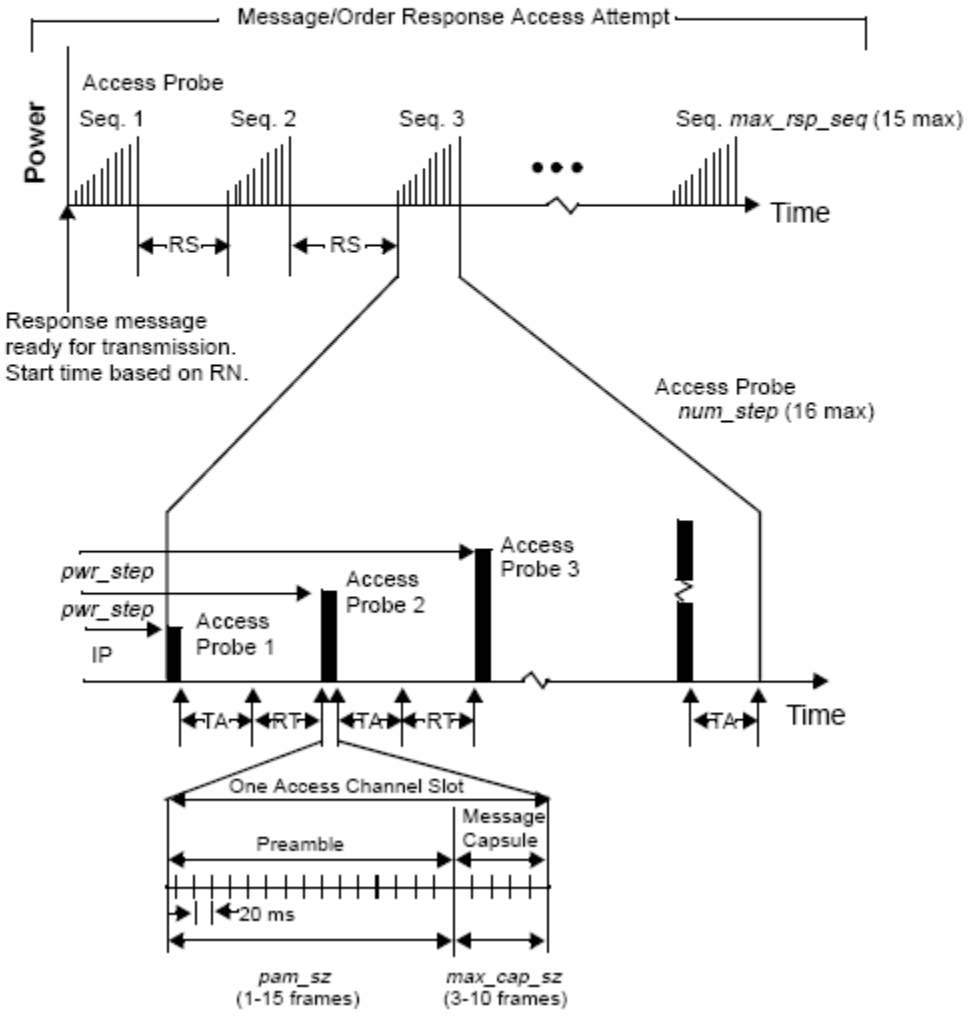
Accessing System

MOBILE SYSTEM ACCESS STATE

- The user originates a call.
- The mobile has received a page, indicating that there is a call to the mobile.
- The mobile needs to send the base station a registration message.
- The mobile needs to send the base station an acknowledgment or response to a message.


From Mobile Idle State
Update Overhead Information
Received message or order requiring an acknowledgment response
Registration Access
User initiated a call
Received Page Message
Mobile Station Order/ Message Response
Registration Access
Mobile Station Origination Attempt
Page Response
To Mobile Idle State
To Mobile Traffic Channel State

ACCESS CHANNEL PROTOCOL
Message/Order Response Access Attempt



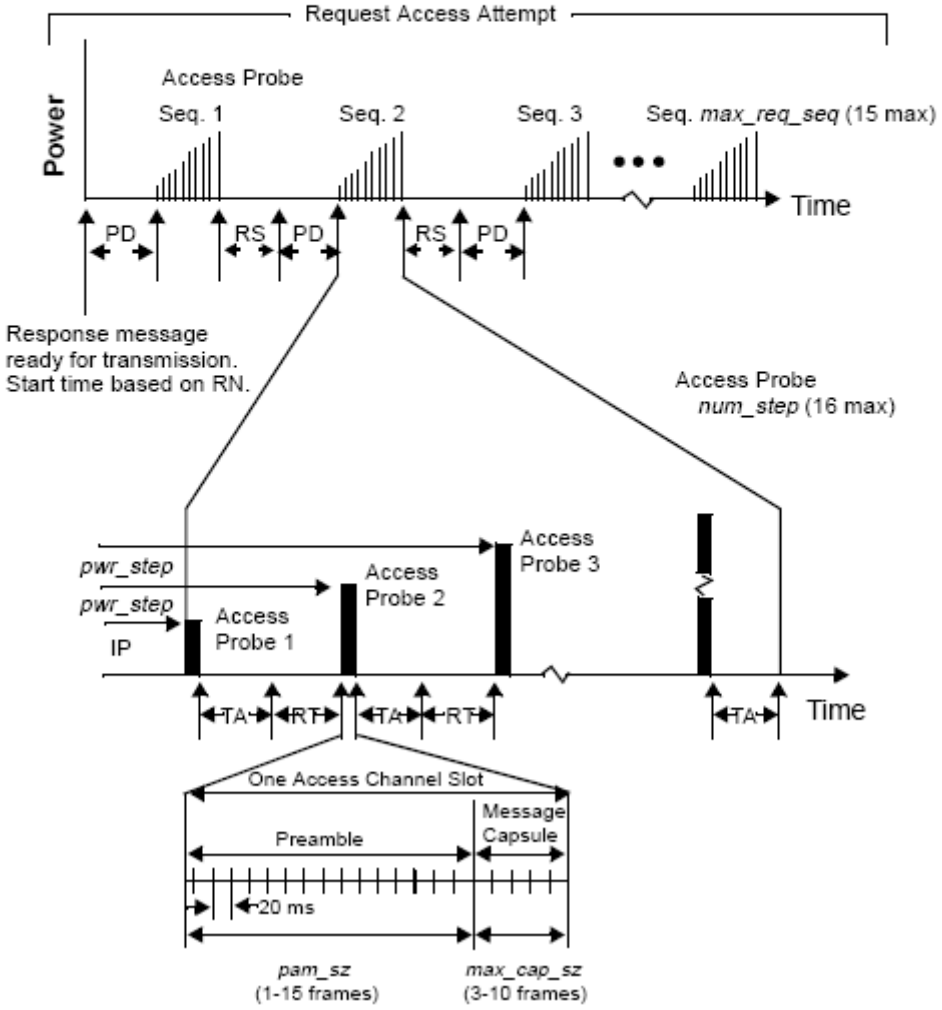
ACCESS CHANNEL PROTOCOL
Request Access Attempt

Acronyms

- **PD** – Persistence Delay
- **RN** – Random Number used to determine the start of transmission
- **RS** – Backoff Delay
- **RT** – Retry Delay
- **TA** – Acknowledgment Time

NOTE: The CDMA Automatic Access Channel Overload feature available with APXD13.1 will manage access channel occupancy and prevent overloading by dynamically changing the persistence.

ACCESS CHANNEL PROTOCOL
Request Access Attempt



ACCESS CHANNEL OCCUPANCY SERVICE MEASUREMENTS

CDMA–PAF

- **CDMA Access Seizures**
- **CDMA Access Channel Occupancy**
- **Peak CDMA Access Channel Occupancy**

SYSTEM ACCESS SUMMARY

- Mobile sends access probes to initiate contact with base station.
- Access channel protocol objective
- Establish contact quickly without causing excessive interference.
- Load balance channels
- Access channel - Hashing.

3G-1X uses the 2G Access Channel Protocol

Traffic Channel Setup

- MOBILE

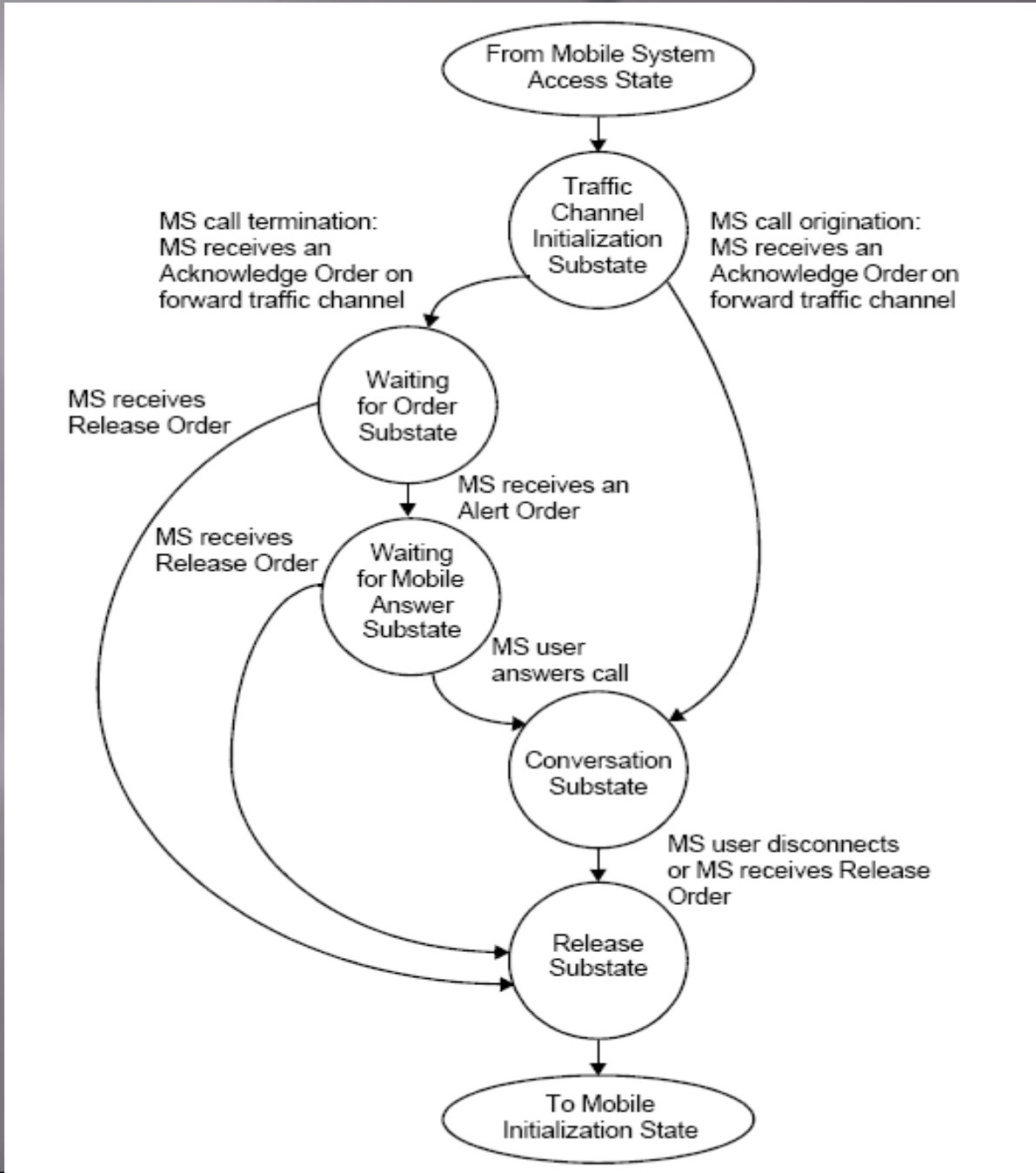
TRAFFIC CHANNEL STATE

- After MS successfully accesses the BTS , mobile verifies the forward traffic channel and transmits on the reverse traffic channel
- Mobile Originated Call – enters conversations substate untill ended by either party
- Mobile Terminated Call – enters wait for order substate and waits for alert

Order. Mobile enters wait for answer substate untill the user answers the call.

- Mobile enters conversation substate when user answers the alert
- Mobile resets back to initialization substate when either calling or called party end the call.

State diagram



TRAFFIC CHANNEL INITIALIZATION SUBSTATE

- Single Frequency Base Station
- BTS assigns a traffic channel to the mobile
- In a system with a single carrier frequency, the first step is selecting a cluster controller (CCC) to load balance traffic over the CCCs.
- If all CEs are busy or reserved for soft handoff, the call attempt ends with a reorder to the mobile. Otherwise, an idle CE is selected and assigned a Walsh code and sector.
- Base station attempts to configure the CE for the service option (SO) requested by the mobile, e.g., Rate Set 1, Rate Set 2, secondary traffic channel, data, fax, etc
- Once communication is established on the uplink, the forward power control algorithm will change the CE gain to maintain an adequate signal level at the mobile.
- Base station sends the mobile a channel assignment message over the paging channel. The message includes the mobile ID (either ESN or MIN), the RF channel.
- Base station attempts to detect the mobile by using the round trip delay calculated from the access channel. Once the mobile is detected, the forward and reverse power control loops continually adjust mobile and base station power to maintain adequate signal levels on the up and down links

TRAFFIC CHANNEL CONFIRMATION SUBSTATE

Base Station

- Once the mobile has been sent the traffic channel assignment parameters, the base station attempts to decode uplink traffic frames from the mobile
- After receiving good frames from the mobile, the base station sends an alert order to the Mobile for terminating calls, and then enters the conversation substate

TRAFFIC CHANNEL INITIALIZATION SUBSTATE

Mobile

- Once the mobile receives a channel assignment message, it attempts to decode traffic frames being sent by the base station.
- After receiving the channel assignment message, the mobile starts a supervision timer which resets after receiving two good frames.
- As soon as it receives the two good frames, the mobile goes to the conversation state or wait for alert state depending if it is a terminating or origination call.

- **WAIT FOR ALERT SUBSTATE**

Mobile

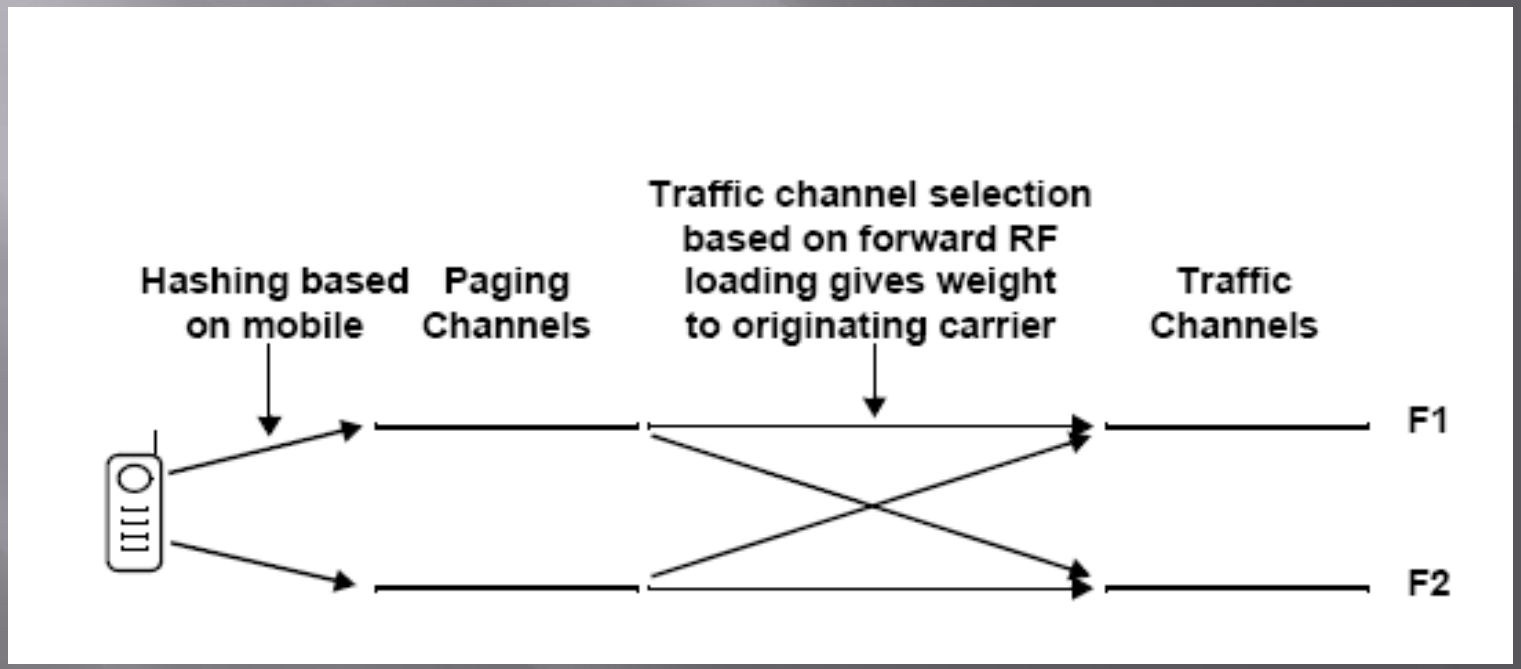
- Once the mobile has confirmed the traffic channel is sending and receiving traffic frames, the mobile now waits for an alert message
- Mobile starts a 5 seconds timer, waits for alert and starts power control-Returns to determinant state if timer expires
- Once the alert message is received, the mobile starts a 65-second timer, and waits for the subscriber to answer the call (press the send button). Once the subscriber answers the call, the mobile is in the conversation state until either party terminates the call.

- **LOAD BALANCE TRAFFIC CHANNELS**

TCA

- Multi carrier systems – mobile should perform traffic carrier frequency selection apart from above processing

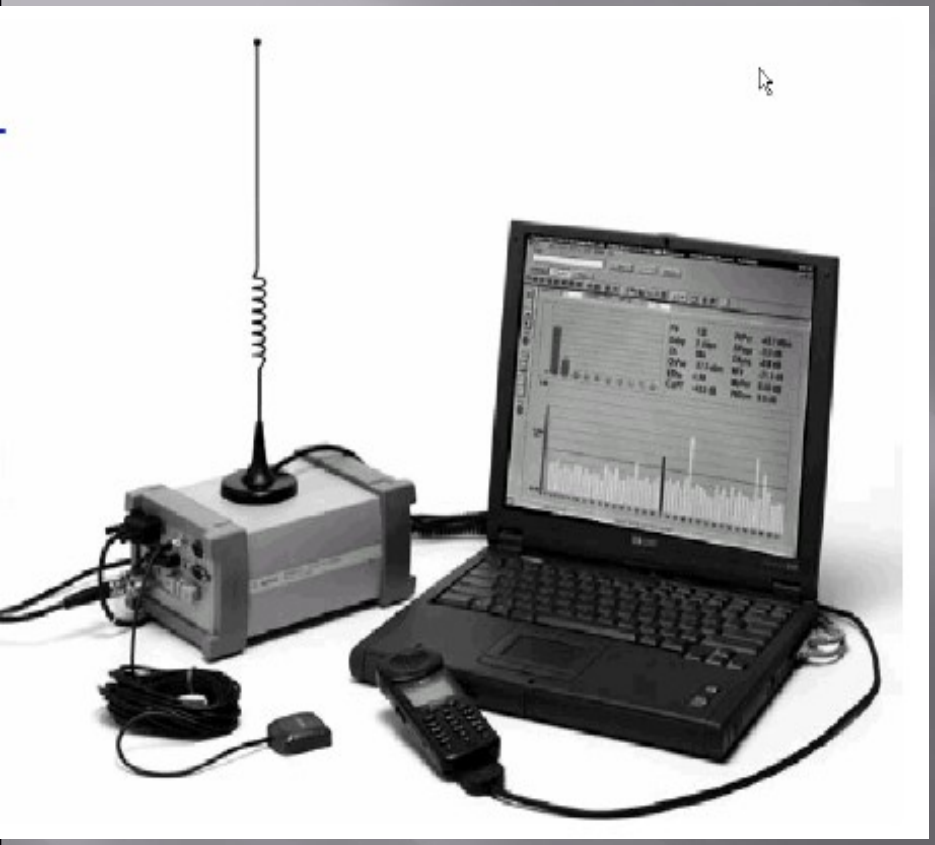
- Access probes are received on the carrier to which the mobile is hashed, Fn.
- Traffic Channel Assignment algorithm (TCA) may assign a traffic channel on another carrier to maintain traffic channel loading — cross carrier assignment.
- Objective is to keep the footprint of the carriers similar.



- **CONVERSATION SUBSTATE**
  - Messages being sent on the traffic channel
  - Continuous confirmation of the traffic channel
  - Locating handoff candidates
  - Performing handoffs
  - Power control
  - Overload control
  - Other call activities

- SERVICE MEASUREMENTS
  - CDMA dropped calls
  - CDMA lost calls
  - RF Origination failures
  - RF terminations failures
  - CSSR
  - Handoff Parameters

Lets look what happens on field.....???

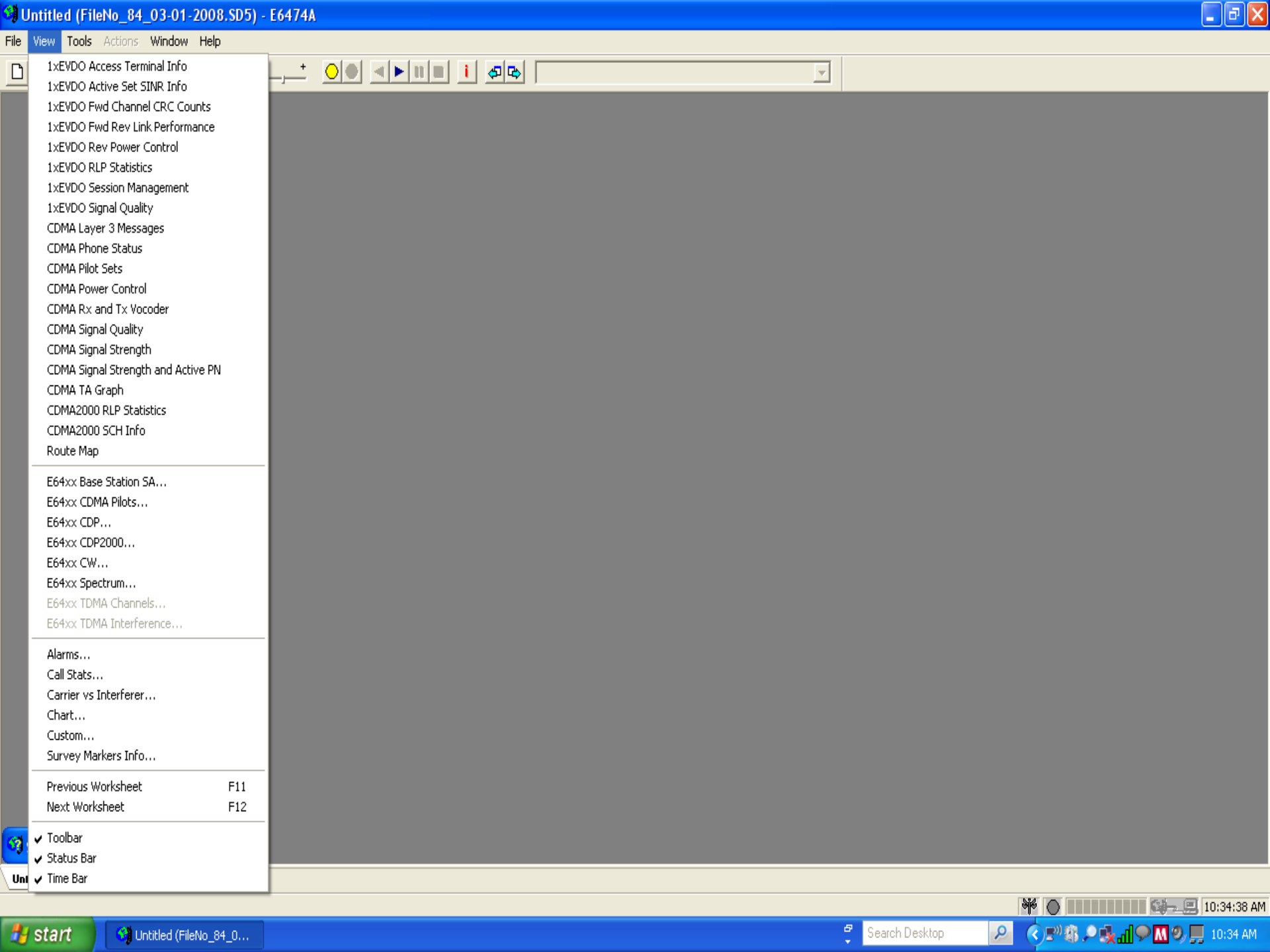


DRIVE TEST

- ✓ Simulation of a Mobile phone user
- ✓ Log and analyze field data

COMPONENTS

- ✓ PN Scanner and Receiver
- ✓ Engineered Test Mobiles
- ✓ Laptop with Agilent software installed
- ✓ Hub

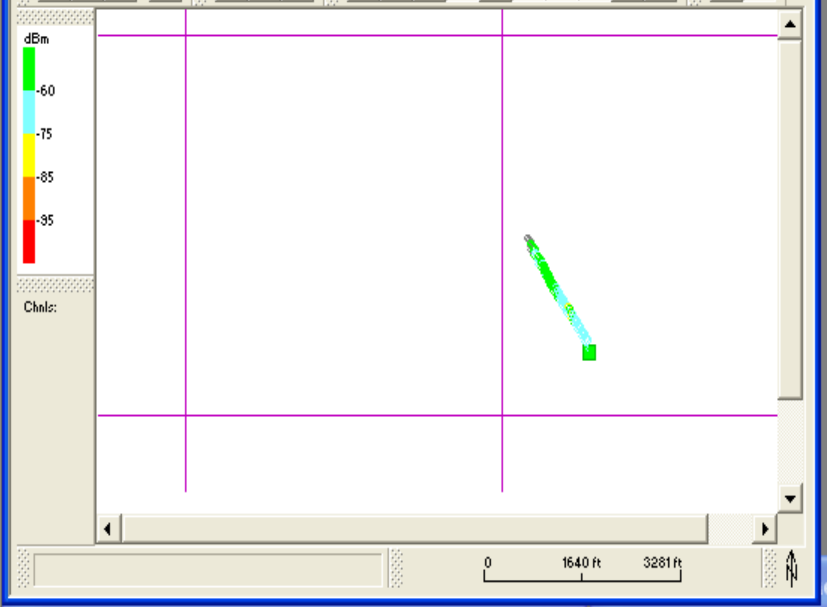

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1xEVDO Active Set SINR Info
1xEVDO Fwd Channel CRC Counts
1xEVDO Fwd Rev Link Performance
1xEVDO Rev Power Control
1xEVDO RLP Statistics
1xEVDO Session Management
1xEVDO Signal Quality
CDMA Layer 3 Messages
CDMA Phone Status
CDMA Pilot Sets
CDMA Power Control
CDMA Rx and Tx Vocoder
CDMA Signal Quality
CDMA Signal Strength
CDMA Signal Strength and Active PN
CDMA TA Graph
CDMA2000 RLP Statistics
CDMA2000 SCH Info
Route Map
E64xx Base Station SA...
E64xx CDMA Pilots...
E64xx CDP...
E64xx CDP2000...
E64xx CW...
E64xx Spectrum...
E64xx TDMA Channels...
E64xx TDMA Interference...
Alarms...
Call Stats...
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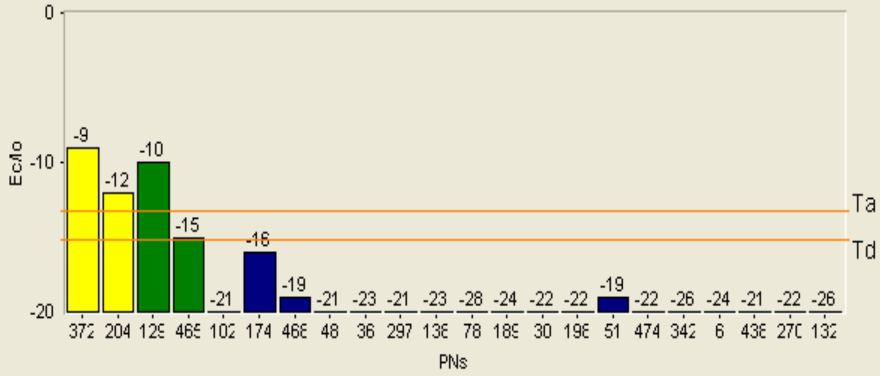
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{#6} Route Map



{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **2 Ways**	Agg Ec/Io: **-10.98**
CDMA Rx State: **Traffic Ch**	Code Ch: **44**	Rx Power: **-79.58**	Tx Power: **0.08**
Phone State Data: **Conversation**	PN: **372**	Tx Gain Adj: **-6.50**	FER: **1.18**



{#4} CDMA Phone Status

Phone State : **CDMA**

Phone State Data : **Conversation**

RF Mode : **CDMA 800**

CDMA RX State : **Traffic Ch**

Entry Reason : **Normal CDMA operation**

Pilot PN : **372**

Code Channel : **44**

Channel Number : **492**

SID : **14655**

NID : **60**

LocID : **0**

Analog RSSI :

Analog Pow Index :

{#1} Call Stats

Technology	yocera CDMA200
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	On Call 0

Rx Power	-79.58		Tx Power	0.08
Tx Gain Adj	-6.50		FER	1.18
Rx Voc Rate	Full		Tx Voc Rate	1/8
Agg Ec/Io	-10.98		Handoff State:	2 Way

	Finger 1	Finger 2	Finger 3	Finger 4
PN	372	372	204	
Ec/Io	-15.57	-17.61	-14.60	
Sector	0x0	0x0	0x1	
Position	0xF1A	0xF27	0xF1B	

essages

Pause | Level 1 | Level 3 | Properties...

CAI = Reverse Traffic Channel CAI msg_type = Pilot Strengtl
CAI = Reverse Traffic Channel CAI msg_type = Power Meas
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CAI = Reverse Traffic Channel CAI msg_type = Order : Mobi
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobi

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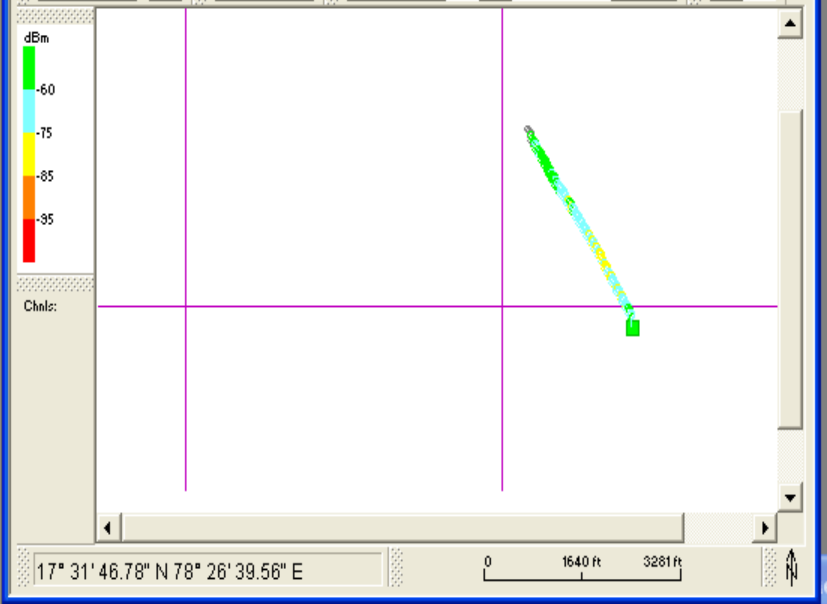
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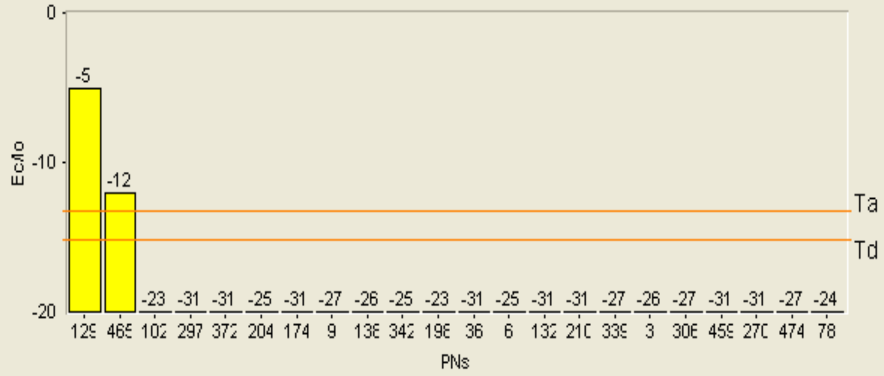
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{#6} Route Map



{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-4.60**
CDMA Rx State: **Traffic Ch**	Code Ch: **44**	Rx Power: **-61.25**	Tx Power: **-25.75**
Phone State Data: **Conversation**	PN: **129**	Tx Gain Adj: **-14.00**	FER: **0.20**



Rx Power	-61.25	Tx Power	-25.75
Tx Gain Adj	-14.00	FER	0.20
Rx Voc Rate	Full	Tx Voc Rate	Full
Agg Ec/Io	-4.60	Handoff State:	1 Way

	Finger 1	Finger 2	Finger 3	Finger 4
PN	129	129	129	
Ec/Io	-5.16	-16.15	-17.61	
Sector	0x0	0x0	0x0	
Position	0xF30	0xF29	0xF3B	

essages

Pause | Level 1 | Level 3 | Properties...

CAI = Reverse Traffic Channel CAI msg_type = Power Meas
CAI = Reverse Traffic Channel CAI msg_type = Power Meas
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobi
CAI = Forward Traffic Channel CAI msg_type = Extended Ne
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobi
CAI = Forward Traffic Channel CAI msg_type = In-Traffic Sy
CAI = Forward Traffic Channel CAI msg_type = Order : Bas
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobi
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CAI = Forward Traffic Channel CAI msg_type = Power Cont
CAI = Reverse Traffic Channel CAI msg_type = Pilot Strengtl

{#4} CDMA Phone Status

Phone State : **CDMA**
Phone State Data : **Conversation**
RF Mode : **CDMA 800**
CDMA RX State : **Traffic Ch**
Entry Reason : **Normal CDMA operation**
Pilot PN : **129**
Code Channel : **44**
Channel Number : **492**
SID : **14655**
NID : **60**
LocID : **0**
Analog RSSI :
Analog Pow Index :

{#1} Call Stats

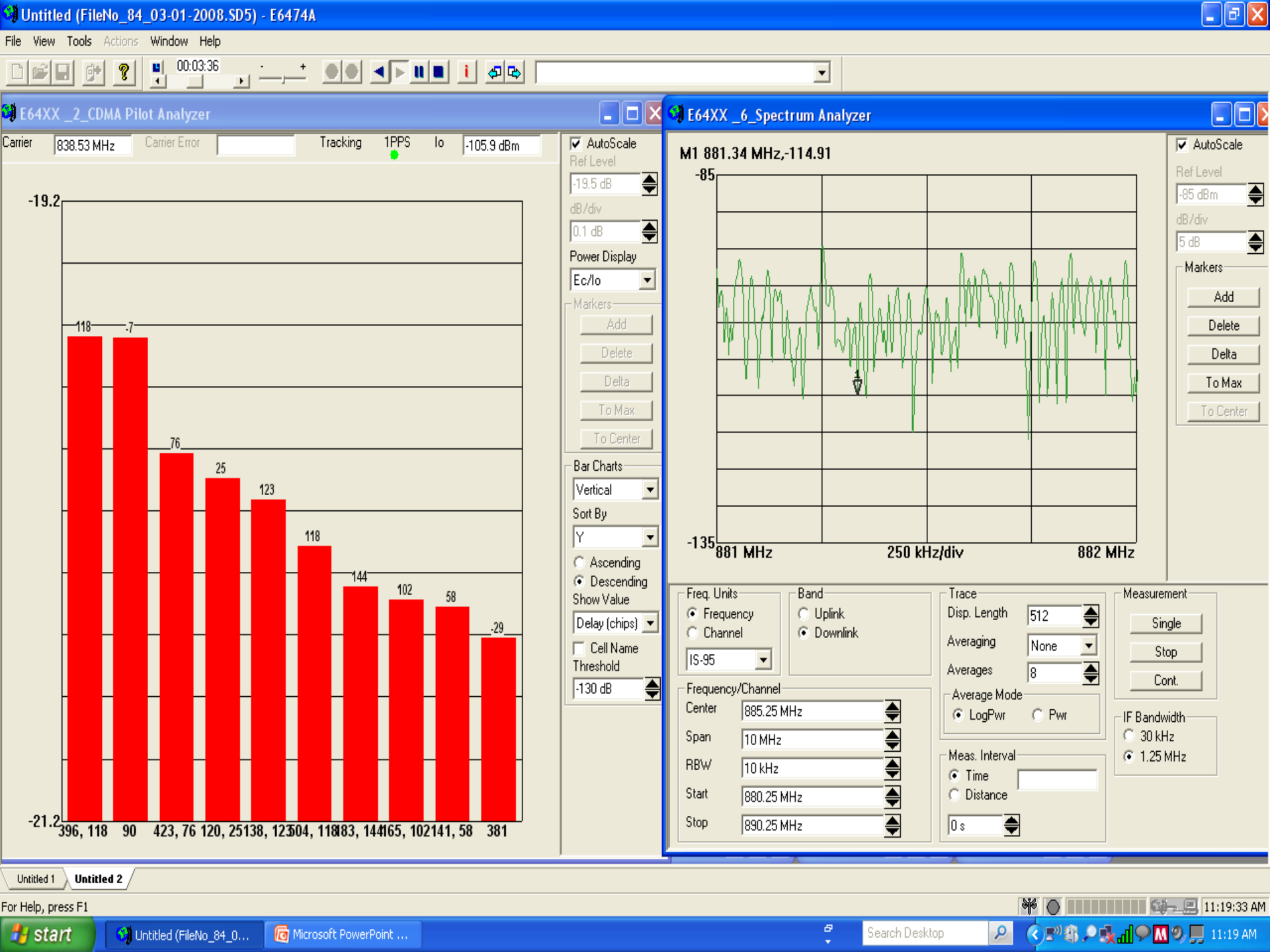
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Dropped	
No Service	
No Comm	
Progress	

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Ec/Io
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Delta
To Max
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Bar Charts
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Descending
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-85
-135
881 MHz
250 kHz/div
882 MHz
AutoScale
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dB/div
5 dB
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Add
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Delta
To Max
To Center
Freq. Units
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Channel
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Band
Uplink
Downlink
Trace
Disp. Length 512
Averaging None
Averages 8
Measurement
Single
Stop
Cont.
Frequency/Channel
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Span 10 MHz
RBW 10 kHz
Start 880.25 MHz
Stop 890.25 MHz
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LogPwr
Pwr
Meas. Interval
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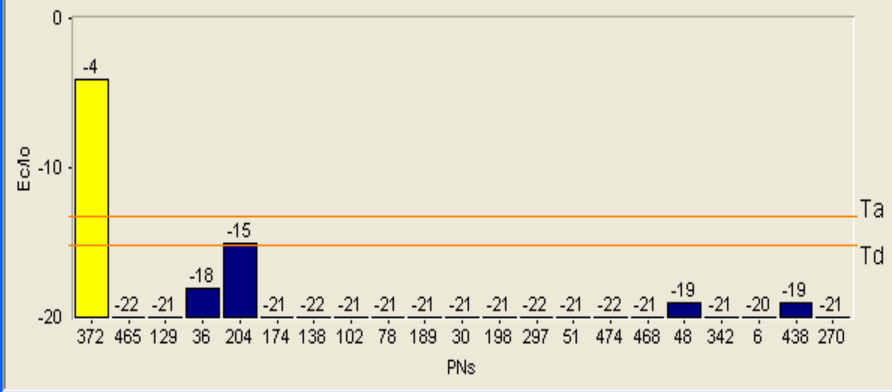
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- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Extended System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended CDMA Channel List Message
- CAI = Paging Channel CAI msg_type = CDMA Channel List
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Access Parameters
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- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Extended System Parameters
- CAI = Paging Channel CAI msg_type = General Page

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-3.63**
CDMA Rx State: **Paging Ch**	Code Ch: **1**	Rx Power: **-48.58**	Tx Power:
Phone State Data: **Idle**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Initialize 12

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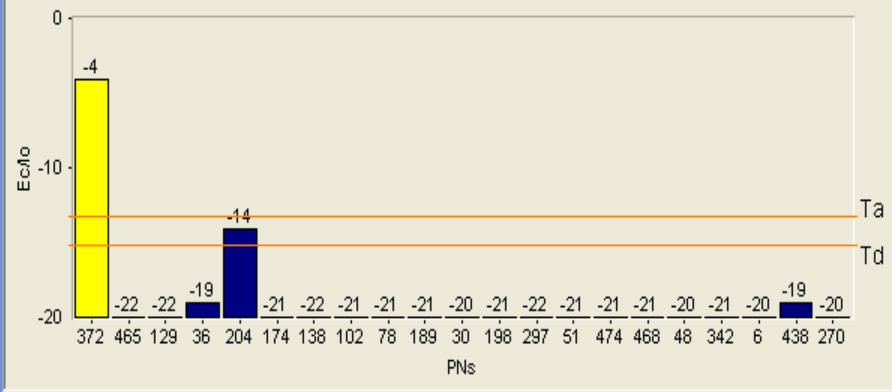
{#4} CDMA Layer 3 Messages

Resume | Level 1 | Level 3 | Properties...

- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Feature Notification Message
  - CAI = Paging Channel CAI
  - msg_type = Feature Notification Message
  - time = 2:16:53.76125
  - ack_seq = 6
  - msg_seq = 1
  - ack_req = 0
  - valid_ack = 1
  - addr_type = 0x2 = IMSI
  - addr_len = 5
  - IMSI Class = Class 0
  - IMSI Class 0 Type = IMSI_S
  - reserved = 0
  - IMSI = (0xB) 0xD41C4F = (122) 959-7180
  - release = 0
  - record_type = 0x1 = Display
  - record_len = 12
  - chari = HYDerabad
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Extended System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended CDMA Channel List Message
- CAI = Paging Channel CAI msg_type = CDMA Channel List
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = Access Parameters
- CAI = Paging Channel CAI msg_type = System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = Order : Base Station Acknowledgement
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Feature Notification Message

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-3.39**
CDMA Rx State: **Paging Ch**	Code Ch: **1**	Rx Power: **-57.58**	Tx Power:
Phone State Data: **Idle**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Idle 7

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{#4} CDMA Layer 3 Messages

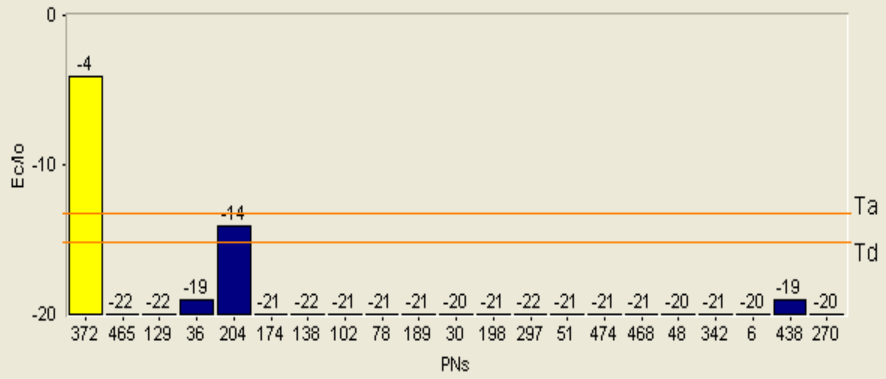
Resume | Level 1 | Level 3 | Properties...

CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI
- msg_type = General Neighbor List
- time = 2:16:53.74250
- pilot_pn = 372
- config_msg_seq = 13
- pilot_inc = 3
- nghbr_srch_mode = 0x1 = Search windows and search priorities
- nghbr_config_pn_incl = 1
- freq_fields_incl = 0
- use_timing = 0
- num_nghbr = 20

- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 465
- search_priority = 0x3 = Very High
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 129
- search_priority = 0x3 = Very High
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 36
- search_priority = 0x3 = Very High
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 204
- search_priority = 0x3 = Very High
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 174
- search_priority = 0x3 = Very High
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 138
- search_priority = 0x1 = Medium
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 102
- search_priority = 0x1 = Medium
- nghbr_config = 0x0 = Neighbor has the same configuration as current
- nghbr_pn = 78
- search_priority = 0x1 = Medium

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-3.39**
CDMA Rx State: **Paging Ch**	Code Ch: **1**	Rx Power: **-57.58**	Tx Power:
Phone State Data: **Idle**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Idle 7

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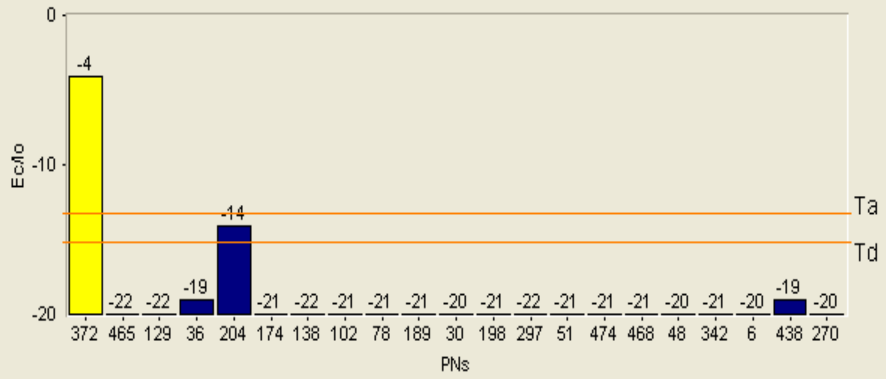
{#4} CDMA Layer 3 Messages

Resume | Level 1 | Level 3 | Properties...

- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Extended System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended CDMA Channel List Message
- CAI = Paging Channel CAI msg_type = CDMA Channel List
  - CAI = Paging Channel CAI
  - msg_type = CDMA Channel List
  - time = 2:16:53.56250
  - pilot_pn = 372
  - config_msg_seq = 13
    - cdma_freq = 369
    - cdma_freq = 410
    - cdma_freq = 451
    - cdma_freq = 492
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = Access Parameters
- CAI = Paging Channel CAI msg_type = System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = Order : Base Station Acknowledgement
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Feature Notification Message

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-3.39**
CDMA Rx State: **Paging Ch**	Code Ch: **1**	Rx Power: **-57.58**	Tx Power:
Phone State Data: **Idle**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Idle 7

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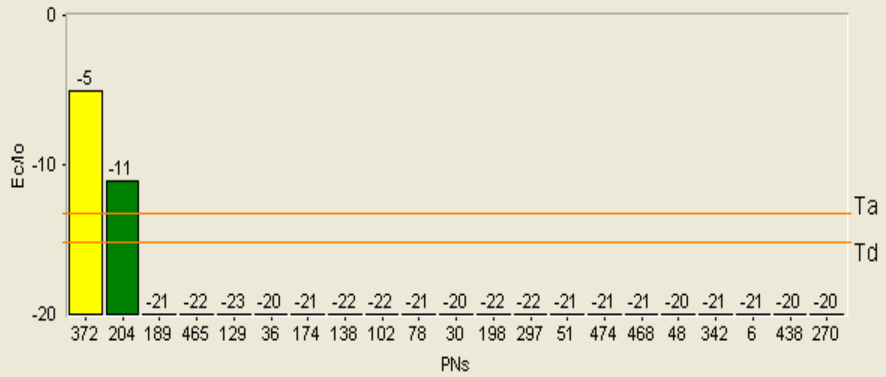
{#4} CDMA Layer 3 Messages

Resume | Level 1 | Level 3 | Properties...

- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = System Parameters
  - CAI = Paging Channel CAI
  - msg_type = System Parameters
  - time = 2:17:4.60250
  - pilot_pn = 372
  - config_msg_seq = 13
  - sid = 14655
  - nid = 60
  - reg_zone = 3
  - total_zones = 3
  - zone_timer = 2
  - timer_length (minutes) = 0x2 = 5
  - mult_sids = 1
  - mult_nids = 1
  - base_id = 801
  - base_class = 0x0 = Public Macrocellular System
  - page_chan = 1
  - max_slot_cycle_index = 1
  - home_reg = 1
  - for_sid_reg = 1
  - for_nid_reg = 1
  - power_up_reg = 1
  - power_down_reg = 1
  - parameter_reg = 1
  - reg_prd = 58
  - base_lat = 0 =N 0.0000
  - base_long = 0= E 0.0000
  - reg_dist = 0x0
  - srch_win_a = 10 , window_size(PN chip) = 100
  - srch_win_n = 10 , window_size(PN chip) = 100
  - srch_win_r = 11 , window_size(PN chip) = 130
  - nghbr_max_age = 0
  - pwr_rep_thresh = 2
  - pwr_rep_frames = 0x7 (56 frames)
  - pwr_thresh_enable = 1
  - pwr_period_enable = 0

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-4.47**
CDMA Rx State: **Paging Ch**	Code Ch: **1**	Rx Power: **-70.25**	Tx Power:
Phone State Data: **Idle**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Setup 7

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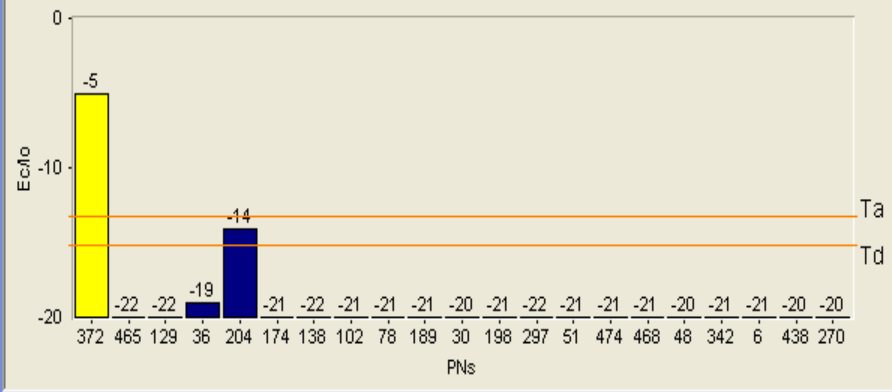
{#4} CDMA Layer 3 Messages

Pause | Level 1 | Level 3 | Properties...

- CAI = Paging Channel CAI msg_type = Access Parameters
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = System Parameters
- CAI = Access CAI msg_type = Origination
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = Access Parameters
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Extended System Parameters
- CAI = Paging Channel CAI msg_type = Feature Notification Message
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended CDMA Channel List Message
- CAI = Paging Channel CAI msg_type = CDMA Channel List
- CAI = Paging Channel CAI msg_type = Access Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-4.47**
CDMA Rx State: **Traffic Ch Init**	Code Ch: **44**	Rx Power: **-70.25**	Tx Power:
Phone State Data: **Mob Orig Attempt**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Setup 2

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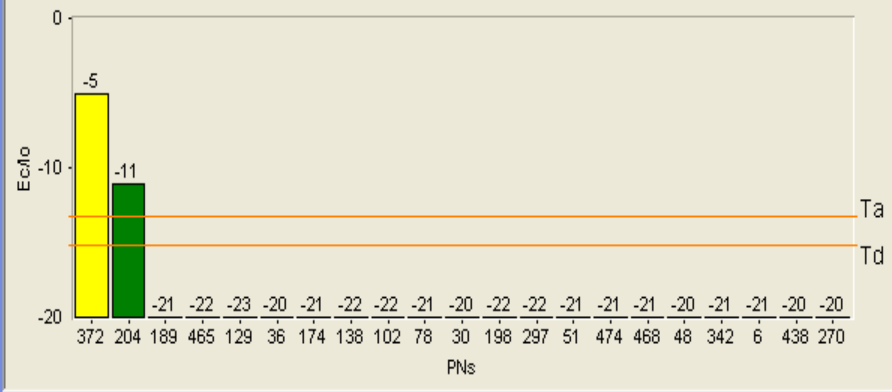
{#4} CDMA Layer 3 Messages

Resume | Level 1 | Level 3 | Properties...

- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = System Parameters
- CAI = Access CAI msg_type = Origination
  - CAI = Access CAI
  - msg_type = Origination
  - time = 2:17:4.59000
  - LAC_LENGTH = 136
  - ack_seq = 5
  - msg_seq = 5
  - ack_req = 1
  - valid_ack = 0
  - ack_type = 2
  - msid_type = IMSI and ESN
  - esn = 0x45D41D8E
  - IMSI Class = Class 0
  - IMSI Class 0 Type = IMSI_S
  - reserved = 0
  - IMSI = (0x38) 0x9FE5F2 = (167) 740-9509
  - auth_mode = 1
  - authr = 0xBC68
  - randc = 0x7E
  - count = 0
  - LAC_PADDING = 7
  - active_pilot_strength = 10 (-5.0 dB)
  - first_is_active = 1
  - first_is_pta = 0
  - num_add_pilots = 0
  - mob_term = 1
  - slot_cycle_index = 1
  - mob_p_rev = 0x6
  - scm = 0x6A
  - request_mode = 0x3 = Either CDMA or wide analog only
  - special service = 1
  - service_option = 0x8000
  - pm = 0
  - digit_mode = 0x0 = DTMF
  - more_fields = 0

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-4.47**
CDMA Rx State: **Paging Ch**	Code Ch: **1**	Rx Power: **-70.25**	Tx Power:
Phone State Data: **Idle**	PN: **372**	Tx Gain Adj: **-63.50**	FER:



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	Setup 7

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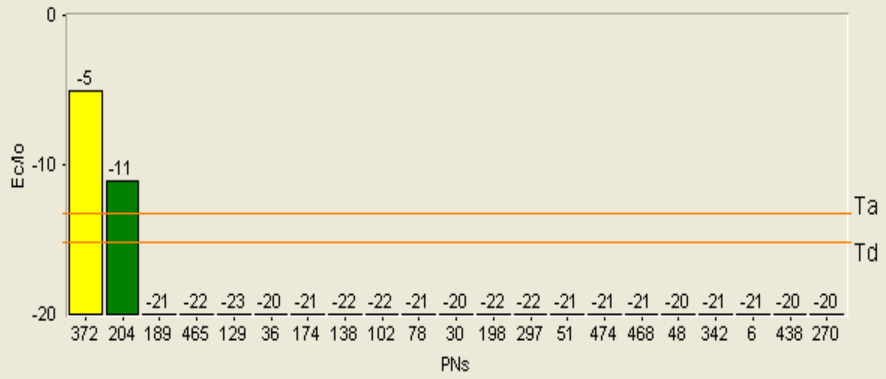
{#4} CDMA Layer 3 Messages

Resume | Level 1 | Level 3 | Properties...

- CAI = Paging Channel CAI msg_type = Order : Base Station Acknowledgement
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended Channel Assignment Message
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended System Parameters
- CAI = Paging Channel CAI msg_type = Order : Base Station Acknowledgement
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Extended CDMA Channel List Message
- CAI = Paging Channel CAI msg_type = CDMA Channel List
- CAI = Paging Channel CAI msg_type = Access Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = System Parameters
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = General Neighbor List
- CAI = Paging Channel CAI msg_type = General Page
- CAI = Paging Channel CAI msg_type = Neighbor List
- CAI = Paging Channel CAI msg_type = Extended System Parameters

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **1 Way**	Agg Ec/Io: **-4.96**
CDMA Rx State: **Traffic Ch**	Code Ch: **44**	Rx Power: **-64.25**	Tx Power: **-13.25**
Phone State Data: **Voice Ch Init**	PN: **372**	Tx Gain Adj: **-4.50**	FER: **1.55**



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	On Call 0

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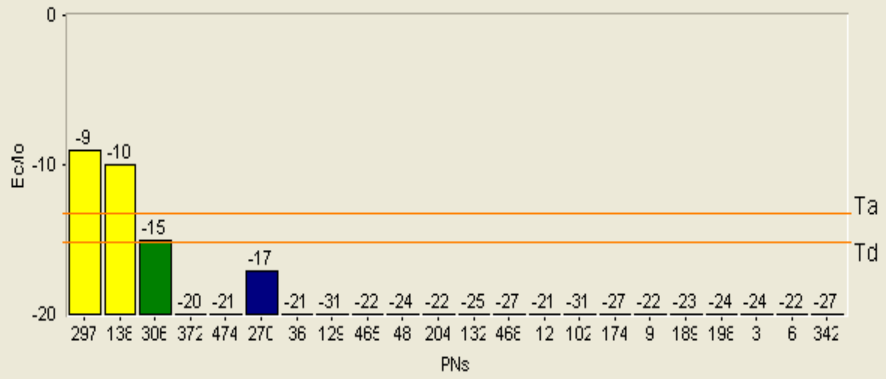
{#4} CDMA Layer 3 Messages

Pause | Level 1 | Level 3 | Properties...

CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobile Station Acknowledgement Order
CAI = Forward Traffic Channel CAI msg_type = Extended Neighbor List Update
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobile Station Acknowledgement Order
CAI = Forward Traffic Channel CAI msg_type = Power Control
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobile Station Acknowledgement Order
CAI = Forward Traffic Channel CAI msg_type = General Handoff Direction
CAI = Reverse Traffic Channel CAI msg_type = Handoff Complete
CAI = Reverse Traffic Channel CAI msg_type = Order : Mobile Station Acknowledgement Order
CAI = Forward Traffic Channel CAI msg_type = General Handoff Direction
CAI = Forward Traffic Channel CAI msg_type = Order : Base Station Acknowledgement
CAI = Reverse Traffic Channel CAI msg_type = Pilot Strength Measurement
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report
CAI = Reverse Traffic Channel CAI msg_type = Power Measurement Report

{#4} CDMA Signal Quality

RF Mode: **CDMA 800**	Channel #: **492**	HO State: **2 Ways**	Agg Ec/Io: **-8.58**
CDMA Rx State: **Traffic Ch**	Code Ch: **44**	Rx Power: **-66.58**	Tx Power: **-9.42**
Phone State Data: **Conversation**	PN: **297**	Tx Gain Adj: **-3.00**	FER: **0.37**



{#1} Call Stats

Technology	Kyocera CDMA2000
Label	{#4}
Total	
Good	
Blocked	
Dropped	
No Service	
No Comm	
Progress	On Call 0

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