THE SOCIALIST REPUBLIC OF VIETNAM

QCVN 13:2010/BTTTT

QUY CHUẨN KỸ THUẬT QUỐC GIA VỀ MÁY DI ĐỘNG CDMA2000-1XBĂNG TẦN 800 MHZ

NATIONAL TECHNICAL REGULATION
ON 800 MHZ CDMA 2000-1X MOBILE STATION

(for information only)

HANOI - 2010

Table of Contents

Foreword

QCVN 13:2010/BTTTT is based on the review and convert of TCN 68-222:2004 "CDMA Mobile Station - Technical Requirements", issued by decision no 33/2004/QĐ-BBCVT dated July 29, 2004 of Minister of Ministry of Post and Telecommunications (now the Ministry of Information and Communications).

Technical Requirements of QCVN 13:2010/BTTTT accordance with standard TIA/EIA/IS-98-C of Telecommunications Industry Association, US.

QCVN 13:2010/BTTTT is drafted by Research Institute of Posts and Telecommunications (RIPT), verified and submitted by Department of Science & Technology, issued by the Minister of Information and Communications as in Circular No 18/2010/TT-BTTTT dated July 30, 2010.

QUY CHUẨN KỸ THUẬT QUỐC GIA
VỀ MÁY DI ĐỘNG CDMA 2000-1X BĂNG TẦN 800 MHZ

National technical regulation
on 800 MHz CDMA 2000-1x mobile station

1. GENERAL

1.1. Scope

This technical regulation details definition, methods of measurement, and minimum performance characteristic for Code Division Multiple Access (CDMA) mobile station to ensure that the mobile station can obtain service in 800 MHz CDMA cellular system.

Mobile Stations operate in the band 824 - 849 MHz and 869 - 894 MHz shall meet technical requirements in this document.

1.2. Subjects of application

This technical regulation applies to all agencies, organizations, manufacturers, importers and operators of CDMA mobile.

1.3. References

[1] TIA/EIA/IS-98-C: Recommended Minimum Performance Standards for Dual-Mode Spread Spectrum Mobile Stations.

[2] TIA/EIA/IS-95-A: Mobile Station - Base Station Compatibility Standard for DualMode Wideband Spread Spectrum Cellular System.

[3] ITU-R M.1073: Digital cellular land mobile telecommunication systems.

1.4. Terms and Definitions

1.4.1. 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.

1.4.2. Access Channel

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

1.4.3. Access Probe

One Access Channel transmission consisting of a preamble and a message. The transmission is an integer number of frames in length and transmits one Access Channel message. See also Access Probe Sequence and Access Attempt.

1.4.4. Access Probe Sequence

A sequence of one or more access probes on the Access Channel. The same Access Channel message is transmitted in every access probe of an access attempt. See also Access Probe and Access Attempt.

1.4.5. AWGN

Additive White Gaussian Noise.

1.4.6. Bad Frames

A category of received Forward CDMA channel frames with poor quality.

1.4.7. Band Class

A set of frequency channels and a numbering scheme for these channels.

1.4.8. 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. See also MSC.

1.4.9. CDMA

See Code Division Multiple Access.

1.4.10. CDMA Cellular System

The entire system supporting Domestic Public Cellular Service operation as addressed by this document.

1.4.11. 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.

1.4.12. CDMA Channel Number

A number corresponding to the center of the CDMA frequency assignment.

1.4.13. CDMA Frequency Assignment

A 1.23 MHz segment of spectrum. For CDMA cellular systems, the channel is centered on one of the 30 kHz channels of the existing analog cellular system. For CDMA PCS systems, the channel is centered on one of the 50 kHz channels.

1.4.14. CDMA PCS System

The entire system supporting Personal Communications Services as addressed by this document.

1.4.15. Code Channel

A subchannel of a Forward CDMA Channel. A Forward CDMA Channel contains 64 code channels. Code channel zero is assigned to the Pilot Channel. Code channels 1 through 7 may be assigned either to the Paging Channels or to the Traffic Channels. Code channel 32 may be assigned either to a Sync Channel or to a Traffic Channel. The remaining code channels may be . assigned to Traffic Channels.

1.4.16. Code Division Multiple Access (CDMA)

A technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences.

1.4.17. CRC

See Cyclic Redundancy Code.

1.4.18. Cyclic Redundancy Code (CRC)

A class of linear error detecting codes which generate parity check bits by finding the remainder of a polynomial division.

1.4.19. dBc

The ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the center frequency of the same signal, to the total inband power of the signal. For CDMA, the total inband power of the signal is measured in a 1.23 MHz bandwidth around the center frequency of the CDMA signal.

1.4.20. dBm

A measure of power expressed in terms of its ratio (in dB) to one milliwatt.

1.4.21. dBm/Hz

A measure of power spectral density. The ratio, dBm/Hz, is the power in one Hertz of bandwidth, where power is expressed in units of dBm.

1.4.22. dBW

A measure of power expressed in terms of its ratio (in dB) to one watt.

1.4.23. E_b

Average energy per information bit for the Sync Channel, Paging Channel, or Forward Traffic Channel at the mobile station antenna connector.

1.4.24. E_b/N_t

The ratio of the combined received energy per bit to the effective noise power spectral density for the Sync Channel, Paging Channel, or Forward Traffic Channel at the mobile station antenna connector.

1.4.25. E_c

Average energy per PN chip for the Pilot Channel, Sync Channel, Paging Channel, Forward Traffic Channel, power control subchannel, or OCNS.

1.4.26. E_c/I_{or}

The ratio of the average transmit energy per PN chip for the Pilot Channel, Sync Channel, Paging Channel, Forward Traffic Channel, power control subchannel, or OCNS to the total transmit power spectral density.

1.4.27. Effective Isotropic Radiated Power (EIRP)

The product of the power supplied to the antenna and the antenna gain in a direction relative to an isotropic antenna.

1.4.28. Effective Radiated Power (ERP)

The product of the power supplied to the antenna and the antenna gain relative to a half-wave dipole in a given direction.

1.4.29. EIRP

See Effective Isotropic Radiated Power.

1.4.30. ERP

See Effective Radiated Power.

1.4.31. FER

Frame Error Rate of Forward Traffic Channel. The value of FER may be estimated by using Service Option 2, 9, 30, or 31.

1.4.32. Forward CDMA Channel

A CDMA Channel from a base station to mobile stations. The Forward CDMA Channel contains 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 carries a Pilot Channel and can carry one Sync Channel, up to seven Paging Channels, and up to 63 Traffic Channels, as long as the total number of channels, including the Pilot Channel, is no greater than 64.

1.4.33. Forward Fundamental Channel

A portion of a Forward Traffic Channel which carries a combination of higher-level data and power control information.

1.4.34. Forward Supplemental Code Channel

A portion of a Forward Traffic Channel which operates in conjunction with a Forward Fundamental Channel in that Forward Traffic Channel, and (optionally) with other Forward Supplemental Code Channels to provide higher data rate services, and on which higher-level data is transmitted.

1.4.35. Forward Traffic Channel

A code channel used to transport user and signaling traffic from a base station to a mobile station.

1.4.36. Frame

A basic timing interval in the system. For the Access Channel, Paging Channel, and Traffic Channel, a frame is 20 ms long. For the Sync Channel, a frame is 26.666... ms long.

1.4.37. Frame Quality Indicator

The CRC check applied to the 9600 bps and 4800 bps frames of **Rate Set 1** and all frames of **Rate Set 2**.

1.4.38. Good Frames

Frames not classified as bad frames. See also **Bad Frames**.

1.4.39. Good Message

A received message is declared a good message if it is received with a correct CRC.

1.4.40. Handoff

The act of transferring communication with a mobile station from one base station to another.

1.4.41. 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. See also Soft Handoff.

1.4.42. I_0

The total received power spectral density, including signal and interference, as measured at the mobile station antenna connector.

1.4.43. I_{oc}

The power spectral density of a band-limited white noise source (simulating interference from other cells) as measured at the mobile station antenna connector.

1.4.44. I_{or}

The total transmit power spectral density of the Forward CDMA Channel at the base station antenna connector.

1.4.45. $\hat{I}_{or}$

The received power spectral density of the Forward CDMA Channel as measured at the mobile station antenna connector.

1.4.46. MER

Message Error Rate. $\text{MER} = 1 - \frac{\text{Number of good messages received}}{\text{Number of messages transmitted}}$

1.4.47. Mobile Station

A station intended to be used while in motion or during halts at unspecified points. Mobile stations include portable units (e.g., hand-held personal units) and units installed in vehicles.

1.4.48. Mobile Switching Center (MSC)

A configuration of equipment that provides cellular radiotelephone service. Also called the Mobile Telephone Switching Office (MTSO).

1.4.49. MSC

See Mobile Switching Center.

1.4.50. Non-Slotted Mode

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

1.4.51. N_t

The effective noise power spectral density at the mobile station antenna connector.

1.4.52. OCNS

See Orthogonal Channel Noise Simulator.

1.4.53. Orthogonal Channel Noise Simulator

A hardware mechanism used to simulate the users on the other orthogonal channels of a Forward CDMA Channel.

1.4.54. OCNS E_c

Average energy per PN chip for the OCNS.

1.4.55. $\frac{\text{OCNS } E_c}{I_{or}}$

The ratio of the average transmit energy per PN chip for the OCNS to the total transmit power spectral density.

1.4.56. Paging_Chip_Bit

Number of PN chips per Paging Channel bit, equal to 128 x v where v equals 1 when the data rate is 9600 bps and v equals 2 when the data rate is 4800 bps.

1.4.57. Paging E_c

Average energy per PN chip for the Paging Channel.

1.4.58. $\frac{\text{Paging } E_c}{I_{or}}$

The ratio of the average transmit energy per PN chip for the Paging Channel to the total transmit power spectral density.

1.4.59. Piece-wise Linear FER Curve

An FER-versus-E_b/N_t curve in which the FER vertical axis is in log scale and the E_b/N_t horizontal axis is in linear scale expressed in dB, obtained by interpolating adjacent test data samples with straight lines.

1.4.60. Piece-wise Linear MER Curve

An MER-versus-E_b/N_t curve in which the MER vertical axis is in log scale and the E_b/N_t horizontal axis is in linear scale expressed in dB, obtained by interpolating adjacent test data samples with straight lines.

1.4.61. Pilot E_c

Average energy per PN chip for the Pilot Channel.

1.4.62. $\frac{\text{Pilot } E_c}{I_{or}}$

The ratio of the average transmit energy per PN chip for the Pilot Channel to the total transmit power spectral density.

1.4.63. 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.

1.4.64. Pilot PN Sequence

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

1.4.65. Power Control Bit

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

1.4.66. Power Control E_c

Average energy per PN chip for the power control subchannel. For the case when the power control sub-channel is assumed to be transmitted at the same power level that is used for the 9600 bps or 14400 bps data rate, the following equations apply: For **Rate Set 1**, it is equal to $\frac{\nu}{11+\nu}\times$ (total Forward Traffic Channel energy per PN chip), where ν equals 1 for 9600 bps, ν equals 2 for 4800 bps, ν equals 4 for 2400 bps, and ν equals 8 for 1200 bps traffic data rate. For **Rate Set 2**, it is equal to $\frac{\nu}{23+\nu}\times$ (total Forward Traffic Channel energy per PN chip), where ν equals 1 for 14400 bps, ν equals 2 for 7200 bps, ν equals 4 for 3600 bps, and ν equals 8 for 1800 bps traffic data rate. The total Forward Traffic Channel is comprised of traffic data and a power control sub-channel.

1.4.67. Power Control Group

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

1.4.68. Ppm

Parts per million.

1.4.69. PS

Pilot Strength. Also see Pilot E_c/I_0.

1.4.70. Rate Set

A set of Traffic Channel transmission formats that are characterized by physical layer parameters such as transmission rates, modulation characteristics, and error correcting coding schemes.

1.4.71. 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.

1.4.72. 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.

1.4.73. Slotted Mode

An operation mode of the mobile station in which the mobile station monitors only selected slots on the Paging Channel.

1.4.74. 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. See Hard Handoff.

1.4.75. Supplemental_Chip_Bit

The number of PN chips per Supplemental Code Channel bit, equal to 128 for Rate Set 1 and 85.33... for **Rate Set 2**.

1.4.76. Sync Channel

Code channel 32 in the Forward CDMA Channel, which transports the synchronization message to the mobile station.

1.4.77. Sync_Chip_Bit

Number of PN chips per Sync Channel bit, equal to 1024.

1.4.78. Sync E_c

Average energy per PN chip for the Sync Channel.

1.4.79. $\frac{\text{Sync}E_c}{I_{or}}$

The ratio of the average transmit energy per PN chip for the Sync Channel to the total transmit power spectral density.

1.4.80. 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.

1.4.81. Traffic_Chip_Bit

The number of PN chips per Traffic Channel bit, equal to 128 × v for Rate Set 1 and 85.33... × v for Rate Set 2. When the data rate is 14400 bps or 9600 bps, v equals 1; when the data rate is 7200 bps or 4800 bps, v equals 2; when the data rate is 3600 bps or 2400 bps, v equals 4; and when the data rate is 1800 bps or 1200 bps, v equals 8.

1.4.82. Traffic E_c

Average energy per PN chip for the Forward Fundamental Channel. For the case when the power control sub-channel is assumed to be transmitted at the same power level that is used for the 9600 bps or 14400 bps data rate, the following equations apply:

For **Rate Set 1**, it is equal to $\frac{11}{11+\nu}$ × (total Forward Fundamental Channel energy per PN chip), where ν equals 1 for 9600 bps, ν equals 2 for 4800 bps, ν equals 4 for 2400 bps, and ν equals 8 for 1200 bps traffic data rate. For **Rate Set 2**, it is equal to $\frac{23}{23+\nu}$ × (total Forward Fundamental Channel energy per PN chip), where v equals 1 for 14400 bps, ν equals 2 for 7200 bps, ν equals 4 for 3600 bps, and ν equals 8 for 1800 bps traffic data rate. The total Forward Fundamental Channel is comprised of traffic data and a power control sub-channel.

1.4.83. $\frac{\text{Traffic } E_c}{I_{or}}$

The ratio of the average transmit energy per PN chip for the Forward Traffic Channel to the total transmit power spectral density.

1.4.84. Valid Power Control Bit

A valid power control bit is sent on the Forward Traffic Channel in the second power control group following the corresponding Reverse Traffic Channel power control group which was not gated off and in which the signal strength was estimated.

1.5. Tolerance Regulations

All parameters indicated in Sections 2 are exact unless an explicit tolerance is stated.

A measurement tolerance, including the tolerance of the measurement equipment, of ±10% is assumed. The $\hat{I}_{or}/I_{oc}$ value shall be within ±0.1 dB of the value specified, and the I_{oc} value shall be within ±5 dB of the value specified.

1.6. Standard Radiated Emissions Measurement Procedure

The measurement and calibration procedures described are intended to provide an overview of radiated and conducted signal measurements.

1.6.1. Standard Radiation Test Site

The test site shall be on level ground that is of uniform electrical characteristics. The site shall be clear of overhead wires and other metallic objects and shall be as free as possible from undesired signals, such as ignition noise and other carriers. Reflecting objects, such as rain gutters and power cables shall lie outside an ellipse measuring 60 meters on the major axis by 52 meters on the minor axis for a 30-meter site, or an ellipse measuring 6 meters on the major axis by 5.2 meters on the minor axis for a 3-meter site. The equipment under test shall be located at one focus of the ellipse and the measuring antenna at the other focus. If desired, shelters may be provided at the test site to protect the equipment and personnel. All such construction shall be of wood, plastic, or other non-metallic material. All power, telephone, and control circuits to the site shall be buried at least 0.3 meter under ground.

A turntable, essentially flush with the ground, shall be provided that can be remotely controlled. A platform 1.2 meters high shall be provided on this turntable to hold the equipment under test. Any power and control cables that are used for this equipment should extend down to the turntable, and any excess cabling should be coiled on the turntable.

If the equipment to be tested is mounted in racks and is not easily removed for testing on the above platform, then the manufacturer may elect to test the equipment when it is mounted in its rack (or racks). In this case, the rack (or racks) may be placed directly on the turntable.

If a transmitter with an external antenna connection is being tested, then the RF output of this transmitter shall be terminated in a non-radiating load that is placed on the turntable. A non-radiating load is used in lieu of an antenna to avoid interference with other radio users. The RF cable to this load should be of minimum length. The transmitter shall be tuned and adjusted to its rated output value before starting the tests.

1.6.2. Search Antenna

For narrow-band dipole adjustable search antennas, the dipole length shall be adjusted for each measurement frequency. This length may be determined from a calibration ruler that is normally supplied with the equipment.

The search antenna shall be mounted on a movable non-metallic horizontal boom that can be raised or lowered on a wooden or other non-metallic pole. The cable connected to the search antenna shall be at a right angle to the antenna. The cable shall be dressed at least 3 meters, either through or along the horizontal boom, in a direction away from the equipment being measured. The search antenna cable may then be dropped from the end of the horizontal boom to ground level for connection to the field-strength measuring equipment.

The search antenna shall be capable of being rotated 90 degrees on the end of the horizontal boom to allow measurement of both vertically and horizontally polarized signals. When the antenna length of a vertically mounted antenna does not permit the horizontal boom to be lowered to its minimum specified search range, adjust the minimum height of the boom for 0.3 meter clearance between the end of the antenna and the ground.

1.6.3. Field-Strength Measurement

A field-strength meter shall be connected to a search antenna. The field-strength meter shall have sufficient sensitivity and selectivity to measure signals over the required frequency ranges at levels at least 10 dB below the levels specified in any document, standard, or specification that references this measurement procedure. The calibration of the measurement instruments (field-strength meter, antennas, etc.) shall be checked frequently to ensure that their accuracy is in accordance with the current standards. Such calibration checks shall be performed at least once per year.

1.6.4. Frequency Range of Measurements

When measuring radiated signals from transmitting equipment, the measurements shall be made from the lowest radio frequency (but no lower than 25 MHz) generated in the equipment to the tenth harmonic of the carrier, except for that region close to the carrier equal to ±250% of the authorized bandwidth.

When measuring radiated signals from receiving equipment, the measurements shall be made from 25 MHz to at least 6 GHz.

1.6.5. Test Ranges

1.6.5.1. 30-Meter Test Range

Measurement of radiated signals shall be made at a point 30 meters from the center of the turntable. The search antenna shall be raised and lowered from 1 to 4 meters in both horizontally and vertically polarized orientations.

The field-strength measuring meter may be placed on a suitable table or tripod at the foot of the mast.

When measuring radiated emissions from receivers, equipment that contains its own receive antenna shall be tested with the antenna in place. Equipment that is connected to an external receive antenna via a cable shall be tested without the antenna, and the receive ports on the equipment under test shall be terminated in a 50 Ω non-radiating resistive load.

1.2.4.5.2 3-Meter Test Range

Measurement of radiated signals may be made at a point 3 meters from the center of the turntable, provided the following three conditions can be met:

- A ground screen that covers an elliptical area at least 6 meters on the major axis by 5.2 meters on the minor axis is used with the measuring antenna and turntable mounted 3 meters apart. The measuring antenna and turntable shall lie on the major axis and shall be equidistant from the minor axis of the elliptical area.
- The maximum dimension of the equipment shall be 3 meters or less. When measuring radiated signals from receivers, the maximum dimension shall include the antenna if it is an integral part of the device.
- The field-strength measuring equipment is either mounted below the ground level at the test site or is located a sufficient distance away from the equipment being tested and from the search antenna to prevent corruption of the measured data.

The search antenna shall be raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. When the search antenna is vertically oriented, the minimum height of the center of the search antenna shall be defined by the length of the lower half of the search antenna.

When measuring radiated emissions from receivers, equipment that contains its own receive antenna shall be tested with the antenna in place. Equipment that is connected to an external receive antenna via a cable shall be tested without the antenna, and the receive ports on the equipment under test shall be terminated in a 50 Ω non-radiating resistive load. The 3-meter test range may be used for determining compliance with limits specified at 30 meters (or other distances), provided that:

- The ground reflection variations between the two distances have been calibrated for the frequencies of interest at the test range, or
- A 5 dB correction factor is added to the specified radiation limit(s) to allow for average ground reflections.

Radiated field strength (volts/meter) varies inversely with distance, so that a measurement made on the 3-meter test range divided by 10 gives the equivalent value that would be measured on a 30-meter test range for the same EIRP (effective isotropic radiated power). The 30-meter field strength in volts/meter can be calculated from the EIRP by using the following formula:

$$\mu V/m \text{ @ } 30 \text{ meters} = 5773.5 \times 10^{EIRP(dBm)/20}$$

1.6.6. Radiated Signal Measurement Procedures

Radiated signals having significant levels shall be measured on the 30-meter or the 3-meter range by using the following procedure:

a) For each observed radiated signal, raise and lower the search antenna to obtain a maximum reading on the field-strength meter with the antenna horizontally polarized. Then rotate the turntable to maximize the reading. Repeat this procedure of raising and lowering the antenna and rotating the turntable until the highest possible signal has been obtained. Record this maximum reading.

b) Repeat step a) for each observed radiated signal with the antenna vertically polarized.

c) Remove the equipment being tested and replace it with a half-wave antenna. The center of the half-wave antenna should be at the same approximate location as the center of the equipment being tested.

d) Feed the half-wave antenna replacing the equipment under test with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to the observed radiated signal, raise and lower the search antenna to obtain a maximum reading on the field-strength measuring meter. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. Record the signal generator power output.

e) Repeat step d) above with both antennas vertically polarized.

f) Calculate the power into a reference ideal isotropic antenna by:

- First reducing the readings obtained in steps d) and e) above by the power loss in the cable between the generator and the source antenna, and
- Then correcting for the gain of the source antenna used relative to an ideal isotropic antenna. The reading thus obtained is the equivalent effective isotropic radiated power (EIRP) level for the spurious signal being measured.

g) Repeat steps a) through f) above for all observed signals from the equipment being tested.

2. TECHNICAL REQUIREMENTS

2.1. CDMA Receiver Minimum technical requirements

2.1.1. Frequency Requirements

2.1.1.1 Frequency coverage

The mobile station shall receive CDMA frequency assignment in band 869 - 894 MHz.

2.1.2. Acquisition Requirements

2.1.2.1. Idle Handoff in Non-Slotted Mode

These tests shall be performed for mobile stations that can operate in non-slotted mode while in the *Mobile Station Idle State.*

a) Definition

When in the *Mobile Station Idle State,* the mobile station continually searches for the strongest Pilot Channel signal on the current CDMA frequency assignment The mobile station determines that an idle handoff should occur when it detects a Pilot Channel signal sufficiently stronger than the one it is currently monitoring.

Test 1 verifies that the mobile station does not perform alternating idle handoffs between two Pilot Channels so frequently that the mobile station cannot receive paging messages on either of the Forward CDMA Channels by checking the number of idle handoffs performed and the Paging Channel message error rate (MER).

Test 2 verifies that the mobile station performs an idle handoff whenever the E_c/I_0 of a pilot in the Neighbor Set exceeds the E_c/I_0 of the pilot in the Active Set by 3 dB, as measured at the mobile station antenna connector, for a period longer than one second. This is accomplished by checking the number of idle handoffs performed and the Paging Channel MER.

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 19, The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the Paging Channel data rate of Channel 1 and Channel 2 to 4800 bps.

3. Send the five overhead messages consecutively in synchronized message capsules on the Primary Paging Channel of both base stations. Message contents shall be as specified in 2.4.5.2. Note that pilot PN offset index P_1 is listed in the *General Neighbor List Message* for base station 2 and pilot PN offset index P_2 is listed in the *General Neighbor List Message* for base station 1.

4. Set the test parameters for Test 1 as specified in Table 1. As specified in Figure 1, the Channel 1 and Channel 2 pilot E_c/I_0 levels shall transistion every 100 ms.

5. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) and retrieve the parameters PAG_I, PAG_2, PAG_4 and PAG_7, and then end the call.

6. Immediately after ending the call, run the test for at least 10 cycles (20 pilot E_c/I_0, transitions).

7. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) and retrieve the parameters PAG_1, PAG_2, PAG_4 and PAG_7, and then end the call.

8. Set the test parameters for Test 2 as specified in Table 1. As specified in Figure 2, the Channel 1 pilot E_c/I_0 level shall transition between state 1 and state 2, where the state 1duration is 5 seconds and the state 2 duration is 10 seconds. Repeat steps 5 through 7.

Table 1 - Test Parameters for Idle Handoff in Non-Slotted Mode

Parameter	Unit	Test 1		Test 2	
		Channel 1	Channel 2	Channel 1	Channel 3
$\hat{I}_{or}/I_{oc}$	dB	3 for S_1 0 for S_2	0 for S_1 3 for S_2	3 for S_1 -16.7 for S_2	0 for S_1 -4.7 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7	-7	-7
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-12	-12	-12	-12
I_{oc}	dBm/I.23 MHZ	-55		-55	
$\frac{\text{Pilot } E_c}{I_o}$		-10 for S_1 -13 for S_2	-13 for S_1 -10 for S_2	-10 for S_1 -25 for S_2	-13

Note: The Pilot E_c/I_0 value is calculated from the parameters set in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

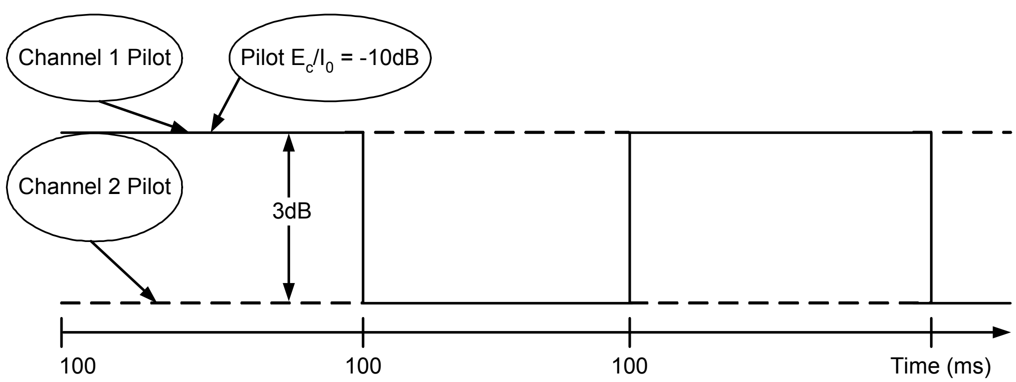

Figure 1 - Idle Handoff in Non-Slotted Mode (Test 1)

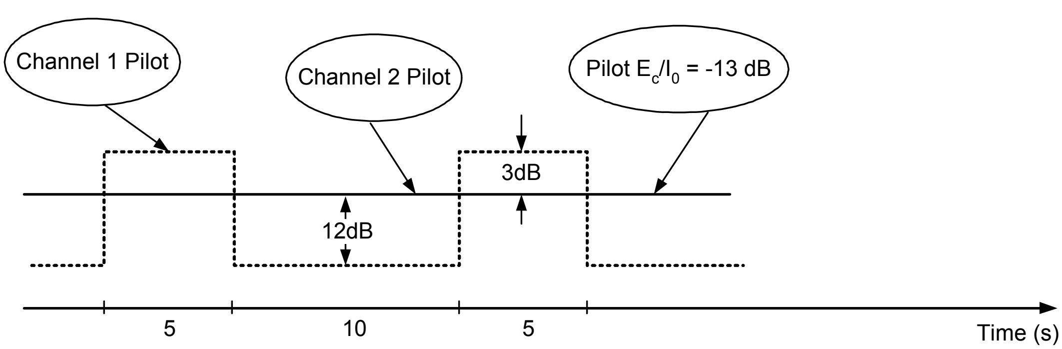

Figure 2 - Idle Handoff in Non-Slotted Mode (Test 2)

c) Minimum technical requirement

The number of idle handoffs during a test is given by ΔPAG_7, where ΔPAG_7 is the increment of the parameter PAG_7 during the test.

The Paging Channel MER is estimated by

$$MER = 1 - \frac{\Delta PAG\_1 - \Delta PAG\_2}{\Delta PAG\_4 \times 5/20}$$

where ΔPAG_1, ΔPAG_2 and ΔPAG_4 are the increment of parameters PAG_1, PAG_2 and PAG_4 during the test, respectively, and the fraction 5/20 is the average number of messages in 10 ms.

Test 1: The mobile station should not perform any idle handoffs. The Paging Channel MER shall be less than or equal to 0.1.

Test 2: The number of idle handoffs shall be equal to the number of pilot E_c/I_0 transitions. The Paging Channel MER shall be less than or equal to 0.1.

2.1.2.2. Idle Handoff in Slotted Mode

These tests shall be performed for mobile stations that can operate in slotted mode.

a) Definition

When in the *Mobile Station Idle State,* the mobile station searches for the strongest Pilot Channel signal on the current CDMA frequency assignment during the assigned slots. The mobile station determines that an idle handoff should occur when it detects a Pilot Channel signal sufficiently stronger than the one it is currently monitoring.

This test verifies that the mobile station performs an idle handoff whenever the E_c/I_0 of a pilot in the Neighbor Set exceeds the E_c/I_0 of the pilot in the Active Set by 3 dB, as measured at the mobile station antenna connector, by measuring the number of idle handoffs performed in a fixed period of time.

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 19. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the Paging Channel data rate of Channel 1 and Channel 2 to 4800 bps.

3. Set MAX_SLOT_CYCLE_INDEX to 0 in the *System Parameters Message* (each slot cycle is 1.28 seconds long).

4. Send the five overhead messages consecutively on the Primary Paging Channel of both Channel 1 and Channel 2. The format of each message is specified in 2.4.5.2.

5. Send a *General Page Message* with no page records with the CLASS_0_DONE, CLASS_1_DONE, TMSI_DONE, and BROADCAST_DONE fields set to ‘1’ at the beginning of each assigned Paging Channel slot of the mobile station in every slot cycle on the Primary Paging Channel of both Channel 1 and Channel 2.

6. Set the test parameters as specified in Table 2 and Figure 3.

7. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2), retrieve the parameter PAG_7, and then end the call.

8. Run the test for exactly 20 Channel 1 pilot E_c/I_0 transitions, starting and ending with the Channel 1 pilot E_c/I_0 at -25 dB. Allow three seconds after the last transition before step 9.

9. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2), retrieve the parameter PAG_7, and then end the call.

Table 2 - Test Parameters for Slotted Mode Idle Handoff

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	3 for S_1 -16.7 for S_2	0 for S_1 4.7 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-12	-12
I_{oc}	dBm/l.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_o}$	dB	-10 for S_1 -25 for S_2	-13

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels

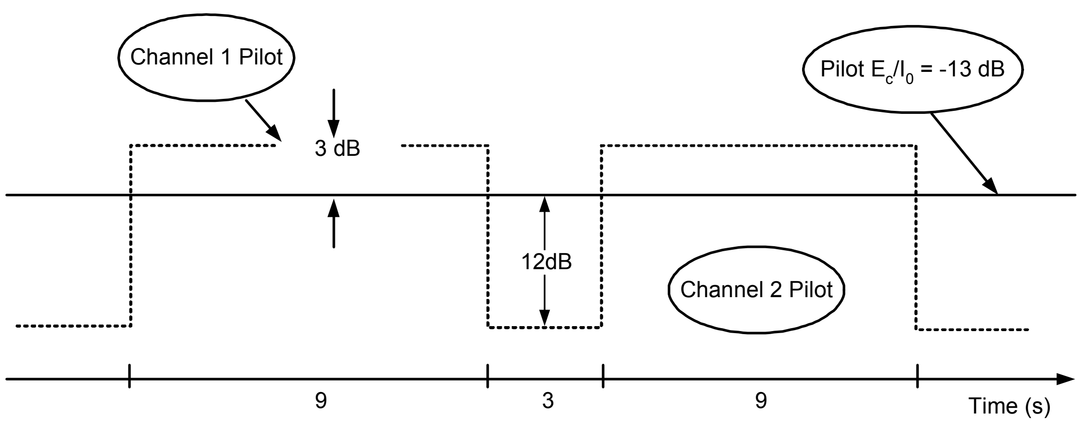

Figure 3 - Slotted Mode Idle Handoff

c) Minimum technical requirement

The number of idle handoffs during a test is given by ΔPAG_7, where ΔPAG_7 is the increment of the parameter PAG_7 during the test.

The number of idle handoffs shall be greater than or equal to 18.

2.1.2.3. Neighbor Set Pilot Detection and Incorrect Detection in Soft Handoff

a) Definition

This test measures the detection time for a pilot in the Neighbor Set at three values of pilot E_c/I_0, for the static add threshold test configuration. The detection time of a pilot is defined as the time elapsed from the time when the pilot increases to a given E_c/I_0 until the mobile station sends a *Pilot Strength Measurement Message* containing this pilot. The accuracy of the Candidate Set pilot PN phase reported in the corresponding *Pilot Strength Measurement Message* is also examined.

The correct detection of a pilot in the Neighbor Set is defined as the acquisition of a pilot with E_c/I_0 above the value defined by T_ADD. The value of T_ADD is set to 28 (-14 dB) as specified in 2.4.5.2. An incorrect detection of a pilot in the Neighbor Set is defined as the acquisition of a pilot with E_c/I_0 below the value defined by T_ADD.

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 19. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the value of T_TDROP in the *System Parameters Message* to 1 (1 second).

3. Set the base station so as to not send any *Extended Handoff Direction Message* or *General Handoff Direction Message* as a response to the *Pilot Strength Measurement Message* sent by the mobile station.

4. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only.

5. Set the test parameters for Test 1 as specified in Table 3 and change the pilot strength of Channel 2 as specified in Figure 4 with T greater than or equal to 0.8 seconds.

6. Send the *Pilot Measurement Request Order* as specified in Figure 4.

7. Record the transmission time and contents of each *Pilot Strength Measurement Message* sent by the mobile station.

8. Set the test parameters for Test 2 as specified in Table 4 and change the pilot strength of Channel 2 as specified in Figure 4 with T greater than or equal to 0.85 seconds. Repeat steps 6 and 7.

9. Set the test parameters for Test 3 as specified in Table 5 and change the pilot strength of Channel 2 as specified in Figure 5 with T equal to 15 seconds. Repeat steps 6 and 7 for 20 cycles of Channel 2 Pilot E_c/I_0.

Table 3 - Test Parameters for Neighbor Set Pilot Detection (Test 1)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	1.4 for S_1 -1.8 for S_2	0.4 for S_1 $-\infty$ for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_o}$	dB	-11	-12 for S_1 $-\infty$ for S_2

Note: The Pilot E_c/I_o value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

Table 4 - Test Parameters for Neighbor Set Pilot Detection (Test 2)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	0.22 for S_1 -1.8 for S_2	-2.3 for S_1 $-\infty$ for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_o}$	dB	-11	-13.5 for S_1 $-\infty$ for S_2

Note: The Pilot E_c/I_o value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

Table 5- Test Parameters for Neighbor Set Pilot Incorrect Detection (Test 3)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	-0.9 for S_1 -1.8 for S_2	-6.4 for S_1 $-\infty$ for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_o}$	dB	-11	-16.5 for S_1 $-\infty$ for S_2

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states.

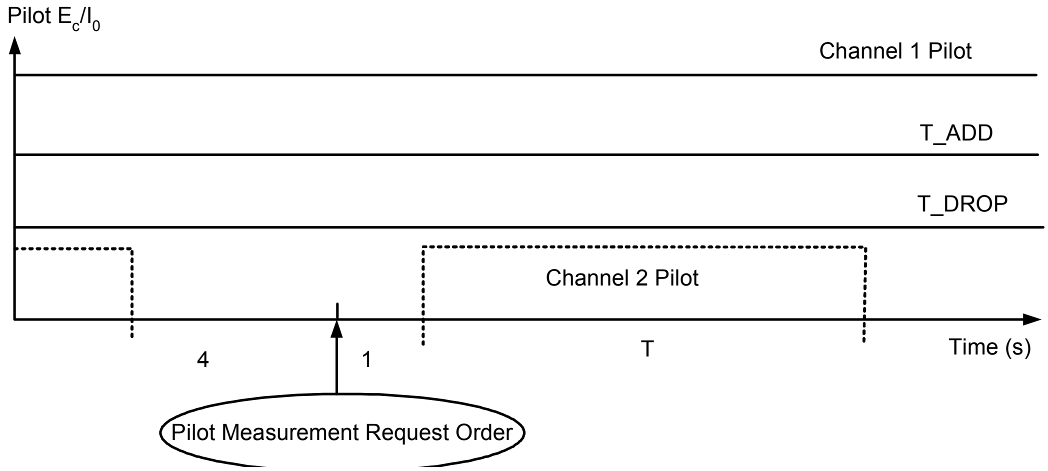

Figure 4 - Neighbor Set Pilot Detection

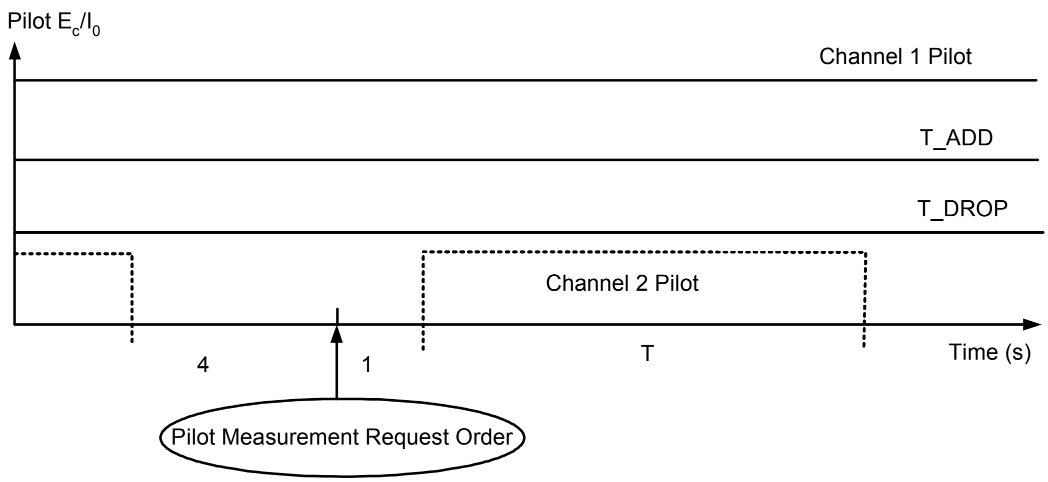

Figure 5 - Neighbor Set Pilot Incorrect Detection

c) Minimum technical requirement

Pilots other than P_1 or P_2 shall not be reported in any *Pilot Strength Measurement Message.*

Test 1:

1. The rate of valid detection within 0.8 seconds shall be greater than 90% with 95% confidence.

2. All of the transmissions of *Pilot Strength Measurement Message* sent as a response to the *Pilot Measurement Request Order* shall only contain P_1.

3. The reported pilot PN phase for P_2 in the *Pilot Strength Measurement Message* in which it is contained shall be no greater than ±1 chip from the actual offset.

Test 2:

The rate of valid detection within 0.85 seconds shall be greater than 50% with 95% confidence.

Test 3:

There shall be no more than one *Pilot Strength Measurement Message* containing P_2 during the test.

2.1.2.4 Candidate Set Pilot Detection and Incorrect Detection in Soft Handoff

a) Definition

This test measures the detection time for a pilot in the Candidate Set for the static comparison threshold test configuration. The detection time of a pilot is defined as the time elapsed from the time when the pilot increases to a given E_c/I_0 until the mobile station sends a *Pilot Strength Measurement Message* containing this pilot. The accuracy of the Active Set pilot PN phase reported in the corresponding *Pilot Strength Measurement Message* is also examined.

The correct detection of a pilot in the Candidate Set is defined as the detection of a pilot in the Candidate Set with E_c/I_0 at least $0.5 \times$ T_COMP dB above the E_c/I_0 of an Active Set pilot. The value of T_COMP is set to 5 (2.5 dB) as specified in 2.4.5.2. An incorrect detection of a pilot in the Candidate Set is defined as the detection of a pilot with E_c/I_0 less than $0.5 \times$ T_COMP dB above the E_c/I_0 of any Active Set pilot.

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 19. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1. and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the base station so as to not send any *Extended Handoff Direction Message* or *General Handoff Direction Message* as a response to the *Pilot Strength Measurement Message* sent by the mobile station.

3. Set the test parameters for Test 1 as specified in Table 6 and change the pilot strength of Channel 2 as specified in Figure 6.

4. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only.

5. Send the *General Handoff Direction Message* listing only pilot P_1 as specified in Figure 6.

6. Record the transmission time and contents of each *Pilot Strength Measurement Message* sent by the mobile station.

7. Set the test parameters for Test 2 as specified in Table 7 and change the pilot strength of Channel 2 as specified in Figure 7.

8. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only.

9. Send the *General Handoff Direction Message* listing only pilot P_1 as specified in Figure 7.

10. Record the transmission time and contents of each *Pilot Strength Measurement Message* sent by the mobile station.

Table 6 - Test Parameters for Candidate Set Pilot Detection (Test 1)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	-3.1 for S_1 -4.8 for S_2	-0.l for S_1 -4.8 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_0}$	dB	-14	-11 for S_1 -14 for S_2

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

Table 7- Test Parameters for Candidate Set Pilot Incorrect Detection (Test 2)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	-4.2 for S_1 -4.8 for S_2	-2.7 for S_1 -4.8 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_0}$	dB	-14	-12.5 for S_1 -14 for S_2

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

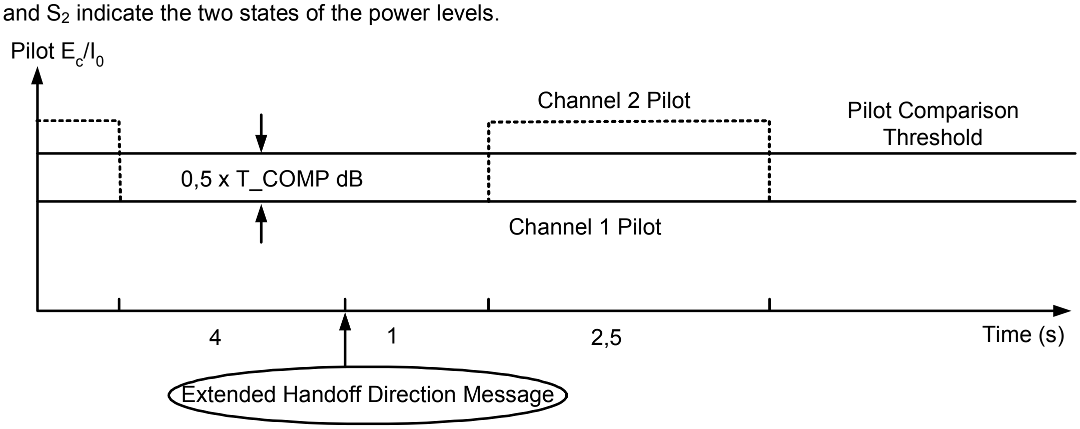

Figure 6 - Candidate Set Pilot Incorrect Detection (Test 1)

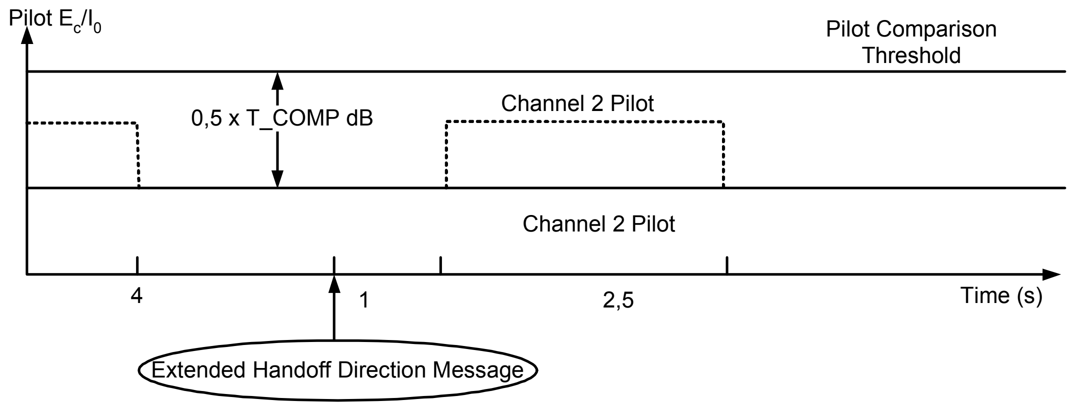

Figure 7 - Candidate Set Pilot Incorrect Detection (Test 2)

c) Minimum technical requirement

Test 1:

1. The rate of correct detection within 2.5 seconds shall be greater than 90% with 95% confidence.

2. The reported pilot PN phase for P_2 in the *Pilot Strength Measurement Message* in which it is contained shall be no greater than ±1 chip from the actual offset.

Test 2: The rate of incorrect detection within 2.5 seconds shall be greater than 80% with 95% confidence. Equivalently stated, the probability that a *Pilot Strength Measurement Message* will be sent containing P_2 within 2.5 seconds is 20% or less with 95% confidence.

2.1.2.5 Active Set Pilot Loss Detection in Soft Handoff

a) Definition

This test measures the loss detection time for a diminishing pilot in the Active Set for the static drop threshold test configuration. The loss detection time for a diminishing pilot in the Active Set is defined as the time elapsed from the time when the pilot decreases to a given E_c/I_0 until the mobile station sends a *Pilot Strength Measurement Message* which flags this pilot for deletion from the active set. The accuracy of the PN phase and strength of Active Set pilots reported in the *Pilot Strength Measurement Message* is also examined.

The mobile station sends a *Pilot Strength Measurement Message* when the pilot E_c/I_0 value of a pilot in the Active Set drops below the value defined by T_DROP for a period of time defined by T_TDROP. The value of T_DROP is set to 32 (-16 dB) as specified in 2.4.5.2. The value of T_TDROP is set to 3 (4 seconds) as specified in 2.4.5.2.

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 19. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the base station so as to not send any *Extended Handoff Direction Message* or *General Handoff Direction Message* as a response to the *Pilot Strength Measurement Message* sent by the mobile station.

3. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only.

4. Send a *General Handoff Direction Message* to the mobile station, specifying the following pilots in the Active Set:

Parameter	Value (Decimal)
PILOT_PN	P_1
PILOT_PN	P_2

5. Set the test parameters for Test 1 as specified in Table 8.

6. Record Reverse Traffic Channel messages for 5 minutes.

7. Set the test parameters for Test 2 as specified in Table 9 and Figure 8.

8. Send a *General Handoff Direction Message* to the mobile station as specified in Figure 8, with the following pilots in the Active Set:

Parameter	Value (Decimal)
PILOT_PN	P_1
PILOT_PN	P_2

9. Record the transmission time and contents of each *Pilot Strength Measurement Message* sent by the mobile station.

Table 8 -Test Parameters for Active Set Pilot Incorrect Loss Detection (Test 1)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	-0.5	-4.5
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	-7
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_0}$	dB	-11	-15

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 9 - Test Parameters for Active Set Pilot Loss Detection (Test 2)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	-1.0 for S_1 2.9 for S_2	-7.0 for S_1 2.9 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	-7
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_0}$	dB	11	-17 for S_1 -11 for S_2

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

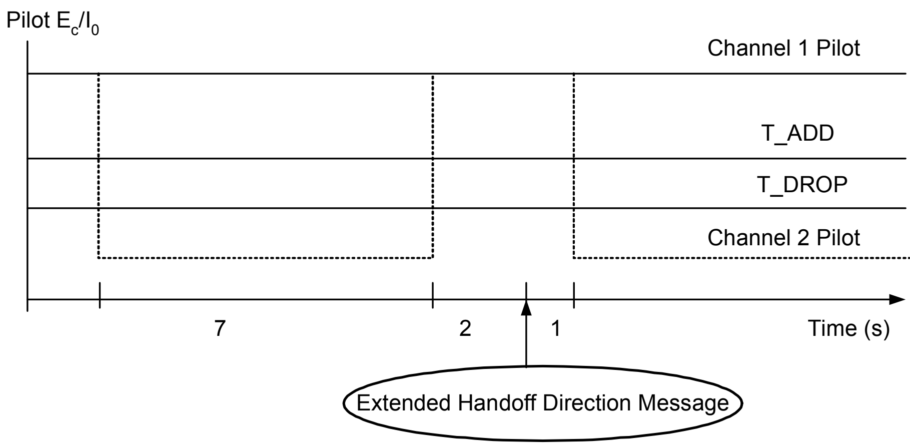

Figure 8 - Active Set Pilot Loss Detection (Test 2)

c) Minimum technical requirement

Test 1: The mobile station shall not send any *Pilot Strength Measurement Message* during the test.

Test 2:

1. The rate of loss detection within 7 seconds shall be greater than 80% with 95% confidence.

2. The reported pilot PN phase for P_2 in the Pilot *Strength Measurement Message* in which it is contained shall be no greater than ±1 chip from the actual offset.

3. The reported pilot E_c/I_0 value for P_1 and P_2 in the *Pilot Strength Measurement Message* shall be no greater than ±1.5 dB from their set values.

2.1.2.6. Idle Handoff to Another Frequency

This test shall be performed for each band class supported by the mobile station.

a) Definition

When in the *Mobile Station Idle* State, the mobile station searches for the strongest Pilot Channel signal on the current CDMA frequency assignment. The mobile station determines that an idle handoff should occur when it detects a Pilot Channel signal sufficiently stronger than the one it is currently monitoring. However, there are system configurations in which a neighbor base station cannot use the current CDMA frequency assignment. In this case, the *Extended Neighbor List Message* or *General Neighbor List Message* may contain the identity of a neighbor base station on a different CDMA frequency assignment. The mobile station also searches this CDMA frequency assignment for this neighbor base station.

The first test verifies that the mobile station quickly performs an idle handoff to a pilot in the Neighbor Set which is on other than the current CDMA frequency assignment whenever the E_c/I_0 of all pilots in the Active Set and the Neighbor Set which are on the current CDMA frequency assignment are less than some specified E_c/I_0.

The second test verifies that the mobile station performs an idle handoff to a pilot in the Neighbor Set which is on other than the current CDMA frequency assignment whenever the E_c/I_0 of all pilots in the Active Set and the Neighbor Set, which are on the current CDMA frequency assignment, are less than some specified E_c/I_0 and are less than the E_c/I_0 of a pilot in the Neighbor Set which is on other than the current CDMA frequency assignment.

The following tests are directly applicable to mobile stations which operate in the slotted mode. For mobile stations which do not operate in the slotted mode, the same test procedures apply, but the *Audit Message* shall be sent in any sequence of slots separated by 1.28 seconds.

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 19. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2. Base station 1 uses arbitrary frequency f_1, and base station 2 uses an arbitrary but different frequency, f_2.

2. The number of Paging Channels should be the same for both Channel 1 and Channel 2. Set the Paging Channel data rate of Channel 1 and Channel 2 to 4800 bps.

3. Set MAX_SLOT_CYCLE_INDEX to 0 in the *System Parameters Message* (each slot cycle is 1.28 seconds long), Set GEN_NGHBR_LIST to 1 in the *System Parameters Message.*

4. Send the five overhead messages consecutively on the Primary Paging Channel of both Channel 1 and Channel 2. The format of each message is specified in 2.4.5.2

with the exception of the *General Neighbor List Message.* For Channel 1, the *General Neighbor List Message* shall have the following field values:

Field	Value (Decimal)
PILOT_INC	12 (768 chips)
NGHBR_SRCH_MODE	1 (search priorities included)
NGHBR_CONFIG_PN_INCL	1 (PN offsets included)
FREQ_FIELDS_INCL	1 (frequency included)
USE_TIMING	0 (hopping beacon timing off)
NUM_NGHBR	7 (seven neighbors)
NGHBR_CONFIG	0 (same as current)
NGHBR_PN	P_2
SEARCH_PRIORITY	1 (medium)
FREQ_INCL	1 (frequency included)
NGHBR_BAND	x (where x is the band class)
NGHBR_FREQ	f_2
NGHBR_CONFIG	0
NGHBR_PN	P_3
SEARCH_PRIORITY	3 (very high)
FREQ_INCL	0 (frequency not included)
NGHBR_CONFIG	0
NGHBR_PN	P_4
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_5
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_6
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_7
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_8
SEARCH_PRIORITY	3
FREQ_INCL	0

For Channel 2, the *General Neighbor List Message* shall have the following field values:

Field	Value (Decimal)
PILOT_INC	12 (768 chips)
NGHBR_SRCH_MODE	1 (search priorities included)
NGHBR_CONFIG_PN_INCL	1 (PN offsets included)
FREQ_FIELDS_INCL	1 (frequencies included)
USE_TIMING	0 (hopping beacon timing off)
NUM_NGHBR	7 (seven neighbors)
NGHBR_CONFIG	0 (same as current)
NGHBR_PN	P_1
SEARCH_PRIORITY	1 (medium)
FREQ_INCL	1 (frequency included)
NGHBR_BAND	x (where x is the band class)
NGHBR_FREQ	f_1
NGHBR_CONFIG	0
NGHBR_PN	P_3
SEARCH_PRIORITY	3 (very high)
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_4
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_5
SEARCH_PRIORITY	3
FREQ_INCL	0
NQHBR_CONFIG	0
NGHBR_PN	P_6
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_7
SEARCH_PRIORITY	3
FREQ_INCL	0
NGHBR_CONFIG	0
NGHBR_PN	P_8
SEARCH_PRIORITY	3
FREQ_INCL	0

5. Set the Channel 1 parameters to the maximum values for Test 1 in Table 10 ($\hat{I}_{or}/I_{oc}$ is equal to 0 dB). Set the Channel 2 parameters to the minimum values for Test 1 in Table 10 ($\hat{I}_{or}/I_{oc}$ is equal to -18 dB).

6. Set up a call to the mobile station and retrieve the parameters PAG_3 and PAG_7, and then end the call.

7. Send a *General Page Message* with no page records and with the CLASS_0_DONE, CLASS_1_DONE, TMSI_DONE, and BROADCAST_DONE fields set to '1' at the beginning of each assigned Paging Channel slot of the mobile station on the Channel 1 Primary Paging Channel. Send an *Audit Message* addressed to the mobile station as a message requiring acknowledgement followed by a *General Page Message* with no page records and with the CLASS_0_DONE, CLASS_1_DONE, TMSI_DONE, and BROADCAST_DONE fields set to '1' at the beginning of each assigned Paging Channel slot of the mobile station on the Channel 2 Primary Paging Channel.

8. Set the test parameters for Test 1 as specified in Table 10. As specified in Figure 9, the Channel 1 and Channel 2 levels shall transition every 2.56 seconds, which corresponds to every second assigned slot of the mobile station. The levels shall transition after sending the *General Page Message* and before the beginning of the next assigned slot.

9. Run the test for at least 10 cycles (20 pilot E_c/I_0 transitions), ending with the Channel 1 pilot E_c/I_0 at -10 dB.

10. Set up a call to the mobile station and retrieve the parameters PAG_3 and PAG_7, and then end the call.

11. Set the Channel 1 parameters to the maximum values for Test 2 in Table 10 ($\hat{I}_{or}/I_{oc}$ is equal to 0 dB). Set the Channel 2 parameters to the minimum values for Test 2 in Table 10 ($\hat{I}_{or}/I_{oc}$ is equal to -6 dB).

12. Set the test parameters for Test 2 as specified in Table 10. As specified in Figure 10, the Channel 1 and Channel 2 levels shall transition every 10.24 seconds, which corresponds to every eighth assigned slot of the mobile station. The levels shall transition after sending the *General Page Message* and before the beginning of the next assigned slot.

13. Run the test for at least 8 cycles (16 pilot E_c/I_0 transitions), ending with the Channel 1 pilot E_c/I_0 at -10 dB.

14. Set up a call to the mobile station and retrieve the parameters PAG_3 and PAG_7, and then end the call.

Table 10 - Test Parameters for Idle Handoff to Another Frequency

		Test 1		Test 2	
Parameter	**Unit**	**Channel 1**	**Channel 2**	**Channel 1**	**Channel 2**
$\hat{I}_{or}/I_{oc}$	dB	Max = 0 Min = -18	Max = 0 Min = -18	Max = 0 Min = -6	Max = 0 Min = -6
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7	-7	-7
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-12	-12	-12	-12
I_{oc}	dBm/ 1.23 MHz	-75		-75	
$\frac{\text{Pilot } E_c}{I_0}$	dB	Max = -10 Min = -25.1	Max = -10 Min = -25.1	Max = -10 Min = -14.0	Max = -10 Min = -14.0
$\frac{\text{Paging } E_b}{N_t}$	dB	Max = 12.1 Min = -5.9	Max = 12.1 Min = -5.9	Max = 12.1 Min = 6.1	Max = 12.1 Min = 6.1

Note: The Pilot E_c/I_0 and Paging E_b/N_t values are calculated from the parameters in the table. These are not directly settable parameters.

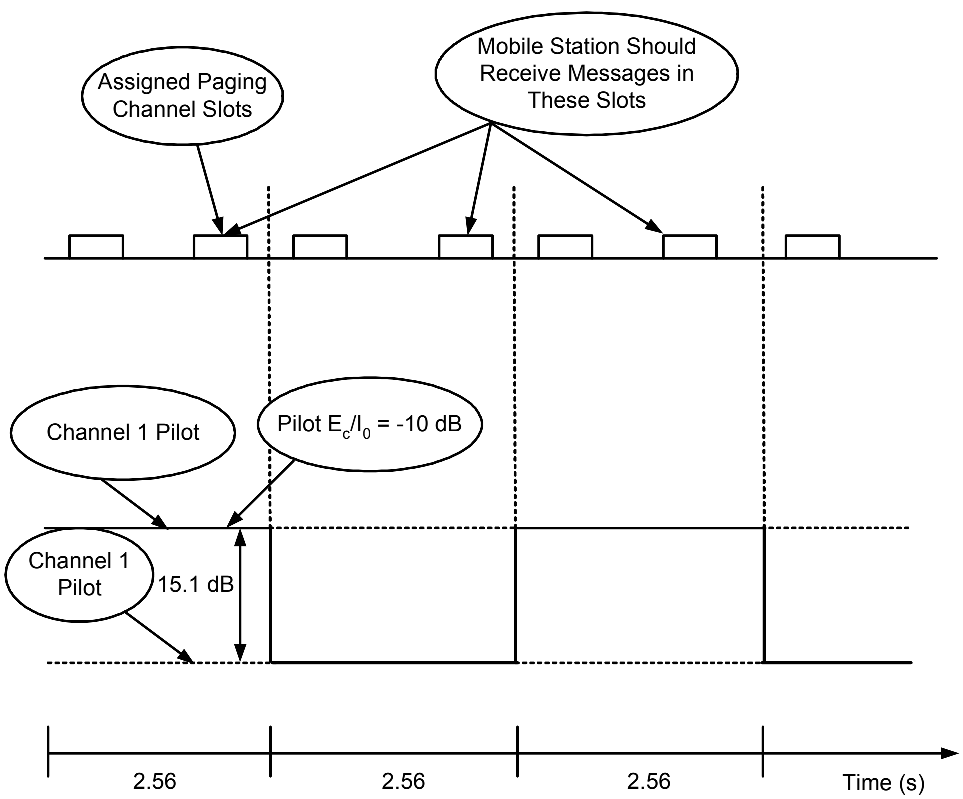

Figure 9: Idle Handoff to Another Frequency (Test 1)

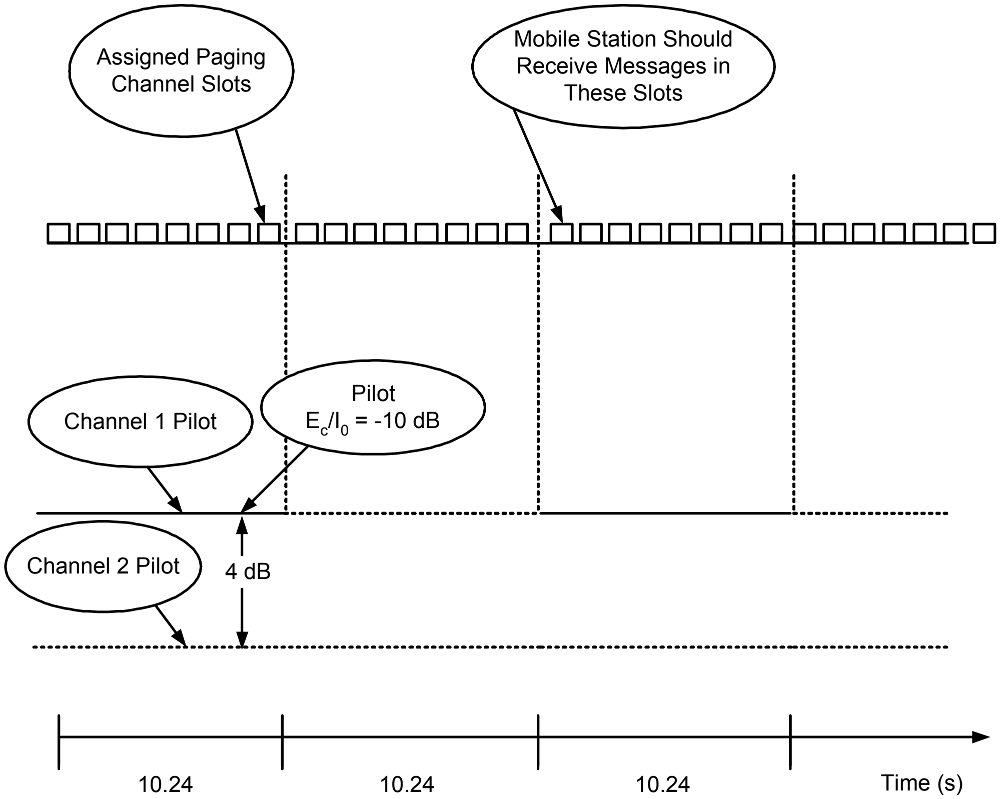

Figure 10 - Idle Handoff to Another Frequency (Test 2)

c) Minimum technical requirement

The number of idle handoffs during a test is given by ∆PAG_7, where ∆PAG_7 is the increment of the parameter PAG_7 during the test.

The number of *Audit Messages* that were correctly received on Channel 2 during a test is given by ∆PAG_3, where ∆PAG_3 is the increment of the parameter PAG_3 during the test.

Test 1: Since the change in pilot power level occurs when the mobile station is operating in slotted mode, it is possible that the mobile station will miss messages sent in the first slot after the transition. However, the mobile station shall receive messages in the second slot after the transition.

The number of idle handoffs shall be equal to the number of pilot E_c/I_0 transitions.

The number of *Audit Messages* that were correctly received shall be at least one half the number of pilot E_c/I_0 transitions. If the transition occurs sufficiently before the first slot, then the number of *Audit Messages* that a mobile station not operating in the slotted mode should have correctly received is equal to the number of pilot E_c/I_0 transitions.

Test 2: Since the levels are sufficient to correctly *receive* messages on both Channel 1 and Channel 2, the mobile station shall receive messages in all assigned slots. The mobile station shall perform idle handoffs to the frequency with the stronger pilot.

The number of idle handoffs shall be equal to the number of pilot E_c/I_0 transitions.

The number of *Audit Messages* that were correctly received shall be equal to four times the number of pilot E_c/I_0 transitions.

2.1.2.7. Access Probe Handoff

a) Definition

The mobile station is permitted to perform an access probe handoff when the mobile station is in the *Page Response Substate* or the *Mobile Station Origination Attempt Substate.*

The correct detection of a pilot while in the *System Access State* is defined as the detection of a pilot in the ACCESS_HO_LIST with E_c/I_0 above the value defined by T_ADD. The value of T_ADD is set to 28 (-14 dB) as specified in 2.4.5.2. An incorrect detection of a pilot while in the *System Access State* is defined as the detection of a pilot in the ACCESS_HO_LIST with E_c/I_0 below the value defined by T_ADD.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN source is not used in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the Paging Channel data rate of Channel 1 and Channel 2 to 4800 bps.

3. Ensure that P_2 is the first pilot listed in the *Neighbor List Message, Extended Neighbor List Message* or *General Neighbor List Message* sent on Channel 1.

4. Set the following parameters in the *Extended System Parameters Message:*

Parameters	Value (Binary)
NGHBR_SET_ENTRY_INFO	0 (Access entry handoff is disabled)
NGHBR_SET_ACCESS_INFO	1 (Base station is including info on neighbor set access probe handoff or access handoff)
ACCESS_HO	0 (Disabled)
ACCESS_PROBE_HO	1 (Enabled)
ACC_HO_LIST_UPD	0 (No access probe handoffs are allowed to pilots not listed in ACCESS_HO_LIST)
MAX_NUM_PROBE_HO	0 (Only one access probe handoff during this access attempt test is allowed)

NGHBR_SET_SIZE	1 (P_2 is the first and only pilot to be listed)
ACCESS_HO_ALLOWED	1 (An access probe handoff to P_2 is allowed)

5. Set the test parameters as specified in Table 11.

Table 11 - Test Parameters for Access Probe Handoff

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/1.23 MHz	-55	-58 for S_1 -45 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	7
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-12	-12
$\frac{\text{Pilot } E_c}{I_0}$	dB	-8.8 for S_1 -17.4 for S_2	-11.8 for S_1 -7.4 for S_2

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

6. Set base station 1 to ignore all access attempts

7. Page the mobile station from base station 1 as specified in Figure 11.

8. After power is detected in an access probe from the mobile station as specified in Figure 11, adjust the power of channel 2 to -45 dBm/1.23 MHz, the state 2 value specified in Table 11.

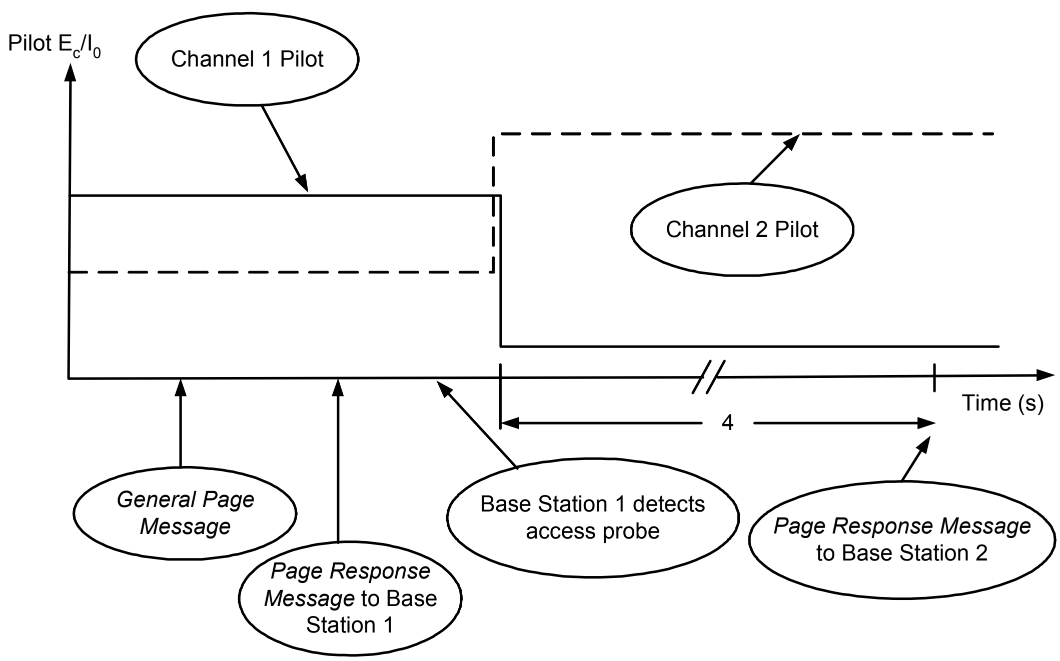

Figure 11- Access Probe Handoff

c) Minimum technical requirement

1. The reported pilot PN phase for P_2 in the *Page Response Message* sent prior to the access probe handoff shall be no greater than ±1 chip from the actual offset. If the mobile station supports access probe handoff, the reported pilot PN phase for P_1 in the *Page Response Message* sent alter the access probe handoff shall also be no greater than ±1 chip from the actual offset.

2. Valid detection of P_2 prior to the access probe handoff shall be greater than 90% with 95% confidence.

3. If the mobile station supports access probe handoff, the probability that the mobile station sends an access probe to base station 2 no later than 4 seconds alter the transition from state 1 to state 2 shall be greater than 90% with 95% confidence. The mobile station shall send all access probes to base station 2 using the appropriate coding for base station 2.

2.1.2.8 Access Handoff

a) Definition

The mobile station is permitted to perform an access handoff to receive the Paging Channel with the best pilot strength and an associated Access Channel. The mobile station is permitted to perform an access handoff when waiting for a response from the base station or before sending a response to the base station. An access handoff is permitted after an access attempt while the mobile station is in the *Page Response Substate* or the *Mobile Station Origination Attempt Substate*.

The value of T_ADD is set to 28 (-14 dB) as specified in 2.4.5.2.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN source is not used in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set the Paging Channel data rate of Channel 1 and Channel 2 to 4800 bps.

3. Ensure that P_2 is the first pilot listed in the *Neighbor List Message, Extended Neighbor List Message* or *General Neighbor List Message* sent on Channel 1.

4. Set the following parameters in the *Extended System Parameters Message:*

Parameters	Value (Binary)
NGHBR_SET_ENTRY_INFO	0 (Access entry handoff is disabled)
NGHBR_SET_ACCESS_INFO	1 (Base station is including information on neighbor set access probe handoff or access handoff)
ACCESS_HO	1 (Enabled)
ACCESS_HO_MSG_RSP	1 (Mobile station is permitted to perform an access handoff after receiving a message and before responding to that message)
ACCESS_PROBE_HO	0 (disabled)
NGHBR_SET_SIZE	1 (P_2 is the first and only pilot to be listed)
ACCESS_HO_ALLOWED	1 (An access handoff to P_2 is allowed)

5. Set the test parameters as specified in Table 12.

Table 12 - Test Parameters for Access Handoff

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/1.23 MHZ	-55	-58 for S_1 45 for S_2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-12	-12
$\frac{\text{Pilot } E_c}{I_0}$	dB	-8.8 for S_1 -17.4 for S_2	-11.8 for S_1 -7.4 for S_2

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter. S_1 and S_2 indicate the two states of the power levels.

6. Set base station 1 to acknowledge an access attempt without assigning a channel.

7. Page the mobile station from base station 1 as specified in Figure 12.

8. After the *Page Response Message* is received and an acknowledgement is sent on Channel 1 as specified in Figure 12, adjust the power of channel 2 to -45 dBm/1.23 MHz, the state 2 value specified in Table 12.

9. Set base station 2 to send a single *Channel Assignment Message* to the mobile station four seconds after the transition from state 1 to state 2.

10. Verify the mobile station completes the call on base station 2.

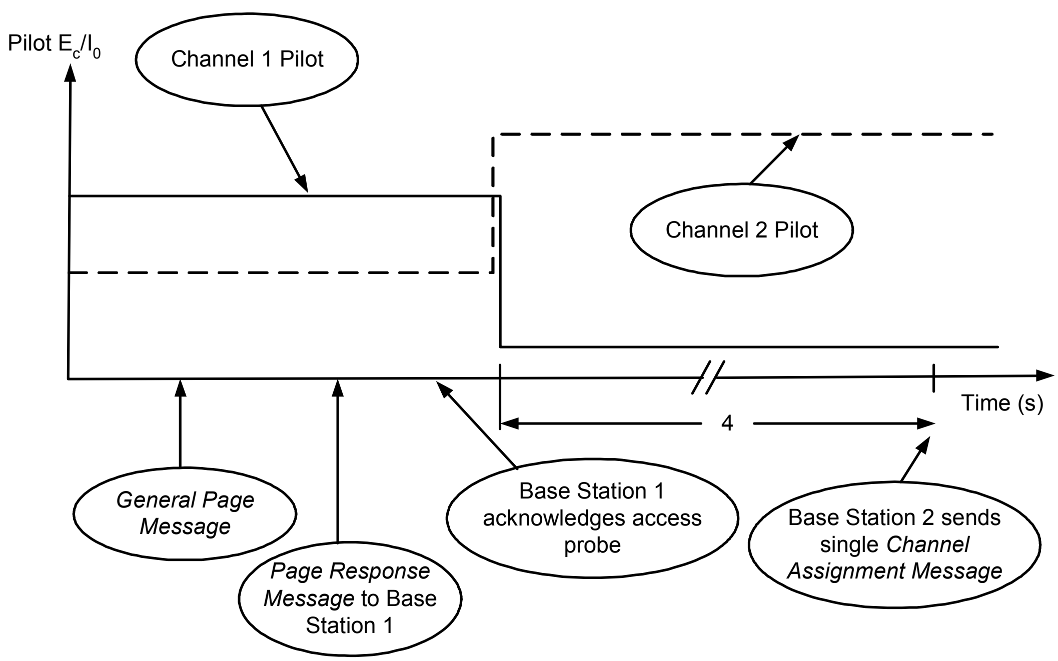

Figure 12: Access Handoff

c) Minimum technical requirement

1. The reported pilot PN phase for P_2 in the *Page Response Message* sent prior to the access handoff shall be no greater than ±1 chip from the actual offset. The

reported pilot PN phase for P_1 in the *Page Response Message* sent after the access handoff shall also be no greater than ±1 chip from the actual offset.

2. Valid detection of P_2 prior to the access handoff shall be greater than 90% with 95% confidence.

3. The probability that the mobile station completes the call on base station 2 shall be greater than 90% with 95% confidence.

2.1.3. Demodulation Requirements

2.1.3.1. Demodulation of Non-Slotted Mode Paging Channel in Additive White Gaussian Noise

These tests shall be performed for mobile stations that can operate in non-slotted mode while in the *Mobile Station Idle State,* and shall be performed for each band class supported by the mobile station.

a) Definition

The performance of the demodulation of Paging Channel in an AWGN (no fading or multipath) environment is determined by the message error rate (MER). The MER is measured only for 9600 bps data rate.

b) Method of Measurement

1. Connect the base station and an AWGN noise source to the mobile station antenna connector as shown in Figure 20.

2. Set the Paging Channel data rate to 9600 bps.

3. Set the test parameters as specified in Table 13.

4. Send the five overhead messages consecutively in synchronized message capsules on the Primary Paging Channel. The format of each message is specified in 2.4.5.2.

5. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) and retrieve the parameters PAG_1, PAG_2 and PAG_4 and then end the call.

6. Run the test for at least 5 seconds and until sufficient confidence is ensured.

7. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) and retrieve the parameters PAG_1, PAG_2 and PAG_4.

Table 13: Test Parameters for Non-Slotted Mode Paging Channel

Parameter	Unit	Value
$\hat{I}_{or}/I_{oc}$	dB	-1
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Sync } E_c}{I_{or}}$	dB	-16

$\frac{\text{Paging } E_c}{I_{or}}$	dB	-16.2
I_{oc}	dBm/ 1.23 MHz	-54
$\frac{\text{Paging } E_b}{N_t}$	dB	3.9

Note: The Paging E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

c) Minimum technical requirement

The actual E_b/N_t used in the test shall be within ±0.2 dB of the value indicated in Table 13.

The Paging Channel MER is estimated by :

$$MER = 1 - \frac{\Delta PAG\_1 - \Delta PAG\_2}{\Delta PAG\_4 \times 5/10}$$

where ΔPAG_1, ΔPAG_2, and ΔPAG_4 are the increment of parameters PAG_1, PAG_2 and PAG_4 during the test, respectively, and the fraction 5/10 is the average number of messages in 10 ms.

The MER shall not exceed the piece-wise linear MER curve specified by the points in Table 14 with 95% confidence.

Table 14 - Minimum technical requirements for Non-Slotted Mode Paging Channel Performance in AWGN

E_b/N_t	MER
3.5	0.055
3.9	0.035
4.1	0.03

2.1.3.2. Demodulation of Slotted Mode Paging Channel in Additive White Gaussian Noise

This test shall be performed for mobile stations that can operate in slotted mode. This test shall be performed for each band class supported by the mobile station.

a) Definition

When operating in the slotted mode, the mobile station starts monitoring the Paging Channel at the beginning of the assigned slots. This test verifies that the mobile station wakes up in time so that it does not miss the beginning of its assigned slots. This test also examines the demodulation performance of the Paging Channel in an AWGN (no fading or multipath) environment. The demodulation performance of the Paging Channel is determined by the message error rate (MER). The MER is measured only for 9600 bps data rate.

b) Method of Measurement

1. Connect the base station and an AWGN noise source to the mobile station antenna connector as shown in Figure 20.

2. Set the Paging Channel data rate to 9600 bps.

3. Set MAX_SLOT_CYCLE_INDEX to 0 in the *System Parameters Message* (each slot cycle is 1.28 seconds long).

4. Send the five overhead messages consecutively on the Primary Paging Channel. The format of each message is specified in 2.4.5.2.

5. Send an *Audit Order* that does not require a layer 2 acknowledgment, addressed to the mobile station, at the beginning of each assigned Paging Channel slot of the mobile station in every slot cycle. The order shall be part of an *Order Message* with a length of 82 bits. Within the same slot as the *Order Message,* send a *General Page Message* with no page records addressed to the mobile station and with the CLASS_0_DONE, CLASS_1_DONE, TMSI_DONE, and BROADCAST_DONE fields set to ‘1’.

6. Set the test parameters as specified in Table 15.

7. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2), retrieve the parameter PAG_3, and then end the call.

8. Run the test for at least two minutes and until sufficient confidence is ensured.

9. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2), retrieve the parameter PAG_3.

Table 15: Test Parameters for Slotted Mode Paging Channel

Parameter	Unit	Value
$\hat{I}_{or}/I_{oc}$	dB	-1
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Sync } E_c}{I_{or}}$	dB	-16
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-16.2
I_{oc}	dBm/1.23 MHz	-54
Paging E_b/N_t	dB	3.9

Note: The Paging E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

c) Minimum technical requirement

The actual E_b/N_t used in the test shall be within ±0.2 dB of the value indicated in Table 15.

The Paging Channel MER is estimated by

$$MER = 1 - \frac{\Delta PAG\_3}{T/1.28}$$

where ∆PAG_3 is the increment of parameter PAG_3 during the test, and T is the length of the test in seconds.

The MER shall not exceed the piece-wise linear MER curve specified by the points in Table 16 with 95% confidence.

Table 16 - Minimum technical requirements for Slotted Mode Paging Channel Performance in AWGN

E_b/N_t	MER
3.5	0.055
3.9	0.035
4.1	0.03

2.1.3.3. Demodulation of Forward Traffic Channel in Additive White Gaussian Noise

This test shall be performed for each band class supported by the mobile station.

a) Definition

The performance of the demodulation of Forward Traffic Channel in an AWGN (no fading or multipath) environment is determined by the frame error rate (FER). The FER is calculated for each individual data rate. For Rate Set 2 Fundamental Code Channels, the accuracy of the Erasure Indicator bits sent by the mobile station is verified in this test.

b) Method of Measurement

1. Connect the base station and an AWGN generator to the mobile station antenna connector as shown in Figure 20.
2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2).
3. Set the test parameters for Test 1 as specified in Table 17.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Set the test parameters for Test 2 as specified in Table 17 and repeat step 4.
6. Set the test parameters for Test 3 as specified in Table 17 and repeat step 4.
7. Set the test parameters for Test 4 as specified in Table 18 and repeat step 4.
8. Set the test parameters for Test 5 as specified in Table 18 and repeat step 4.

9. Set the test parameters for Test 6 as specified in Table 18 and repeat step 4.

If Rate Set 2 is supported, perform the following steps:

1. Connect the base station and an AWGN generator to the mobile station antenna connector as shown in Figure 20.
2. Set up a call using Rate Set 2 Fundamental Code Channel loopback mode (Service Option 9).
3. Set the test parameters for Test 7 as specified in Table 19.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Check the accuracy of the received Erasure Indicator bits at the base station against the corresponding frames received at the mobile station.
6. Set the test parameters for Test 8 as specified in Table 19 and repeat steps 4 and 5.
7. Set the test parameters for Test 9 as specified in Table 19 and repeat steps 4 and 5.
8. Set the test parameters for Test 10 as specified in Table 20 and repeat steps 4 and 5.
9. Set the test parameters for Test 11 as specified in Table 20 and repeat steps 4 and 5.
10. Set the test parameters for Test 12 as specified in Table 20 and repeat steps 4 and 5.

If one or more Rate Set 1 Supplemental Code Channels are supported, perform the following steps:

1. Connect the base station and an AWGN generator to the mobile station antenna connector as shown in Figure 20.
2. Set up a call using Rate Set 1 Supplemental Code Channel loopback mode (Service Option 30) with 9600 bps data only on the Fundamental Code Channel.
3. Set the test parameters for Test 13 as specified in Table 21.
4. Count, at the base station, the number of Forward Supplemental Code Channel frames transmitted and the number of good Forward Supplemental Code Channel frames received at the mobile station.
5. Set the test parameters for Test 14 as specified in Table 21 and repeat step 4.
6. Set the test parameters for Test 15 as specified in Table 21 and repeat step 4.

If one or more Rate Set 2 Supplemental Code Channels are supported, perform the following steps:

1. Connect the base station and an AWGN generator to the mobile station antenna connector as shown in Figure 20.
2. Set up a call using Rate Set 2 Supplemental Code Channel loopback mode (Service Option 31) with 9600 bps data only on the Fundamental Code Channel.
3. Set the test parameters for Test 16 as specified in Table 22.
4. Count, at the base station, the number of Forward Supplemental Code Channel frames transmitted and the number of good Forward Supplemental Code Channel frames received at the mobile station.
5. Set the test parameters for Test 17 as specified in Table 22 and repeat step 4.
6. Set the test parameters for Test 18 as specified in Table 22 and repeat step 4.

Table 17 - Test Parameters for Forward Traffic Channel Rate Set 1 Fundamental Code Channel in AWGN

Parameter	Units	Test 1	Test 2	Test 3
$\hat{I}_{or}/I_{oc}$	dB		-1	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB		-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-16.3	-15.8	-15.6
I_{oc}	dBm/ 1.23 MHz		-54	
Data Rate	bps	9600	9600	9600
Traffic E_b/N_t	dB	3.8	4.3	4.5

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 18 -Test Parameters for Forward Traffic Channel Rate Set 1 Fundamental Code Channel in AWGN

Parameter	Units	Test 4	Test 5	Test 6
$\hat{I}_{or}/I_{oc}$	dB		-1	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB		-7	

Traffic $\frac{E_c}{I_{or}}$	dB	-19.1	-21.6	-24.5
I_{oc}	dBm/ 1.23 MHz	-54		
Data Rate	bps	4800	2400	1200
Traffic E_b/N_t	dB	4.0	4.5	4.6

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 19 - Test Parameters for Forward Traffic Channel Rate Set 2 Fundamental Code Channel in AWGN

Parameter	Units	Test 7	Test 8	Test 9
$\hat{I}_{or}/I_{oc}$	dB	-1		
Pilot $\frac{E_c}{I_{or}}$	dB	-7		
Traffic $\frac{E_c}{I_{or}}$	dB	-13.0	-12.7	-12.4
I_{oc}	dBm/1.23 MHz	-54		
Data Rate	bps	14400	14400	14400
Traffic E_b/N_t	dB	5.3	5.6	5.9

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 20 - Test Parameters for Forward Traffic Channel Rate Set 2 Fundamental Code Channel in AWGN

Parameter	Units	Test 10	Test 11	Test 12
$\hat{I}_{or}/I_{oc}$	dB	-1		
Pilot $\frac{E_c}{I_{or}}$	dB	-7		
Traffic $\frac{E_c}{I_{or}}$	dB	-17.3	-20.8	-24.4
I_{oc}	dBm/1.23 MHz	-54		
Data Rate	bps	7200	3600	1800
Traffic E_b/N_t	dB	4.0 4.1	3.5	2.9

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 21 - Test Parameters for Forward Traffic Channel Rate Set 1 Supplemental Code Channel in AWGN

Parameter	Units	Test 13	Test 14	Test 15
$\hat{I}_{or}/I_{oc}$	dB	-1		
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		
$\frac{\text{Supplemental } E_c}{I_{or}}$	dB	-17.0	-16.7	-16.1
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-12		
I_{oc}	dBm/1.23 MHz	-54		
Data Rate	bps	9600	9600	9600
Supplemental E_b/N_t	dB	3.1	3.4	4.0

Note: The Supplemental E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 22 - Test Parameters for Forward Traffic Channel Rate Set 2 Supplemental Code Channel in AWGN

Parameter	Units	Test 16	Test 17	Test 18
$\hat{I}_{or}/I_{oc}$	dB	-1		
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		
$\frac{\text{Supplemental } E_c}{I_{or}}$	dB	-13.7	-13.5	-13.0
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-12		
I_{oc}	dBm/ 1.23 MHz	-54		
Data Rate	bps	14400	14400	14400
Supplemental E_b/N_t	dB	4.6	4.8	5.3

Note: The Supplemental E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter.

c) Minimum technical requirement

The actual E_b/N_t used in each test shall be within ±0.2 dB of the value indicated in Tables 17, 18, 19, 20, 21 and 22.

For Rate Set 2 Fundamental Code Channels the value of the Erasure Indicator bits corresponding to all frames received in category 26 at the mobile station shall be ‘1’.

The value of the Erasure Indicator bits corresponding to all other frames received at the mobile station shall be ‘0’.

The FER for Rate Set 1 Fundamental Code Channel tests shall not exceed the piecewise linear FER curve specified by the points in Table 23 with 95% confidence.

The FER for Rate Set 2 Fundamental Code Channel tests shall not exceed the piecewise linear FER curve specified by the points in Table 24 with 95% confidence.

The FER for Rate Set 1 Supplemental Code Channel tests shall not exceed the piecewise linear FER curve specified by the points in Table 25 with 95% confidence.

The FER for Rate Set 2 Supplemental Code Channel tests shall not exceed the piecewise linear FER curve specified by the points in Table 26 with 95% confidence.

Table 23 - Minimum technical requirements for Traffic Channel Rate Set 1 Fundamental Code Channel Performance In AWGN

Rate	E_b/N_t [dB]	FER
9600 bps	3.6	0.05
	3.8	0.03
	4.3	0.01
	4.5	0.005
	4.7	0.003
4800 bps	3.6	0.03
	4.0	0.01
	4.2	0.005
2400 bps	4.0	0.03
	4.5	0.01
	4.8	0.005
1200 bps	3.9	0.03
	4.6	0.01
	4.9	0.005

Table 24 - Minimum technical requirements for Traffic Channel Rate Set 2 Fundamental Code Channel Performance in AWGN

Rate	E_b/N_t [dB]	FER
14400 bps	5.2	0.05
	5.5	0.03
	5.8	0.01
	6.0	0.005
	6.2	0.003
7200 bps	3.7	0.03
	4.1	0.01
	4.4	0.005

3600 bps	3.1	0.03
	3.6	0.01
	3.9	0.005
1800 bps	2.5	0.03
	3.0	0.01
	3.4	0.005

Table 25 - Minimum technical requirements for Traffic Channel Rate Set 1 Supplemental Code Channel Performance in AWGN

E_b/N_t [dB]	FER
3.1	0.1
3.4	0.05
4.0	0.01

Table 26 - Minimum technical requirements for Traffic Channel Rate Set 2 Supplemental Code Channel Performance, in AWGN

E_b/N_t [dB]	FER
4.6	0.1
4.8	0.05
5.3	0.01

2.1.3.4 Demodulation of Forward Traffic Channel in Multipath Fading Channel

This test shall be performed for each band class supported by the mobile station.

a) Definition

The performance of the demodulation of Forward Traffic Channel in multipath fading channel is determined by the frame error rate (FER) or the error rate in each frame category. The FER is calculated for each individual data rate. The following table summarizes the fading tests to be performed:

Case	Rate Set	Channel Simulator Configuration Number
1	1	l (8 km/h, 2 paths)
2	1	3 (30 km/h, 1 path)
3	1	4 (100 km/h, 3 paths)
4	2	l (8 km/h, 2 paths)
5	2	3 (30 km/h, 1 path)
6	2	4 (100 km/h, 3 paths)

Cases 1 and 4 test the demodulation performance for the 8 km/h, two-path case by checking the full rate FER. Cases 2 and 5 test the demodulation performance for the 30 km/h, single-path case by checking the FER at all four possible data rates. Cases 3 and 6 test the demodulation performance and the rate determination for the 100 km/h, three-path case by checking the FER and the error rate in each frame category.

b) Method of Measurement

1. Connect the base station and an AWGN generator to the mobile station antenna connector as shown in Figure 17.
2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2).
3. Set the test parameters for Test 1 as specified in Table 27.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Set the test parameters for Test 2 as specified in Table 27 and repeat step 4.
6. Set the test parameters for Test 3 as specified in Table 27 and repeat step 4.
7. Set the test parameters for Test 4 as specified in Table 28 and repeat step 4.
8. Set the test parameters for Test 5 as specified in Table 28 and repeat step 4.
9. Set the test parameters for Test 6 as specified in Table 29 and repeat step 4.
10. Set the test parameters for Test 7 as specified in Table 29 and repeat step 4.
11. Set the test parameters for Test 8 as specified in Table 29 and repeat step 4.
12. Set the test parameters for Test 9 as specified in Table 30 and repeat step 4.
13. Set the test parameters for Test 10 as specified in Table 30 and repeat step 4.
14. Set the test parameters for Test 11 as specified in Table 30 and repeat step 4.
15. Set the test parameters for Test 12 as specified in Table 31 and repeat step 4. Count, at the base station, the number of frames received in each category at the mobile station.

If Rate Set 2 is supported, perform the following steps:

1. Connect the base station and an AWGN generator to the mobile station antenna connector as shown in Figure 17.
2. Set up a call using Rate Set 2 Fundamental Code Channel loopback mode (Service Option 9).
3. Set the test parameters for Test 13 as specified in Table 32.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Set the test parameters for Test 14 as specified in Table 32 and repeat step 4.
6. Set the test parameters for Test 15 as specified in Table 33 and repeat step 4
7. Set the test parameters for Test 16 as specified in Table 33 and repeat step 4.
8. Set the test parameters for Test 17 as specified in Table 34 and repeat step 4.

9. Set the test parameters for Test 18 as specified in Table 34 and repeat step 4.
10. Set the test parameters for Test 19 as specified in Table 34 and repeat step 4.
11. Set the test parameters for Test 20 as specified in Table 35 and repeat step 4. Count, at the base station, the number of frames received in each category at the mobile station.
12. Set the test parameters for Test 21 as specified in Table 35 and repeat step 4. Count, at the base station, the number of frames received in each category at the mobile station.
13. Set the test parameters for Test 22 as specified in Table 35 and repeat step 4. Count, at the base station, the number of frames received in each category at the mobile station.
14. Set the test parameters for Test 23 as specified in Table 35 and repeat step 4. Count, at the base station, the number of frames received in each category at the mobile station.

Table 27 - Test Parameters for Forward Traffic Channel Rate Set 1 in Fading Channel (Case 1)

Parameter	Units	Test 1	Test 2	Test 3
$\hat{I}_{or}/I_{oc}$	dB		8	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB		-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-16.1	-13.5	-11.5
$\hat{I}_{oc}$	dBm/1.23 MHz		-63	
Data Rate	bps		9600	
Traffic E_b/N_t	dB	6.8	9.4	11.4
Channel Simulator Configuration			1	

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 28: Test Parameters for Forward Traffic Channel Rate Set 1 in Fading Channel (Case 1)

Parameter	Units	Test 4	Test 5
$\hat{I}_{or}/I_{oc}$	dB	0	-4
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-6.2	-7.6
$\hat{I}_{oc}$	dBm/ 1.23 MHz	-55	-51
Data Rate	bps	9600	
Traffic E_b/N_t	dB	13.1	8.7
Channel Simulator Configuration		1	

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 29 - Test Parameters for Forward Traffic Channel Rate Set 1 in Fading Channel (Case 2)

Parameter	Units	Test 6	Test 7	Test 8
$\hat{I}_{or}/I_{oc}$	dB	4		
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-12.3	-9.5	-7.5
$\hat{I}_{oc}$	dBm/1.23 MHz	-59		
Data Rate	bps	9600		
Traffic E_b/N_t	dB	12.8	15.6	17.6
Channel Simulator Configuration		3		

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 30 - Test Parameters for Forward Traffic Channel Rate Set 1 in Fading Channel (Case 2)

Parameter	Units	Test 9	Test 10	Test 11
$\hat{I}_{or}/I_{oc}$	dB	4		
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-14.4	-17.5	-21.3
$\hat{I}_{oc}$	dBm/1.23 MHz	-59		
Data Rate	bps	4800	2400	1200
Traffic E_b/N_t	dB	13.7	13.6	12.8
Channel Simulator Configuration		3		

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 31 - Test Parameters for Forward Traffic Channel Rate Set 1 in Fading Channel (Case 3)

Parameter	Units	Test 12
$\hat{I}_{or}/I_{oc}$	dB	2
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$ (for 9600 bps)	dB	-14.7
$\hat{I}_{oc}$	dBm/1.23 MHz	-57
Data Rate	bps	Variable
Traffic E_b/N_t	dB	5.3
Channel Simulator Configuration		4

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 32 - Test Parameters for Forward Traffic Channel Rate Set 2 in Fading Channel (Case 4)

Parameter	Units	Test 13	Test 14
$\hat{I}_{or}/I_{oc}$	dB	8	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-13.1	-9.4
$\hat{I}_{oc}$	dBm/1.23 MHz	-63	
Data Rate	bps	14400	
Traffic E_b/N_t	dB	8.0	11.7
Channel Simulator Configuration		1	

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 33 - Test Parameters for Band 800 MHz Forward Traffic Channel Rate Set 2 in Fading Channel (Case 5)

Parameter	Units	Test 15	Test 16
$\hat{I}_{or}/I_{oc}$	dB	12	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-14.3	-9.3
$\hat{I}_{oc}$	dBm/1.23 MHz	-67	
Data Rate	bps	14400	
Traffic E_b/N_t	dB	17.0	22.0
Channel Simulator Configuration		3	

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 34 - Test Parameters for Band 800 MHz Forward Traffic Channel Rate Set 2 in Fading Channel (Case 5)

Parameter	Units	Test 17	Test 18	Test 19
$\hat{I}_{or}/I_{oc}$	dB	12		
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-19.4	-24.1	-28.3
$\hat{I}_{oc}$	dBm/ 1.23 MHz	-67		
Data Rate	bps	7200	3600	1800
Traffic E_b/N_t	dB	14.9	13.2	12.0
Channel Simulator Configuration		3		

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

Table 35 - Test Parameters for Forward Traffic Channel Rate Set 2 in Fading Channel (Case 6)

Parameter	Units	Test 20	Test 2l	Test 22	Test 23
$\hat{I}_{or}/I_{oc}$	dB	2			
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7			
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-10.3	-15.7	-19.6	-23.4
$\hat{I}_{oc}$	dBm/1.23MHz	-57			
Data Rate	bps	14400	7200	3600	1800
Traffic E_b/N_t	dB	8.0	5.6	4.7	3.9
Channel Simulator Configuration		4			

Note: The Traffic E_b/N_t value is calculated from the parameters in the table. It is not a directly settable parameter. The channel simulator configurations are found in Table 77.

c) Minimum technical requirement

A minimum confidence level of 95% shall be obtained for the following FER requirements.

Case 1:

The actual E_b/N_t used in each test shall be within ±0.5 dB of the value indicated in Tables 36 and 37.

The FER for each test at 9600 bps shall not exceed the piece-wise linear FER curve specified by the points in Tables 36, 37, and 38.

Case 2:

The actual E_b/N_t used in each test shall be within ±0.5 dB of the value indicated in Tables 38 and 39.

The FER for each test shall not exceed the piece-wise linear FER curve specified by the points in Table 39.

Case 3:

The actual E_b/N_t used shall be within ±0.2 dB of the value indicated in Table 40.

The FER for each data rate shall not exceed the line specified by the points in Table 40. The error rate of each frame category should not exceed the corresponding error rate value specified in Table 41.

Case 4:

The actual E_b/N_t used in each test shall be within ±0.5 dB of the value indicated in Table 42.

The FER for each test at 14400 bps shall not exceed the piece-Wise linear PER curve specified by the points in Table 42.

Case 5:

The actual E_b/N_t used in each Band 800 MHz test shall be within ±0.5 dB of the value indicated in Tables 41.

The FER for each test shall not exceed the piece-wise linear FER curve specified by the points in Table 43.

Case 6:

The actual E_b/N_t used in each test shall be within ±0.2 dB of the value indicated in Table 42.

The FER for each data rate shall not exceed the line specified by the points in Tables 44. The error rate of each frame category should not exceed the corresponding error rate value specified in Table 45.

Table 36 - Minimum technical requirements for Traffic Channel Performance in Fading Channel (Case 1, Tests 1, 2, and 3)

E_b/N_t [dB]	FER
6.0	0.04
6.8	0.03
9.4	0.01
11.4	0.005
11.9	0.004

Table 37 - Minimum technical requirements for Traffic Channel Performance in Fading Channel (Case 1, Test 4)

E_b/N_t [dB]	FER
10.2	0.03
13.1	0.01
15.1	0.005

Table 38 - Minimum technical requirements for Traffic Channel Performance in Fading Channel (Case 1, Test 5)

E_b/N_t [dB]	FER
5.3	0.3
8.7	0.1
11.1	0.05

Table 39 - Minimum technical requirements for Traffic Channel Performance in Fading Channel (Case 2, Tests 6, 7, 8, 9, 10 and 11)

Rate (bps)	E_b/N_t [dB]	FER
9600	12.1	0.04
	12.8	0.03
	15.6	0.01
	17.6	0.005
	18.2	0.004
4800	11.3	0.03
	13.7	0.01
	15.3	0.005
2400	11.1	0.03
	13.6	0.01
	15.2	0.005
1200	10.3	0.03
	12.8	0.01
	14.3	0.005

Table 40 - Minimum technical requirements for Band 800 MHz Traffic Channel Performance in Fading Channel (Case 3, Test 12)

E_b/N_t [dB]	FER (9600 bps)	FER (4800 bps)	FER (2400 bps)	FER (1200 bps)
5.1	2.58×10^{-2}	1.18×10^{-2}	1.09×10^{-2}	1.16×10^{-2}
5.6	8.82×10^{-3}	4.15×10^{-3}	4.45×10^{-3}	3.49×10^{-3}

Table 41 - Recommended Minimum technical requirements for Band 800 MHz Traffic Channel Performance in Fading Channel (Case 3, Test 12)

	Received Frame Category					
Transmit	9600 bps	4800 bps	2400 bps	1200 bps	9600 bps with bit errors	Undetected Bit Errors
9600 bps	N/A	1.67×10^{-5}	1.56×10^{-4}	4.67×10^{-4}	1.71×10^{-2}	1.67×10^{-5}
4800 bps	1.67×10^{-5}	N/A	6.70×10^{-5}	6.70×10^{-5}	1.34×10^{-4}	1.67×10^{-5}
2400 bps	1.67×10^{-5}	2.44×10^{-4}	N/A	3.84×10^{-4}	2.44×10^{-4}	6.98×10^{-5}
1200 bps	3.95×10^{-5}	1.67×10^{-5}	7.89×10^{-5}	N/A	1.97×10^{-4}	3.95×10^{-5}

Table 42 - Minimum technical requirements for Traffic Channel Rate Set 2 Performance in Fading Channel (Case 4, Tests 13 and 14)

E_b/N_t [dB]	FER
7.5	0.04
8.0	0.03
10.0	0.01
11.7	0.005
12.1	0.004

Table 43 - Minimum technical requirements for Band 800 MHz Traffic Channel Rate Set 2 Performance in Fading Channel (Case 5, Tests 15, 16, 17, 18, and 19)

Rate (bps)	E_b/N_t [dB]	FER
14400	16.4	0.04
	17.0	0.03
	20.0	0.01
	22.0	0.005
	22.6	0.004
7200	12.7	0.03
	14.9	0.01
	16.1	0.005
3600	11.3	0.03
	13.2	0.01
	14.6	0.005
1800	10.1	0.03
	12.0	0.01
	13.2	0.005

Table 44 - Minimum technical requirements for Band 800 MHz, Traffic Channel Rate Set 2 Performance in Fading Channel (Case 6, Tests 20, 21, 22, and 23)

FER	E_b/N_t (14400 bps)	E_b/N_t (7200 bps)	E_b/N_t (3600 bps)	E_b/N_t (1800 bps)
0.03	7.3	5.0	4.1	3.2
0.005	8.5	5.9	5.0	4.3

Table 45: Recommended Minimum technical requirements for Band 800 MHz Traffic Channel Rate Set 2 Performance in Fading Channel (Case 6, Tests 20, 21, 22, and 23)

	Received Frame Category				
Transmit	14400 bps	7200 bps	3600 bps	1800 bps	Undetected Bit Errors
14400 bps	N/A	5.00×10^{-5}	3.26×10^{-5}	2.28×10^{-4}	5.00×10^{-5}
7200 bps	4.66×10^{-5}	N/A	1.19×10^{-4}	8.58×10^{-3}	4.00×10^{-5}
3600 bps	1.35×10^{-5}	7.74×10^{-6}	N/A	4.72×10^{-5}	1.35×10^{-5}
1800 bps	1.44×10^{-5}	1.13×10^{-5}	1.24×10^{-4}	N/A	5.64×10^{-5}

2.1.3.5. Demodulation of Forward Traffic Channel During Soft Handoff

a) Definition

The performance of the demodulation of Forward Traffic Channel during a two-way soft handoff is determined by the frame error rate (FER).

b) Method of Measurement

1. Connect two base stations and an AWGN generator to the mobile station antenna connector as shown in Figure 18, with both channel simulators set to configuration 2 (see Table 77). The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters for Test 1 as specified in Table 46 for both base stations.

4. Send a *General Handoff Direction Message* to the mobile station, specifying the following pilots in the Active Set:

Parameter	Value (Decimal)
PILOT_PN	P_1
PILOT_PN	P_2

5. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.

6. Set the test parameters for Test 2 as specified in Table 46 for both base stations and repeat step 5.

7. Set the test parameters for Test 3 as specified in Table 46 for both base stations and repeat step 5.

Table 46 - Test Parameters for Forward Traffic Channel During Soft Handoff

Parameter	Units	Test 1	Test 2	Test 3
$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$	dB	10		
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-15.3	-13.9	-13.0
I_{oc}	dBm/1.23 MHz	-65		
Traffic E_b/N_t	dB	5.5	6.9	7.8

Note: The Traffic E_b/N_t value is calculated from the parameters in the table, It is not a directly settable parameter.

c) Minimum technical requirement

The actual E_b/N_t used in each test shall be within ±0.3 dB of the value indicated in Table 46.

The FER for each test shall not exceed the piece-wise linear FER curve specified by the points in Table 47 with 95% confidence.

Table 47- Minimum technical requirements for Traffic Channel Performance During Soft Handoff

E_b/N_t [dB]	FER
5.1	0.04
5.5	0.03
6.9	0.01
7.8	0.005
8.1	0.004

2.1.3.6. Decision of Power Control Bit for Channels Belonging to Different Power Control Sets During Soft Handoff

a) Definition

When simultaneously receiving channels belonging to different power control sets, the mobile station shall increase its transmit power if all valid power control bits received from all power control sets indicate an increment, and shall reduce its transmit power if any valid power control bit received indicates a decrement. This test verifies the above "or of downs" logic.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN generator is not applicable in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1.

The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only between the base station and the mobile station.

3. Set the test parameters as specified in Table 48 for both base stations.

4. Send a *General Handoff Direction Message* to the mobile station, specifying the following pilots in the Active Set:

Parameter	Value (Decimal)
USE_TIME	0 (no action time)
PILOT_PN	P_1
FWR_COMB_IND	0
PILOT_PN	P_2
PWR_COMB_IND	0 (no combining with P_1)

5. After waiting a minimum of 160 ms, synchronously send a periodic pattern of twenty ‘0’ power control bits followed by twenty ‘1’ power control bits on both Channel 1 and Channel 2.

6. Measure the output power at the mobile station antenna connector for a duration of 80 power control groups (100 ms).

7. Send a periodic pattern of twenty ‘0’ power control bits followed by twenty ‘1’ power control bits on Channel 1. Send continuously ‘0’ power control bits on Channel 2.

8. Measure the output power at the mobile station antenna connector for a duration of 80 power control groups (100 ms).

9. If Rate Set 2 is supported, repeat steps 2 through 8 using Rate Set 2 Fundamental Code Channel loopback mode (Service Option 9) with 14400 bps data rate only.

Table 48 - Test Parameter for Decision of Power Control Bit for Different Power Control Set

Parameter	Units	9.6 kbps Value	14.4 kbps Value
$\hat{I}_{or1}$	dBm/1.23 MHz	-55	-55
$\hat{I}_{or2}$	dBm/1.23 MHz	-55	-55
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4	-7.4
$\frac{\text{Power Control } E_c}{I_{or}}$	dB	-17.8	-21.0

c) Minimum technical requirement

The mobile station output power, measured at the mobile station antenna connector, shall have a periodic pattern. In each period the power shall increase monotonically for a duration of 20 power control groups (25 ms) and then decrease monotonically for a duration of 20 power control groups.

2.1.3.7 Decision of Power Control Bit for Channels Belonging to the Same Power Control Set

a) Definition

In each power control group containing valid power control bits, the mobile station should provide diversity combining of identical power control subchannels and shall obtain at most one power control bit from each set of identical power control subchannels. This test partially verifies the diversity combining of power control bits belonging to identical power control subchannels and the diversity combining of power control bits belonging to different paths of the same power control subchannel.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 18. The AWGN generators and channel simulators are not applicable in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 49 for both base stations.

4. Send a *General Handoff Direction Message* to the mobile station, specifying the following pilots in the Active Set:

Parameter	Value (Decimal)
USE_TIME	0 (no action time)
PILOT_PN	P_1
PWR_COMB_IND	0
PILOT_PN	P_2
PWR_COMB_IND	1 (combine with P_1)

5. After waiting a minimum of 160 ms, begin sending an alternating pattern of one '0' power control bit followed by one ‘1’ power control bit on Channel 1 and a sequence of '1’ power control bits on Channel 2.

6. Measure the output power at the mobile station antenna connector for at least 40 power control groups (50 ms) for each trial. Perform at least 11 trials.

7. If Rate Set 2 is supported, repeat steps 2 through 6 using Rate Set 2 Fundamental Code Channel loopback mode (Service Option 9) with 14400 bps data rate only.

Table 49 - Test Parameters for Decision of Power Control Bit for the Same Power Control Set

Parameter	Units	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/1.23 MHz	-55	-58
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4	-7.4 (Rate Set 1) -12.5 (Rate Set 2)
$\frac{\text{Power Control } E_c}{I_{or}}$	dB	-17.8 (Rate Set 1) -21.0 (Rate Set 2)	-17.8 (Rate Set 1) -26.1 (Rate Set 2)
Channel Simulator Configuration		5	N/A

Note: The channel simulator configurations are found in Table 77.

c) Minimum technical requirement

In 90% of the trials (each with at least 40 power control groups), the mobile station output power, measured at the mobile station antenna connector, shall follow the power control bit pattern of alternating ‘0’ and ‘1’ sent on Channel 1, with the exception of at most one bit per trial.

2.1.3.8 Demodulation of Power Control Subchannel During Soft Handoff

a) Definition

The mobile station shall not use a power control subchannel when the pilot E_c/I_0 of the corresponding COMA Channel is low. This test verifies that the mobile station stops using a power control subchannel in the "or of downs" when the pilot E_c/I_0 of the corresponding COMA Channel is low.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN generators are not applicable in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 50 and Figure 13 for both base stations.

4. Send a *General Handoff Direction Message* to the mobile station, specifying the following pilots in the Active Set:

Parameter	Value (Decimal)
USE_TIME	0 (no action time)
PILOT_PN	P_1
PWR_COMB_IND	0
PILOT_PN	P_2
PWR_COMB_IND	0 (no combining with P_1)

5. After waiting a minimum of 160 ms, synchronously send a periodic pattern of one '0' power control bit followed by one ‘1’ power control bit on both Channel 1 and Channel 2.

6. Measure the mobile station output power at the mobile station antenna connector for at least 22 seconds, which does not have to be contiguous. The 22-second period must contain at least 11 transitions from the state where Channel 2 Pilot E_c/I_0 changes from -10 dB to -20 dB.

7. If Rate Set 2 is supported, repeat steps 2 through 6 using Rate Set 2 Fundamental Code Channel loopback mode (Service Option 9) with 14400 bps data rate only.

Table 50 - Test Parameters for Demodulation of Power Control Subchanne1 During Soft Handoff

Parameter	Units	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/1.23 MHz	Max = -52.2 Min = -55	Max = -55 Min = -65
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4	-12.4 (Rate Set 1) -9.2 (Rate Set 2)
$\frac{\text{Power Control } E_c}{I_{or}}$	dB	-17.8 (Rate Set 1) -21.0 (Rate Set 2)	-22.8
$\frac{\text{Pilot } E_c}{I_o}$	dB	Max = -7.2 Min = -10	Max = -10 Min = -20

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter.

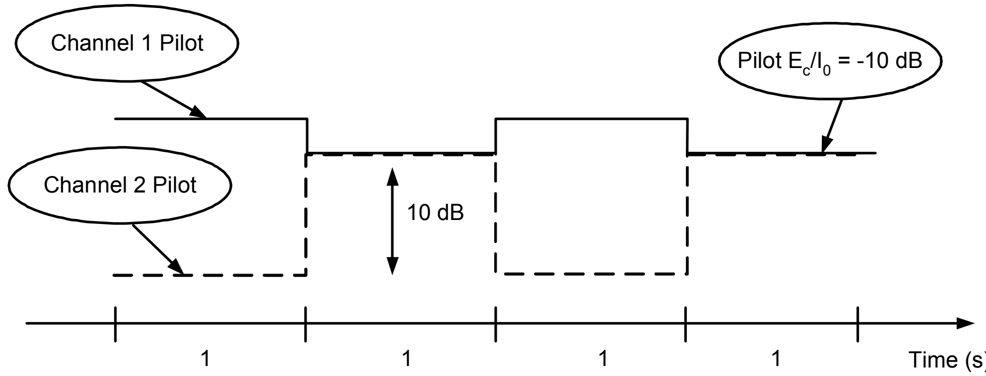

Figure 13 - Demodulation of Power Control Subchannel During Soft Handoff

c) Minimum technical requirement

The mobile station output power, measured at the mobile station antenna connector, shall be in a steady state, defined as steady state 1, when the pilot E_c/I_0 value of Channel 2 is -10 dB, and it shall follow the power control bit pattern of alternating ‘0’ and ‘1’ in 85% of the 1 second steady state 1 segments with 90% confidence. The mobile station output power shall be in a steady state, defined as steady state 2, no later than 40 ms after the pilot E_c/I_0 value of Channel 2 drops to -20 dB in 90% of the trials, and shall follow the power control bit pattern of alternating ‘0’ and ‘1’. The mobile station output power in steady state 2 shall be no greater than the mobile station output power in steady state 1, and shall be greater than the mobile station output power in steady state 1 minus 12 dB.

2.1.4. Receiver Performance

2.1.4.1 Receiver Sensitivity and Dynamic Range

This test shall be performed for each band class supported by the mobile station. This test may be performed using either Rate Set 1 or Rate Set 2 Fundamental Code Channel loopback mode.

a) Definition

The RP sensitivity of the mobile station receiver is the minimum received power, measured at the mobile station antenna connector, at which the frame error rate (FER) does not exceed a specified value. The receiver dynamic range is the input power range at the mobile station antenna connector over which the FER does not exceed a specific value.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.
2. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only or Rate Set 2 loopback mode (Service Option 9) with 14400 bps data rate only.

3. Set the test parameters for Test 1 as specified in Table 51.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Set the test parameters for Test 2 as specified in Table 51 and repeat step 4.

Table 51 - Test Parameters for Receiver Sensitivity and Dynamic Range

Parameter	Units	Test 1	Test 2
$\hat{I}_{or}$	dBm/1.23 MHz	-104	-25
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-15.6 (Rate Set 1) -12.3 (Rate Set 2)	

c) Minimum technical requirement

The FER in each test shall not exceed 0.005 with 95% confidence.

2.1.4.2. Single Tone Desensitization

This test shall be performed for each band class supported by the mobile station.

a) Definition

Single tone desensitization is a measure of a receiver's ability to receive a CDMA signal at its assigned channel frequency in the presence of a single tone spaced at a given frequency offset from the center frequency of the assigned channel. The receiver desensitization performance is measured by the frame error rate (PER).

b) Method of Measurement

1. Connect the base station and an interfering CW tone to the mobile station antenna connector as shown in Figure 20.
2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.
3. Set the test parameters for Test 1 as specified in Table 52.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Set the test parameters for Test 2 as specified in Table 52 and repeat step 4 and 5.

Table 52 - Test Parameters for Single Tone Desensitization

Parameter	Units	Test 1	Test 2
Tone Offset from Carrier	kHz	+900	-900
Tone Power	dBm	-30	
$\hat{I}_{or}$	dBm/1.23 MHz	-101	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-15.6	

c) Minimum technical requirement

The PER in each test shall not exceed 0.01 with 95% confidence

2.1.4.3 Intermodulation Spurious Response Attenuation

a) Definition

The intermodulation spurious response attenuation is a measure of a receiver's ability to receive a CDMA signal on its assigned channel frequency in the presence of two interfering CW tones. These tones are separated from the assigned channel frequency and are separated from each other such that the third order mixing of the two interfering CW tones can occur in the non-linear elements of the receiver, producing an interfering signal in the band of the desired CDMA signal. The receiver performance is measured by the frame error rate (FER).

b) Method of Measurement

1. Connect the base station and two interfering CW tones to the mobile station antenna connector as shown in Figure 20.
2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.
3. Set the test parameters for Test 1 as specified in Table 53.
4. Count, at the base station, the number of frames transmitted and the number of good frames received at the mobile station.
5. Set the test parameters for Test 2 as specified in Table 53 and repeat step 4.
6. Set the test parameters for Test 3 as specified in Table 54 and repeat step 4.
7. Set the test parameters for Test 4 as specified in Table 54 and repeat step 4.
8. Set the test parameters for Test 5 as specified in Table 55 and repeat step 4.
9. Set the test parameters for Test 6 as specified in Table 55 and repeat step 4.

Table 53 - Test Parameters for Band 800 MHz, Intermodulation Spurious Response Attenuation (Tests 1 and 2)

		Mobile Station Class I		Mobile Station Class II and Class III	
Parameter	Units	Test 1	Test 2	Test 1	Test 2
Tone 1 Offset from Carrier	kHz	+900	-900	+900	-900
Tone Power 1	dBm	-40		-43	
Tone 2 Offset from Carrier	kHz	+1700	-1700	+1700	-1700
Tone Power 2	dBm	-40		-43	
$\hat{I}_{or}$	dBm/l.23 MHz	-101		-101	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7		-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-15.6		-15.6	

Table 54 -Test Parameters for Band 800 MHz, Intermodulation Spurious Response Attenuation (Tests 3 and 4)

Parameter	Units	Test 3	Test 4
Tone 1 Offset from Carrier	kHz	+900	-900
Tone Power 1	dBm	-32	
Tone 2 Offset from Carrier	kHz	+1700	-1700
Tone Power 2	dBm	-32	
$\hat{I}_{or}$	dBm/ 1.23 MHz	-90	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-15.6	

Table 55 - Test Parameters for Band 800 MHz Intermodulation Spurious Response Attenuation (Tests 5 and 6)

Parameter	Units	Test 5	Test 6
Tone 1 Offset from Carrier	kHz	+900	-900
Tone Power 1	dBm	-21	
Tone 2 Offset from Carrier	kHz	+1700	-1700
Tone Power 2	dBm	-21	
$\hat{I}_{or}$	dBm/1.23 MHz	-79	
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-15.6	

c) Minimum technical requirement

The FER in Tests 1, 2, 5, and 6 shall not exceed 0.01 with 95% confidence.

The FER in Tests 3 and 4 should not exceed 0.01 with 95% confidence.

2.1.5. Limitations on Emissions

2.1.5.1 Conducted Spurious Emissions

a) Definition

Conducted spurious emissions are spurious emissions generated or amplified in a receiver that appear at the mobile station antenna connector.

b) Method of Measurement

1. Connect a spectrum analyzer (or other suitable test equipment) to the mobile station antenna connector.

2. Enable the mobile station receiver for CDMA-only mode, so that the mobile station continuously cycles between the *System Determination Substate* and the *Pilot Channel Acquisition Substate* of the *Mobile Station Initialization State.* Since there is no Forward CDMA Channel, the mobile station should not pass the *Pilot Channel Acquisition Substate.*

3. Sweep the spectrum analyzer over a frequency range from the lowest intermediate frequency or lowest oscillator frequency used in the receiver or 1 MHz, whichever is lowest, to at least 2600 MHz.

c) Minimum technical requirement

The conducted spurious emissions for a mobile station operating in Band 800 MHz shall be:

1. Less than -81 dBm, measured in a 1 MHz resolution bandwidth at the mobile station antenna connector, for frequencies within the mobile station receive band between 869 and 894 MHz.

2. Less than -61 dBm, measured in a 1 MHz resolution bandwidth at the mobile station antenna connector, for frequencies within the mobile station transmit band between 824 and 849 MHz.

3. Less than -47 dBm, measured in a 30 kHz resolution bandwidth at the mobile station antenna connector, for all other frequencies.

2.1.5.2. Radiated Spurious Emissions

a) Definition

Radiated spurious emissions are those spurious emissions generated or amplified in a receiver and radiated by the antenna, housing and all power, control, and audio leads connected to the receiver.

b) Method of Measurement

Enable the mobile station receiver for CDMA-only mode, so that the mobile station continuously cycles between the *System Determination Substate* and the *Pilot Channel Acquisition Substate* of the *Mobile Station Initialization State.* Since there is no Forward CDMA Channel, the mobile station should not pass the *Pilot Channel Acquisition Substate.*

Use the measurement procedure defined in Section 2 to measure the radiated spurious emissions of the mobile station receiver.

c) Minimum technical requirement

The radiated spurious power levels from the receiver, when measured using the procedure in Section 2, shall not exceed the levels specified in Table 56.

Table 56 - Maximum Allowable Radiated spurious Emissions

Frequency Range	Maximum Allowable EIRP
25 to 70 MHz	-45 dBm
70 to 130 MHz	-41 dBm
130 to 174 MHz	-41 to -32 dBm*
174 to 260 MHz	-32 dBm
260 to 470 MHz	-32 to -26 dBm*
470 to 1000 MHz (Band 800 MHz)	-21 dBm

* Interpolate linearly on a log frequency scale.

2.1.6. Supervision

2.1.6.1 Paging Channel

a) Definition

When in the *System Access Sale,* the mobile station shall monitor the Paging Channel. The mobile station shall reset a timer for T_{40m} seconds whenever a valid message is received on the Paging Channel, whether addressed to the mobile station or not. If the timer expires, the mobile station shall stop transmitting access attempts. This test verifies the mobile station supervision of the Paging Channel when it is in the *System Access State.*

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.
2. Set the base station to ignore all access attempts.
3. Set the test parameters as specified in Table 57.
4. Set the following parameters of the *Access Parameters Message* to the value specified below:

Parameter	Value (Decimal)
NUM_STEP	15 (16 probes/sequence)
MAX_RSP_SEQ	15 (15 sequences)

5. Send a page to the mobile station.
6. Wait for two seconds and disable the Paging Channel.
7. Monitor the mobile station output power.

Table 57 - Test Parameters for Supervision of Paging Channel

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-55
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Paging } E_c}{I_{or}}$	dB	-16

c) Minimum technical requirement

The mobile station shall transmit access attempts as a response to the page. The mobile station shall stop transmitting access attempts T_{40m} seconds after the Paging Channel is disabled.

2.1.6.2. Forward Traffic Channel

a) Definition

When in the *Mobile Station Control on the Traffic Channel State,* the mobile station shall monitor the Forward Traffic Channel at all times. If the mobile station receives N_{2m} consecutive bad frames on the Forward Traffic Channel, it shall disable its transmitter. Thereafter, if the mobile station receives N_{3m} consecutive good frames, the mobile station should re-enable its transmitter.

The mobile station shall establish a Forward Traffic Channel fade timer. The timer shall be enabled when the mobile station first enables its transmitter when in the *Traffic Channel Initialization_Substate* of the *Mobile Station Control on the Traffic Channel State.* The fade timer shall be reset for T_{5m} seconds whenever N_{3m} consecutive good frames are received on the Forward Traffic Channel. If the timer expires, the mobile station shall disable its transmitter and declare a loss of the Forward Traffic Channel.

Test 1 verifies that the mobile station disables its transmitter after receiving N_{2m} consecutive bad frames.

Test 2 verifies that the mobile station disables its transmitter and declares a loss of the Forward Traffic Channel after not receiving any N_{3m} consecutive good frames for a period of T_{5m} seconds.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set the base station so as to not drop a call.

3. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

4. Set the test parameters for Test 1 as specified in Table 58.

5. Send exactly N_{2m} bad frames on the Forward Traffic Channel starting at a frame boundary.

6. Monitor the mobile station output power (Test 1).

7. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

8. Set the test parameters as specified in Table 58.

9. Send alternating good and bad frames on the Forward Traffic Channel for at least T_{5m} seconds starting at the beginning of the first bad frame.

10. Monitor the mobile station output power (Test 2).

11. If Rate Set 2 is supported, repeat steps 3 through 10 using Rate Set 2 Fundamental Code Channel loopback mode (Service Option 9) with 14400 bps data rate only.

Table 58 - Test Parameters for Supervision of Forward Traffic Channel

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-75
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-16

c) Minimum technical requirement

Test 1: The mobile station shall disable its transmission $N_{2m} \times 0.02 + 0.02$ seconds after the start of the first bad frame. The mobile station should re-enable its transmitter $N_{3m} \times 0.02 + 0.02$ seconds after the start of the first good frame.

Test 2: The mobile station shall disable its transmission $T_{5m} + 0.02$ seconds after the first bad frame has been sent. The mobile station shall not re-enable its transmitter.

2.2. CDMA Transmitter Minimum technical requirements

2.2.1. Frequency Requirements

2.2.1.1. Frequency Accuracy

a) Definition

Frequency accuracy is the ability of a mobile station transmitter to transmit at an assigned carrier frequency.

b) Method of Measurement

Method of measurement specified in 2.2.3.2 may be used to perform this test.

c) Minimum technical requirement

The mobile station output carrier frequency while transmitting in 824 - 849 MHz shall be within ±300 Hz of 45 MHz below the carrier frequency of the Forward CDMA Channel.

2.2.2. Handoff

2.2.2.1 CDMA to CDMA Hard Handoff

a) Definition

The base station directs the mobile station to perform a CDMA to CDMA hard handoff by sending an *Extended Handoff Direction Message* or *General Handoff Direction Message* in which the mobile station is transitioned between disjoint sets of base stations, different frequency assignments, or different frame offsets. Hard handoff is characterized by a temporary disconnection of the Traffic Channel.

This test measures the time to execute a CDMA to CDMA hard handoff between Traffic Channels belonging to different base stations (different pilot PN offset indices) with different CDMA frequency assignments. This test also verifies that the mobile station disables its transmitter before changing frequency.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN generator is not applicable in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, a CDMA frequency assignment f_1 (any valid value), and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, a CDMA frequency assignment f_2 (any valid value other than f_1), and is called Channel 2. Channel 2 shall be available at the action time specified in the *General Handoff Direction Message* sent in step 4.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 59.

4. Send a *General Handoff Direction Message* to the mobile station to set an explicit action time and the following parameters:

Parameter	Value (Decimal)
USE_TIME	1 (use action time)
PILOT_PN	P_2
FREQ_INCL	1 (frequency included)
CDMA_FREQ	f_2

5. Measure T_1, the time elapsed from the action time to the instant the mobile station transmit power, as measured at the mobile station antenna connector, on the old CDMA frequency assignment drops below -61 dBm/MHz.

Measure T_2, the time elapsed from the action time to the instant the mobile station transmitter is enabled on the new CDMA frequency assignment.

Table 59: Test Parameters for CDMA to CDMA Hard Handoff

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/1.23 MHz	-75	-75
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4	-7.4

c) Minimum technical requirement

The mobile station transmit power shall remain under open loop and dosed loop power control until the action time. T1 shall be less than 2 ms.

T_2 shall be less than T_{61m} + (N_{11m}+ 2) × 20 ms = 140 ms.

2.2.2.2 Transmit Power after Hard Handoff

a) Definition

Mobile Station output power is given by the following equation:

$$P_{out} = \text{offset power} - P_{in} + \text{NOM\_PWR} - 16 \times \text{NOM\_PWR\_EXT} + \text{INIT\_PWR} + \text{step number} \times \text{PWR\_STEP} + \sum pcb + \text{interference correction}$$

Where:

P_{out} is the mobile transmit power in dBm,

P_{in} is the mobile receiver power in dBm,

Offset power is -73

Step number is the number of power steps needed in the access probe, and

$\sum$pcb is the summation of all Power Control Bits since starting transmission on the traffic channel.

Interference correction is the noise floor correction (see 6.1.2.3.1 of TIA/EIA-95-B).

When changing channels from a serving frequency (f_1) to a target frequency (f_2), the nominal transmit power should be the following:

$$P_{out}(\text{target}) = \text{Offset power(target)} - P_{in}(\text{target}) + \text{NOM\_PWR(target)} - 16 \times \text{NOM\_PWR\_EXT(target)} + \text{INIT\_PWR(serving)} + \text{step number} \times \text{PWR\_STEP(serving)} + \sum pcb(\text{serving}) + \text{interference correction (serving)}.$$

b) Method of Measurement

Test 1:

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN generator is not applicable in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1, a CDMA frequency assignment f(any valid value), and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, a CDMA frequency assignment f_2 (any valid value other than f_1), and is called Channel 2. Channel 2 shall be available at the action time specified in the *Extended Handoff Direction Message* sent in step 4.

2. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 60.

4. Send an *Extended Handoff Direction Message* to the mobile station to set an explicit action time and the following parameters:

Parameter	Value (Decimal)
USE_TIME	1 (use action time)
PILOT_PN	P_2
FREQ_INCL	1 (frequency included)
CDMA_FREQ	f_2

5. Measure the powers, P, when the phone enables its transmitter on the new channel.

Table 60 - Test Parameters for CDMA to CDMA Hard Handoff

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/1.23 MHz	-95	-65
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4	-7.4
INIT_PWR	dB	0	0
NOM_PWR	dB	0	0
NOM_PWR_EXT	dB	0	0
PWR_STEP	dB	0	0

Test 2:

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The AWGN generator is not applicable in this test. The Forward Channel from base station 1 has an arbitrary pilot PN offset index P_1. a CDMA frequency assignment f_1 (any valid value), and is called Channel 1. The Forward Channel from base station 2 has an arbitrary pilot PN offset index P_2, a CDMA frequency assignment f_2 (any valid value other than f_1), and is called Channel 2. Channel 2 shall be available at the action time specified in the *Extended Handoff Direction Message* sent in step 4.

2. Set up a call using Rate Set 1 loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 61.

4. Send an *Extended Handoff Direction Message* to the mobile station to set an explicit action time and the following parameters:

Parameter	Value (Decimal)
USE_TIME	1 (use action time)
PILOT_PN	P_2
FREQ_INCL	1 (frequency included)
CDMA_FREQ	f_2

5. Measure the power, P, when the phone enables its transmitter on the new channel.

Table 61 - Test Parameters for CDMA to CDMA Hard Handoff

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}$	dBm/ 1.23 MHz	-75	-75
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4	-7.4
INIT_PWR	dB	0	0
NOM_PWR	dB	+7	-8
NOM_PWR_EXT	dB	0	0
PWR_STEP	dB	0	0

c) Minimum technical requirement

Test 1:

The mobile transmit power, P, shall be -8 dBm ± 10 dB.

Test 2:

The mobile transmit power, P, shall be -6 dBm ± 10 dB.

2.2.2.3 Candidate Frequency Single Search

a) Definition

This test measures the correct detection of a pilot in. the Candidate Frequency Neighbor Set. Correct detection is defined as the reporting of a pilot with E_c/I_0 above the value defined by CF_T_ADD. The value of CF_T_ADD is set to 28 (-14 dB). An incorrect detection of a pilot in the Candidate Frequency Neighbor Set is defined as the reporting of a pilot with E_c/I_0 below the value defined by CF_T_ADD.

The base station directs the mobile station to perform a single search of the Candidate Frequency Search Set by sending a *Candidate Frequency Search Request Message.* The mobile station reports the search results to the base station in the *Candidate Frequency Search Report Message.* The accuracy of the reported pilot PN phases is also examined.

b) Method of Measurement

1. Connect two base stations to the mobile station antenna connector as shown in Figure 19. The Forward Channel for base station 1 has a CDMA frequency assignment FI (any valid value), an arbitrary pilot PN offset index P_1, and is called Channel 1. The Forward Channel for base station 2 has a CDMA frequency assignment f_2 (any valid value other than f_1), an arbitrary pilot PN offset index P_2, and is called Channel 2.

2. Set up a call using Rate set 1 loopback mode (Service Option 2) with 9600 bps data rate only between base station 1 and the mobile station.

3. Set the test parameters for Test 1 as specified in Table 62.

4. Send a *Candidate Frequency Search Request Message* to the mobile station to set an explicit action time with the following parameters:

Parameters	Value (Decimal)
USE_TIME	1 (use action time)
SEARCH_TYPE	1 (single search)
SEARCH_MODE	0 (CDMA)
CDMA_FREQ	f_2
SF_TOTAL_EC_THRESH	31 (disabled)
SF_TOTAL_EC_IO_THRESH	31 (disabled)
CF_SRCH_WIN_N	8(60 chips)
CF_T_ADD	28 (-14 dB)
NUM_PILOTS	1 (1 pilot)
CF_NGHBR_SRCH_MODE	0 (no search priorities or search windows specified)
NGHBR_PN	P_2

5. Record the transmission time and contents of each *Candidate Frequency Search Report Message* sent by the mobile station.

6. Set the test parameters for Test 2 as specified in Table 63. Repeat steps 4 and 5 for 20 trials.

Table 62 - Test Parameters for Candidate Frequency Neighbor Set Pilot Detection (Test 1)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	0	-2.6
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/ 1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_0}$	dB	-10	-11.5

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter.

Table 63 - Test Parameters for Candidate Frequency Neighbor Set Pilot Incorrect Detection (Test 2)

Parameter	Unit	Channel 1	Channel 2
$\hat{I}_{or}/I_{oc}$	dB	0	-9.5
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7	N/A
I_{oc}	dBm/1.23 MHz	-55	
$\frac{\text{Pilot } E_c}{I_0}$	dB	-10	-17

Note: The Pilot E_c/I_0 value is calculated from the parameters in the table. It is not a directly settable parameter.

c) Minimum technical requirement

Test 1:

1. No pilot other than P_2 shall be reported in any *Candidate Frequency Search Report Message.*

2. Valid detection of P_2 shall be greater than 90% with 95% confidence

3. The reported pilot PN phase for P_2 in the *Candidate Frequency Search Report Message* shall be no greater than ± 1 chip from the actual offset.

Test 2:

There shall be no more than one *Candidate Frequency Search Report Message* containing P_2 during the test.

2.2.3. Modulation Requirements

2.2.3.1 Time Reference

a) Definition

The mobile station time reference is derived from the earliest arriving multipath component being used for demodulation, When receiving the Forward Traffic Channel, the mobile station time reference shall be used as the transmit time of the Reverse Traffic Channel. Test 1 checks the accuracy of the mobile station time reference in static conditions. Test 2 checks the mobile station time reference slew rate.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 64.

4. Determine the mobile station transmit time error at the mobile station antenna connector using the ρ-meter described in 2.4.4.2.

5. Connect the base station to the mobile station antenna connector as shown in Figure 17. The AWGN generator is not applicable in this test. The channel simulator periodically generates two alternating paths which are 10 chips apart. Each of the two paths lasts for 20 seconds and the alternating period is 40 seconds.

6. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

7. Set the test parameters as specified in Table 64.

8. Determine the mobile station transmit time at the mobile station antenna connector for a period of at least two minutes, and calculate the time reference slew rate.

Table 64 - Test Parameters for Time Reference

Parameter	Units	Value
$\hat{I}_{or}$	dBm/ 1.23 MHz	-75
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-14

c) Minimum technical requirement

The mobile station time reference in steady state conditions shall be within ±1 μs of the time of occurrence, as measured at the mobile station antenna connector, of the earliest arriving multipath component being used for demodulation.

If a mobile station time reference correction is needed, it shall be corrected no faster than 1/4 chip (203.451 ns) in any 200 ms period and no slower than 3/8 PN chip (305.18 ns) per second.

2.2.3.2. Waveform Quality and Frequency Accuracy

a) Definition

The waveform quality factor, ρ (see 2.4.4.2), is measured in this test. The measurement also returns values for $\Delta\hat{f}$ and $\hat{\tau}$. The value of $\Delta\hat{f}$ found in maximizing the expression for ρ is used to provide an estimate of carrier frequency error. The value of $\hat{\tau}$ found in maximizing the expression for ρ is used to provide an estimate of transmit time error.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 65.

4. Measure the waveform quality factor, ρ, frequency error, $\Delta\hat{f}$, and transmit time error, $\hat{\tau}$, at the mobile station antenna connector using the ρ-meter described in 2.4.4.2.

Table 65 - Test Parameters for Waveform Quality

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-75
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

c) Minimum technical requirement

The waveform quality factor ρ, shall be greater than 0.944 (excess power is less than 0.25 dB). The frequency error, $\Delta\hat{f}$, shall be within ±300 Hz while transmitting in Band 800 MHz. The transmit time error, $\hat{\tau}$, shall be within ±1 μs.

2.2.4. RF Output Power Requirements

2.1.4.1 Range of Open Loop Output Power

a) Definition

The mobile station estimates its open loop mean output power from its mean input power. The estimate is defined as:

mean output power (dBm) = - mean input power (dBm)
+ offset power
+ interference correction
+ NOM_PWR - 16 × NOM_PWR_EXT
+ INIT_PWR

where the offset power is summarized below:

Band Class	Offset Power
800 MHz	-73

This test measures the range of the estimated open loop output power.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set the parameter values in the *Access Parameters Message* to the values specified below.

Parameter	Value (Decimal)
PAM_SZ	15 (15 frames)
MAX_RSP_SEQ	1 (1 sequence)

3. Set the test parameter for Test 1 as specified in Table 66.
4. Set the base station to ignore all access attempts.
5. Send a page to the mobile station.
6. Measure the output power of the mobile station at the antenna connector during a probe.
7. Set the test parameter for Test 2 as specified in Table 66 and repeat steps 5 and 6.
8. Set the test parameter for Test 3 as specified in Table 66 and repeat steps 5 and 6.

Table 66 - Test Parameter of $\hat{I}_{or}$ for Range of Open Loop Output Power

Mobile Station Class	Unit	Test 1	Test 2	Test 3
Class I	dBm/ 1.23 MHz	-25	-65	-103
Class II	dBm/l.23 MHz	-25	-65	-98.3
Class III	dBm/l.23 MHz	-25	-65	-93.5

c) Minimum technical requirement

The mobile station output power shall satisfy the range specified in Table 67.

Table 67 - Minimum technical requirements for Range of Open Loop Output Power

Mobile Station Class	Unit	Test 1	Test 2	Test 3
Class I	dBm/1.23 MHz	-48 ± 9.5	-8 ± 9.5	27 ± 9.5
Class II	dBm/1.23 MHz	-48 ± 9.5	-8 ± 9.5	24 ± 9.5
Class III	dBm/1.23 MHz	-48 ± 9.5	-8 ± 9.5	20 ± 9.5

2.2.4.2 Time Response of Open Loop Power Control

a) Definition

Following a step change in the mean input power, the mean output power of the mobile station changes as a result of the open loop power control. This test measures the open loop power control time response to a step change in the mean input power.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 68.

4. Send alternating '0' and '1' power control bits on the Forward Traffic Channel.

5. Change the input power by a step of +20 dB and measure the transmitted output power as a function of time after the step change for 100 ms.

6. Change the input power by a step of -20 dB and measure the transmitted output power as a function of time after the step change for 100 ms.

7. Change the input power by a step of -20 dB and measure the transmitted output power as a function of time after the step change for 100 ms.

8. Change the input power by a step of +20 dB and measure the transmitted output power as a function of time after the step change for 100 ms.

Table 68 - Test Parameters for Time Response of Open Loop Power Control

Parameter	Units	Value
$\hat{I}_{or}$	dBm/ 1.23 MHz	-60
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

c) Minimum technical requirement

Following a step change in mean input power, ΔP_{in}, the mean output power of the mobile station shall transition to its final value in a direction opposite in sign to ΔP_{in}, with magnitude contained between mask limits[(1)] defined by:

a. upper limit:

for $0 < t < 24$ ms: $\max[1.2 \times |\Delta P_{in}| \times (t/24), |\Delta P_{in}| \times (t/24) + 2.0 \text{ dB}] + 1.5$ dB,

for $t \geq 24$ ms: $\max[1.2 \times |\Delta P_{in}|, |\Delta P_{in}| + 0.5 \text{ dB}] + 1.5$ dB;

b. lower limit:

for $t > 0$: $\max[0.8 \times |\Delta P_{in}| \times [1- e^{(1.25-t)/36}] -2.0 \text{ dB}, 0] - 1$ dB;

where t is expressed in units of milliseconds, ΔP_{in} is expressed in units of dB, and max [x, y] is the maximum of x and y. Figure 14 shows the limits for ΔP_{in} = 20 dB. The absolute value of the change in mean output power due to open loop power control shall be a monotonically increasing function of time. If the change in mean output power consists of discrete increments, no single increment due to open loop power control shall exceed 1.2 dB.

(1) The mask limits can be approximated by a piece-wise linear approximation. The mask limits allow for the effect of alternating closed loop power control bits.

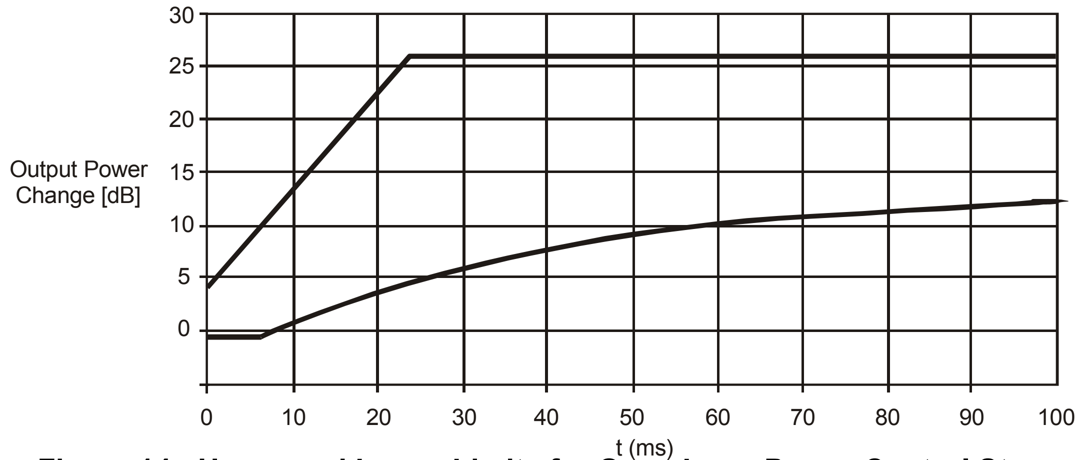

Figure 14 - Upper and Lower Limits for Open Loop Power Control Step Response for ΔP_{in} = 20 dB

2.2.4.3 Access Probe Output Power

a) Definition

This test verifies the following access parameters: nominal power offset, initial power offset, power increment between consecutive probes, number of access probes in one probe sequence, and the number of probe sequences in one access attempt.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set $\hat{I}_{or}$ to -75 dBm /1.23 MHz.

3. Set the parameter MAX_RSP_SEQ in the *Access Parameters Message* to one.

4. Set the base station to ignore all access attempts.

5. Send a page to the mobile station.

6. Measure the mobile station output power for each probe at the antenna connector.

7. Change the parameter values in the *Access Parameters Message* to the values specified below. Repeat steps 5 and 6.

Parameter	Value (Decimal)
NOM_PWR	3 (3 dB)
INIT_PWR	3 (3 dB)
PWR_STEP	1 (1 dB/step)
NUM_STEP	4 (5 probes/sequence)
MAX_RSP_SEQ	3 (3 sequences)

c) Minimum technical requirement

In the first access attempt:

a. The power of all access probes shall be within a range of ±1 dB of the expected value.

b. The number of access probes in an access probe sequence shall be five.

c. There shall be one access probe sequence in the access attempt.

In the second access attempt:

a. The power of the first access probe of each access probe sequence shall be 6 ± 1.2 dB above the power of the access probes in the first access scenario.

b. The power increment between consecutive access probes in each access probe sequence shall be 1 ± 0.5 dB.

c. The number of access probes in each access probe sequence shall be five.

d. The number of access probe sequences in the access attempt shall be three.

e. The access probes shall be randomized.

2.2.4.4 Range of Closed Loop Power Control

a) Definition

The mobile station provides a closed loop adjustment to its open loop estimate. Adjustments are made in response to valid received power control bits. The range of the adjustment is defined by the difference between the maximum mobile station output power and the open loop estimate, and the difference between the minimum mobile station output power and the open loop estimate.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.
2. Set the power control step size to 1 dB.
3. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.
4. Set the attenuation in the Forward CDMA Channel to yield an open loop output power, measured at the mobile station antenna connector, of -15 dBm.
5. Transmit alternating ‘0’ and ‘1’ power control bits (the last bit is a ‘1’ bit), followed by 100 consecutive ‘0’ power control bits, followed by 100 consecutive ‘1’ power control bits, and followed by 100 consecutive ‘0’ power control bits.
6. Measure the mobile station output power (Test 1).
7. Set the attenuation in the Forward CDMA Channel to yield an open loop output power, measured at the mobile station antenna connector, of 19 dBm and repeat steps 5 and 6 (Test 2).
8. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 4800 bps data rate only.
9. Set the attenuation in the Forward CDMA Channel to yield an open loop output power, measured at the mobile station antenna connector, of -15 dBm when the mobile station transmitter is gated on.

10. Transmit alternating ‘0’ and ‘1’ valid power control bits (the last bit is a ‘1’ bit), followed by 100 consecutive ‘0’ valid power control bits, followed by 100 consecutive ‘1’ valid power control bits, and followed by 100 consecutive ‘0’ valid power control bits. Set all invalid power control bits to ‘0’.
11. Measure the mobile station output power (Test 3).
12. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 2400 bps data rate only and repeat steps 9 through 11 (Test 4).
13. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 1200 bps data rate only and repeat steps 9 through 11 (Test 5).
14. If the mobile station supports 0.5 dB power control step size, proceed through steps 15 to 19; otherwise stop the test.
15. Set the power control step size to 0.5 dB.
16. Repeat steps 3 through 6 (Test 6).
17. Repeat steps 8 through 11 (Test 7).
18. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 2400 bps data rate only and repeat steps 9 through 11 (Test 8).
19. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 1200 bps data rate only and repeat steps 9 through 11 (Test 9).
20. If the mobile station supports 0.25 dB power control step size, proceed through steps 21 to 25; otherwise stop the test.
21. Set the power control step size to 0.25 dB.
22. Repeat steps 3 through 6 (Test 10).
23. Repeat steps 8 through 11 (Test 11).
24. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 2400 bps data rate only and repeat steps 9 through 11 (Test 12).
25. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 1200 bps data rate only and repeat steps 9 through 11 (Test 13).

c) Minimum technical requirement

The requirement on the average rate of change in mean output power specified below applies to mobile station output power up to 3 dB below the lower limit of the maximum output power specified in Table 70.

Test 1:

a. The closed loop power control range shall be at least ±24 dB around the open loop estimate.

b. The interval from the end of the first valid ‘1’ power control bit after the 100 consecutive ‘0’ valid power control bits to the time the mobile station output power starts to decrease shall be no longer than 2.5 ms.

c. The average rate of change in mean output power for 9600 bps data rate shall be greater than 12.8 dB per 20 ms and less than 19.2 dB per 20 ms.

d. Following the reception of a valid power control bit, the mean output power of the mobile station shall be within 0.3 dB of its final value in less than 500 μs.

Test 2:

The interval from the end of the first valid ‘1’ power control bit after the 100 consecutive ‘0’ valid power control bits until the time the mobile station output power starts to decrease shall be no longer than 2.5 ms.

Test 3:

a. The closed loop power control range shall be at least ±24 dB around the open loop estimate.

b. The interval from the end of the first valid ‘1’ power control bit after the 100 consecutive ‘0’ valid power control bits until the time the mobile station output power starts to decrease shall be no longer than 5 ms.

c. The average rate of change in mean output power for 4800 bps data rate shall be greater than 6.4 dB per 20 ms and less than 9.6 dB per 20 ms.

Test 4:

a. The closed loop power control range shall be at least ±24 dB around the open loop estimate.

b. The interval from the end of the first valid ‘1’ power control bit after the 100 consecutive ‘0’ valid power control bits until the time the mobile station output power starts to decrease shall be no longer than 10 ms.

c. The average rate of change in mean output power for 2400 bps data rate shall be greater than 3.2 dB per 20 ms and less than 4.8 dB per 20 ms.

Test 5:

a. The closed loop power control range shall be at least ±24 dB around the open loop estimate.

b. The interval from the end of the first valid ‘1’ power control bit after the 100 consecutive ‘0’ valid power control bits until the time the mobile station output power starts to decrease shall be no longer than 20 ms.

c. The average rate of change in mean output power for 1200 bps data rate shall be greater than 1.6 dB per 20 ms and less than 2.4 dB per 20 ms.

Test 6:

a. The average rate of change in mean output power for 9600 bps data rate shall be greater than 12 dB per 40 ms and less than 20 dB per 40 ms.

b. Following the reception of a valid power control bit, the mean output power of the mobile station shall be within 0.15 dB of its final value in less than 500 μs.

Test 7:

The average rate of change in mean output power for 4800 bps data rate shall be greater than 6.0 dB per 40 ms and less than 10 dB per 40 ms.

Test 8:

The average rate of change in mean output power for 2400 bps data rate shall be greater than 3.0 dB per 40 ms and less than 5.0 dB per 40 ms.

Test 9:

The average rate of change in mean output power for 1200 bps data rate shall be greater than 1.5 dB per 40 ms and less than 2.5 dB per 40 ms.

Test 10:

a. The average rate of change in mean output power for 9600 bps data rate Shall be greater than 11.2 dB per 80 ms and less than 20.8 dB per 80 ms.

b. Following the reception of a valid power control bit, the mean output power of the mobile station shall be within 0.1 dB of its final value in less than 500 μs.

Test 11:

The average rate of change in mean output power for 4800 bps data rate shall be greater than 5.6 dB per 80 ms and less than 10.4 dB per 80 ms.

Test 12:

The average rate of change in mean output power for 2400 bps data rate shall be greater than 2.8 dB per 80 ms and less than 5.2 dB per 80 ms.

Test 13:

The average rate of change in mean output power for 1200 bps data rate shall be greater than 1.4 dB per 80 ms and less than 2.6 dB per 80 ms.

2.2.4.5 Maximum RF Output Power

a) Definition

The maximum RF output power is defined as the maximum power, measured at the mobile station antenna connector, that the mobile station transmits.

b) Method of Measurement

1. Set the following parameters of the *Access Parameters Message* as specified below:

Parameter	Value (Decimal)
NOM_PWR	7 (7 dB)
INIT_PWR	15 (15 dB)
PWR_STEP	7 (7 dB/step)

NUM_STEP	15 (16 probes/sequence)
MAX_RSP_SEQ	15 (15 sequences)

2. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

3. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

4. Set the test parameters as specified in Table 69.

5. Send continuously ‘0’ power control bits to the mobile station.

6. Measure the mobile station output power at the mobile station antenna connector.

Table 69 - Test Parameters for Maximum RF Output Power

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

c) Minimum technical requirement

The maximum output power of each mobile station class shall be such that the maximum radiated power for the mobile station class using the antenna gain recommended by the mobile station manufacturer is within the limits specified in Table 70.

Table 70 - Effective Radiated Power at Maximum Output Power

Mobile Station Class	Radiating Measurement	Lower Limit	Upper Limit
Class I	ERP	1 dBW (1.25 Watts)	8 dBW (6.3 Watts)
Class II	ERP	-3 dBW (0.5 Watts)	4 dBW (2.5 Watts)
Class III	ERP	-7 dBW (0.2 Watts)	0 dBW (1.0 Watts)

2.2.4.6 Minimum Controlled Output Power

a) Definition

The minimum controlled output power of the mobile station is the output power, measured at the mobile station antenna connector, when both closed loop and open loop power control indicate minimum output.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

3. Set the test parameters as specified in Table 71.

4. Send continuously ‘1’ power control bits to the mobile station.

Table 71 - Test Parameters for Minimum Controlled Output Power

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-25
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

c) Minimum technical requirement

With both closed loop and open loop power control set to minimum, the mean output power of the mobile station shall be less than -50 dBm/ 1.23 MHz centered at the CDMA Channel frequency.

2.2.4.7. Standby Output Power and Gated Output Power

a) Definition

The standby output power is the mobile station output power when its transmit functions are disabled (e.g., during the *Mobile Station Initialization State, Mobile Station Idle State* and during the *System Access State* when the mobile station does not transmit access probes).

When operating in the variable data rate transmission mode, the mobile station transmits at nominal controlled power level only during gated-on periods, each defined as a power control group. The transmitted power level is suppressed during gated-off periods. This test measures the time response of the mean output power for an isolated gated-on power control group (1.25 ms).

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.

2. Set the test parameters as specified in Table 72.

3. Measure the output power, at the mobile station antenna connector, during the *Mobile Station Initialization State* or during the *Mobile Station Idle State.*

4. Send a page to the mobile station and measure the output power, at the mobile station antenna connector, during the time periods between transmission of access probes.

5. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 1200 bps data rate only.

6. Send alternating ‘0’ and ‘1’ valid power control bits on the Forward Traffic Channel.

7. Measure the time response of the mobile station output power, averaged over at least 100 isolated gated-on power control groups. The power is measured at the mobile station antenna connector.

Table 72 - Test Parameters for Standby Output Power and Gated Output Power

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-75
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

c) Minimum technical requirement

Standby Output Power:

When operating in Band 800 MHz and the transmitter is disabled, the output noise power spectral density of the mobile station shall be less than -61 dBm, measured in a 1 MHz resolution bandwidth at the mobile station antenna connector, for frequencies within the mobile station transmit band between 824 and 849 MHz.

Gated Output Power:

Given an ensemble of power control groups, all with the same mean output power, the time response of the ensemble average shall be within the limits shown in Figure 15. The mean output power of the ensemble average is the mean value of gated-on output power measured within a 1.25 ms time window. The measured width of response between points 3 dB below the mean output power shall be at least 1.247 ms and within the range shown in Figure 15. The output power level outside of a 1.261 ms time window shall be at least 20 dB below the mean output power of the ensemble average as shown in Figure 15.

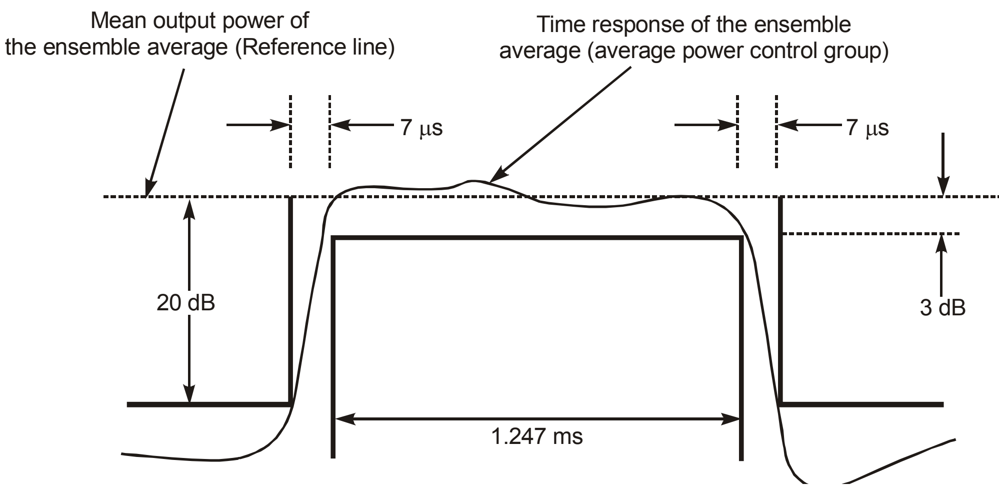

Figure 15 - Transmission Evelope Mask
(Average Gated-on lower Control Group)

2.2.4.8. Power Up Function Output Power

The tests in this section shall be performed if the mobile station supports the power up function.

a) Definition

This test verifies the following power up function parameters: probe duration, initial power offset, power increment between consecutive probes, time interval between consecutive probes, the total number of PUF probes in one PUF attempt, and the maximum number of full power PUF probes.

b) Method of Measurement

1. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test.
2. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2).
3. Send alternating ‘0’ and ‘1’ power control bits on the Forward Traffic Channel.
4. Set the base station to ignore all PUF attempts.
5. Send a *Power Up Function Message* to the mobile station with the values specified below:

Parameter	Value (Decimal)
PUF_SETUP_SIZE	0 (1 power control group)
PUF_PULSE_SIZE	15 (16 power control groups)
PUF_INTERVAL	2 (2 frames between start of subsequent PUF probes)
PUF_INIT_PWR	8 (8 dB)

PUF_PWR_STEP	1 (1 dB/step)
TOTAL_PUF_PROBES	3 (4 probes)
MAX_PWR_PUF	0 (1 pulse at max power)
PUF_FREQ_INCL	0 (same as current)

6. Measure the mobile station output power for each PUF probe at the antenna connector.
7. Send a *Power Up Function Message* with the values specified below. Repeat step 6.

Parameter	Value (Decimal)
PUF_SETUP_SIZE	0 (1 power control group)
PUF_PULSE_SIZE	15 (16 power control groups)
PUF_INTERVAL	2 (2 frames between start of subsequent PUF probes)
PUF_INIT_PWR	16 (16 dB)
PUF_PWR_STEP	4 (4 dB/step)
TOTAL_PUF_PROBES	7 (8 probes)
MAX_PWR_PUF	2 (3 pulses at max power)
PUF_FREQ_INCL	0 (same as current)

c) Minimum technical requirement

In the first PUF probe attempt:

a. The power increment between consecutive access probes in each PUF probe attempt shall be 1 ± 0.33 dB.

b. The duration of each PUF probe shall be between 20 ms and 22.5 ms, including the setup time.

c. There shall be two frames between the start of subsequent PUF probes.

d. The number of PUF probes in the PUF probe attempt shall be four.

In the second PUF probe attempt:

a. The power of the first PUF probe of each PUF probe attempt shall be 8 ± 2.67 dB above the power of the PUF probes in the first PUF probe attempt.

b. The power increment between consecutive PUF probes in each PUF probe attempt shall be 4 ± 1.33 dB.

c. The duration of each PUF probe shall be between 20 ms and 22.5 ms, including the setup time.

d. There shall be two frames between the start of subsequent PUF probes.

e. The number of PUF probes in each PUF probe attempt shall be less than eight.

f. The mobile station shall not transmit more than three PUF probes at full power.

2.2.5. Limitations on Emissions

2.2.5.1 Conducted Spurious Emissions

a) Definition

Conducted spurious emissions are emissions at frequencies that are outside the assigned CDMA Channel, measured at the mobile station antenna connector. This test measures the spurious emissions during continuous transmission and gated transmission.

b) Method of Measurement

1. Set the following parameters of the *Access Parameters Message* as specified below:

Parameter	Value (Decimal)
NOM_PWR	7 (7 dB)
INIT_PWR	15 (15 dB)
PWR_STEP	7 (7 dB/step)
NUM_STEP	15 (16 probes/sequence)
MAX_RSP_SEQ	15 (15 sequences)

2. Connect the base station to the mobile station antenna connector as shown in Figure 20. The AWGN generator and the CW generator are not applicable in this test. Connect a spectrum analyzer (or other suitable test equipment) to the mobile station antenna connector.

3. Set up a call using Rate Set 1 Fundamental Code Channel loopback mode (Service Option 2) with 9600 bps data rate only.

4. Set the test parameters as specified in Table 73.

5. Send continuously ‘0’ power control bits to the mobile station.

6. Measure the spurious emission level in the mobile station transmit band between 819 MHz and 854 MHz for Band 800 MHz.

Table 73 - Test Parameters for Testing Spurious Emissions at Maximum RF Output Power

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

c) Minimum technical requirement

When transmitting in the Band 800 MHz, the spurious emissions between 819 and 854 MHz shall be less than the limits specified in Table 74.

Table 74 - Band 800 MHz Transmitter Spurious Emission Limits

For |Δf| Greater than	Emission Limit
885 kHz	Less stringent of -42 dBc/30 kHz or -54 dBm/ 1.23 MHz
1.98 MHz	Less stringent of -54 dBc/30 kHz or -54 dBm/ 1.23 MHz
3.125 MHz	-13 dBm/ 100 kHz

Note: All frequencies in the measurement bandwidth shall satisfy the restrictions on |Δf| where Δf = center frequency - closer measurement edge frequency. The -13 dBm/100 kHz emission limit is based on ITU Category A emission limits.

2.2.5.2 Radiate Spurious Emissions

Decision 478/2001/QD-TCBD (Technical Requirement for type approval of radio transceiver terminal) shall be applied.

2.3. CDMA Evironmental Requirements

2.3.1. Temperature and Power Supply Voltage

a) Definition

The temperature and voltage ranges denote the ranges of ambient temperature and power supply input voltages over which the mobile station will operate and meet the requirements of these standards. The ambient temperature is the average temperature of the air surrounding the mobile station. The power supply voltage is the voltage applied at the input terminals of the mobile station. The manufacturer shall specify the temperature range and the power supply voltage over which the equipment is to operate. In order to provide a convenient means for the manufacturer to express the temperature range under which the mobile station conforms to these recommended Minimum technical requirements, temperature ranges designated by letters are defined in Table 75.

Table 75 - Temperature Range

Designator	Range
A	-40^0C to $+70^0C$
B	-30^0C to $+60^0C$

b) Method of Measurement

The mobile station shall be installed in its normal configuration (i.e., in its normal mounting arrangement fully assembled) and placed in a temperature chamber. The temperature chamber shall be stabilized at the manufacturer's highest specified operating temperature, and the mobile station shall be operated over the power supply input voltage range specified by the manufacturer or ±10%, whichever is greater. With the mobile station operating, the temperature shall be maintained at the specified test temperature without forced circulation of air from the temperature chamber being directly applied to the mobile station. The measurements specified in 2.3.1.3 shall then be performed. Turn the mobile station off stabilize the mobile station in the chamber at room temperature, and repeat the measurements specified in 2.3.1.3.

Turn the mobile station off, stabilize the mobile station in the chamber at the coldest operating temperature specified by the manufacturer, and repeat the measurements specified in 2.3.1.3.

The overall temperature range may be reduced to a lesser range than –30^{o}C to +60^{o}C if the manufacturer uses circuitry that automatically inhibits RP transmission when the temperature falls outside the lesser range specified. Measurements shall be made at the specified extremes of the manufacturer's temperature range. The manufacturer shall verify that RF transmission is inhibited outside of the specified temperature range.

c) Minimum technical requirement

The mobile station equipment shall meet all of the Minimum technical requirements specified in Sections 2.1 and 2.2 under the standard environmental test conditions specified in 2.4.2. Over the ambient temperature and power supply ranges specified by the manufacturer, the operation of the mobile station equipment shall meet the following Minimum technical requirements:

1. Receiver sensitivity and dynamic range as specified in 2.1.4.1. For a Band 800 MHz Class III mobile station, the received CDMA power, $\hat{I}_{or}$, used to measure receiver sensitivity may be increased 2 dB at 60°C and higher.

2. Frequency accuracy as specified in 2.2.1.1.

3. Waveform quality as specified in 2.2.3.2.

4. Range of estimated open loop output power (see 2.2.4.1). The mobile station output power shall satisfy the range specified in Table 76.

Table 76 - Minimum technical requirements for RP Power Output Requirements

Band Class	Mobile Station Class	Unit	Test 1	Test 2	Test 3
800 MHz	Class I	dBm/1.23 MHz	-48 + 9.5/-12.5	-8 + 9.5/-12.5	27 + 9.5/-12.5
	Class II	dBm/1.23 MHz	-48 + 9.5/-12.5	-8 + 9.5/-12.5	24 + 9.5/-12.5
	Class III	dBm/1.23 MHz	-48 + 9.5/-12.5	-8 + 9.5/-12.5	20 + 9.5/-12.5

5. Range of closed loop correction as specified in 2.2.4.4.

6. Maximum RF output power as specified in 2.2.4.5. The EIRP for a Band 800 MHz mobile station is permitted to drop by 2 dB at 60^0C and higher.

7. Minimum controlled output power as specified in 2.2.4.6.

8. Conducted spurious emissions as specified in 2.2.5.1.

2.3.2. High Humidity

a) Definition

The term "high humidity" denotes the relative humidity at which the mobile station will operate with the specified performance.

b) Method of Measurement

The mobile station, after having operated normally under standard test conditions, shall be placed, inoperative, in a humidity chamber with the humidity maintained at 0.024/gm H_2O/gm Dry Air at 50^0C (40% Relative Humidity) for a period of not less than eight hours. The measurements specified in 2.1.4.1 (receiver sensitivity and dynamic range) and 2.2.3.2 (waveform quality) shall then be performed. No readjustment of the mobile station shall be allowed during this test.

Turn the mobile station off, stabilize the mobile station in the chamber at standard conditions within six hours, and perform the measurements specified in Sections 9 and 10.

c) Minimum technical requirement

The mobile station equipment shall meet the Minimum technical requirements specified in 2.1.4.1 and 2.2.3.2 under the high humidity conditions. Once stabilized in standard conditions, the mobile station shall meet all the Minimum technical requirements specified in Sections 2.1 and 2.2.

2.3.3. Vibration Stability

a) Definition

Vibration stability is the ability of the mobile station to maintain specified mechanical and electrical performance after being vibrated.

b) Method of Measurement

Sinusoidal vibration at 1.5 g acceleration swept through the range of 5 to 500 Hz at the rate of 0.1 octave/second shall be applied to the mobile station in three mutually perpendicular directions (sequentially) for a single sweep rising in frequency followed by a single sweep falling in frequency.

c) Minimum technical requirement

The mobile station equipment shall meet all the Minimum technical requirements specified in Sections 2.1 and 2.2 after being subjected to the above vibration tests.

2.3.4. Shock Stability

a) Definition

Shock stability is the ability of the mobile station to maintain specified mechanical and electrical performance after being shocked.

b) Method of Measurement

The mobile station shall be subjected to three test table impacts, in three mutually perpendicular directions and their negatives, for a total of 18 impacts. In all cases, the mobile station shall be secured to the test table by its normal mounting hardware. Each impact shall be a half sine wave, lasting from 7 to 11 ms with at least 20 g peak acceleration.

c) Minimum technical requirement

The mobile station equipment shall meet all the Minimum technical requirements specified in Sections 2.1 and 2.2 and shall not suffer any mechanical damage after being subjected to the above shock tests.

2.4. CDMA Standard Test Conditions

2.4.1. Standard Equipment

2.4.1.1 Basic Equipment

The equipment shall be assembled, and any necessary adjustments shall be made in accordance with the manufacturer's instructions for the mode of operation required. When alternative modes are available, the equipment shall be assembled and adjusted in accordance with the relevant instructions. A complete series of measurements shall be made for each mode of operation.

2.4.1.2 Associated Equipment

The mobile station equipment may include associated equipment during tests, provided that the associated equipment is normally used in the operation of the equipment under test. For mobile station equipment, this may include power supplies, handsets, cradles, charging stands, control cables, and battery cables.

2.4.2. Standard Environmental Test Conditions

Measurements under standard atmospheric conditions shall be carried out under any combination of the following conditions:

- Temperature: +15^{0}C to +35^{0}C
- Relative humidity: 45% to 75%
- Air pressure: 86,000 Pa to 106,000 Pa (860 mbar to 1060 mbar)

If desired, the results of the measurements can be corrected by calculation to the standard reference temperature of 25^{0}C and the standard reference air pressure of 101,300 Pa (1013 mbar).

2.4.3. Standard Conditions for the Primary Power Supply

2.4.3.1. General

The standard test voltages shall be those specified by the manufacturer, or an equivalent type that duplicates the voltage, impedance, and ampere hours (if relevant for the measurement) of the recommended supply.

2.4.3.2. Standard DC Test Voltage from Accumulator Batteries

The standard (or nominal) DC test voltage specified by the manufacturer shall be equal to the standard test voltage of the type of accumulator to be used, multiplied by the number of cells minus an average DC power cable loss value, that the manufacturer determines as being typical (or applicable) for a given installation. Since accumulator batteries may or may not be under charge or may be in a state of discharge when the equipment is being operated, the manufacturer shall also test the equipment at anticipated voltage extremes above and below the standard voltage. The test voltages shall not deviate from the stated values by more than ±2% during a series of measurements carried out as part of a single test on the same equipment.

2.4.3.3. Standard AC Voltage and Frequency

For equipment that operates from the AC mains, the standard AC test voltage shall be equal to the nominal voltage specified by the manufacturer. If the equipment is provided with different input taps, the one designated “nominal” shall be used. The standard test frequency and the test voltage shall not deviate from their nominal values by more than ±2%.

The equipment shall operate without degradation with input voltage variations of up to ±10%, and shall maintain its specified transmitter frequency stability for input voltage variations of up to ±15%. The frequency range over which the equipment is to operate shall be specified by the manufacturer.

2.4.4. Standard Test Equipment

2.4.4.1. Standard Channel Simulator

The channel simulator shall support the following channel model parameters:

• All paths are independently faded.

• The fading is Rayleigh. The probability distribution function of power, F(P), of the signal power level P is:

$$F(P) = \begin{cases} 1 - e^{-P/P_{ave}}, & P > 0 \\ 0, & P \leq 0 \end{cases}$$

where P_{ave} is the mean power level.

• The level crossing rate, L(P) is:

$$L(P)=\begin{cases}\sqrt{2\pi P/P_{ave}}\cdot f_d\cdot e^{-P/P_{ave}}, & P>0\\ 0, & P\le 0\end{cases}$$

where f_d is the Doppler frequency offset associated with the simulated vehicle speed given by

$$f_d=\left(\frac{v}{c}\right)f_c$$

where f_c is the carrier frequency, v is the vehicle speed, and c is the speed of light in a vacuum.

• The power spectral density, S(f), is:

$$S(f)=\begin{cases}\dfrac{1}{\sqrt{1-\left(\dfrac{f-f_c}{f_d}\right)^2}}, & f_c-f_d\le f\le f_c+f_d\\ 0, & \text{otherwise}\end{cases}$$

• The autocorrelation coefficient of the unwrapped phase[(1)], ρ(t), is:

$$\rho(t)=\frac{3}{2\pi}\sin^{-1}\left[J_0(2\pi f_d t)\right]+6\left\{\frac{1}{2\pi}\sin^{-1}\left[J_0(2\pi f_d t)\right]\right\}^2-\frac{3}{4\pi^2}\sum_{n=1}^{\infty}\frac{\left[J_0(2\pi f_d t)\right]^{2n}}{n^2}$$

where $J_0()$ is a zero-order Bessel function of the first kind.

This autocorrelation coefficient is shown in Figure 16.

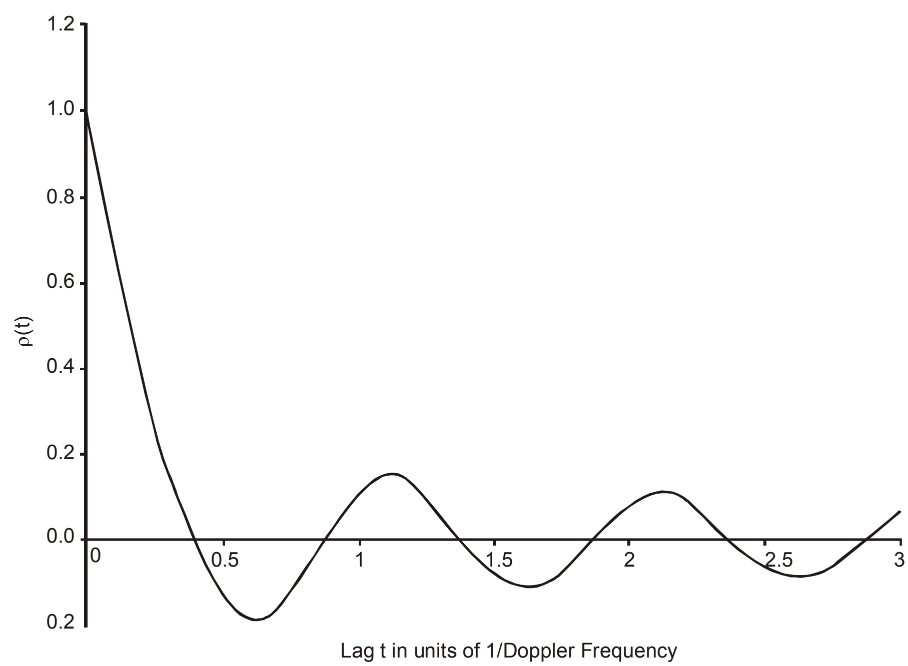

Figure 16 - Autocorrelation Coefficient of the Phase

---

(1) The term "unwrapped" refers to the continuous nature of the phase, that is, with no discontinuities of 2π.

The following standard conditions and tolerances on the channel model parameters shall be supported by the channel simulator:

• Vehicle speed, v: 8 km/h

Mobile station f_d: 6.53 Hz ± 5%

• Vehicle speed, v: 30 km/h

Mobile station f_d: 24.5 Hz ± 5%

• Vehicle speed, v: 100 km/h

Mobile station f_d: 81.67 Hz ± 5%

• Power distribution function, F(P):

1. The tolerance shall be within ±1 dB of calculated, for power levels from 10 dB above to 20 dB below the mean power level.
2. The tolerance shall be within ±5 dB of calculated, for power levels from 20 dB below to 30 dB below the mean power level.

• Tolerance:

The tolerance shall be within ±10% of calculated, for power levels from 3 dB above to 30 dB below the mean power level.

• Measured power spectral density, S(f), around the carrier, f_c:

1. At frequency offsets $|f - f_c| = f_d$ the maximum power spectral density S(f) shall exceed $S(f_c)$ by at least 6 dB.
2. For frequency offsets $|f - f_c| > 2f_d$, the maximum power spectral density S(f) shall be less than $S(f_c)$ by at least 30 dB.

• Simulated Doppler frequency, f_d, shall be computed from the measured S(f) as:

$$f_d = \left[\frac{2\int (f - f_c)^2 S(f) df}{\int S(f) df} \right]^{-1/2}$$

• Measured autocorrelation function of the unwrapped phase, ρ(t):

- At a lag of $0.05/f_d$, ρ(t) shall be 0.8 ± 0.1.
- At a lag of $0.15/f_d$, ρ(t) shall be 0.5 ± 0.1.

a) Standard Channel Simulator Configurations

The standard channel simulator shall support all the configurations specified in Table 77.

Table 77 - Standard Channel Simulator Configurations

Channel Simulator Configuration	1	2	3	4	5
Vehicle Speed (km/h) Band Class 0	8	30	30	100	0
Number of Paths	2	2	1	3	2
Path 2 Power (Relative to Path 1) [dB]	0	0	N/A	0	0
Path 3 Power (Relative to Path 1) [dB]	N/A	N/A	N/A	-3	N/A
Delay from Path 1 to Input [μs]	0	0	0	0	0
Delay from Path 2 to Input [μs]	2	2	N/A	2	2
Delay from Path 3 to Input [μs]	N/A	N/A	N/A	14.5	N/A

2.4.4.2. Waveform Quality Measurement Equipment

a) Rho Meter

The mobile station transmitter generates O-QPSK signals

The ideal transmitter signal is given as

$$s(t) = R(t)e^{j\omega_0 t}$$

where R(t) is the complex envelope of the transmitter signal and ω_0 is the radian carrier frequency.

The samples of R(t) at t = kT_s are given as

$$R(kT_s) = \sum_n g(kT_s - nT_c)\cos(\Phi_n) + j\sum_n g(kT_s - nT_c - T_c/2)\sin(\Phi_n)$$

where $g(kT_S)$ is the unit impulse response of the baseband filter described in 6.1.3.1.10 of TIA/EIA-95-B. T_C is the duration of a PN chip, and ϕ_n is the phase corresponding to the nth chip, occurring at time t_n = nT_C, as specified in Figure 6.1.3.1.9-1 of TIA/EIA-95-B. The chip rate, I/T_C, is 1.2288 Mcps. The sample rate $1/T_S$ equals $4/T_C$.

Modulation accuracy is the ability of the transmitter to generate the ideal signal, s(t). The actual transmitter waveform is given as

$$x(t) = C_0\left[R(t+\tau) + E(t)\right]e^{j(\omega_0+\Delta\omega)(t+\tau)}$$

where τ is the time offset of the actual transmit signal referenced to the time coordinate of R(t); $C_0 = A_0 e^{j\theta_0}$ is a complex constant representing the magnitude of the transmitter signal, A_0, and arbitrary phase, θ_0; $\Delta\omega$ is the radian frequency offset of the actual carrier relative to the frequency of the ideal carrier; and E(t) is the complex envelope of the error from ideal of the actual transmitter signal.

The time and frequency error of the actual transmitter signal is corrected by multiplying by a complex factor to produce

$$y(t) = x(t - \hat{\tau})e^{j[(\omega_0 + \Delta\hat{\omega})t]}$$

in which $\hat{\tau}$ and $\Delta\hat{\omega}$ are estimates, to the accuracy specified below, of the transmit time error and the frequency error of the actual transmit signal. The radian frequency error, $\Delta\hat{\omega}$, is converted to frequency error in Hertz by $\Delta\hat{f} = \Delta\hat{\omega}/2\pi$.

The ρ-meter shall contain a band-limiting filter. This filter should have less than ±0.1 dB ripple in the passband, and a minimum corner frequency (0.1 dB) of 700 kHz. At frequencies greater than 1.2 MHz, the filter shall have at least 40 dB rejection. The implementation of this filter shall be determined by the ρ-meter manufacturer consistent with the accuracy requirements specified below. Z(t) denotes the actual output of the filter.

Modulation accuracy is measured by determining the normalized correlated power between the actual waveform and the ideal waveform sampled at the decision points $t_k = 2(k - 1)T_S = (k - l)T_C/2$, and is given in terms of the transmitter waveform quality factor, ρ, defined as

$$\rho = \frac{\left|\sum_{k=1}^{M} R_k Z_k^*\right|^2}{\sum_{k=1}^{M} |R_k|^2 \sum_{k=1}^{M} |Z_k|^2}$$

where $Z_k = Z(t_k)$ is the kth sample of the compensated transmit signal in the measurement interval; $R_k = R(t_k)$ is the kth sample of the ideal signal in the measurement interval; and M is the measurement interval in half-chip intervals and shall be at least 1229 half-chip intervals (0.5 ms).

The value of $\Delta\hat{\omega}$ found in maximizing the expression for ρ is the carrier frequency error.

The value of $\hat{\tau}$ found in maximizing the expression for ρ is the transmit time error.

The accuracy of the waveform quality measurement equipment shall be as follows:

- Waveform quality factor (ρ): ±0.003 over the range of 0.90 to 1.00.
- Frequency error: ±30 Hz.
- Transmit time error: ±135 ns.

The equipment shall be tunable over the entire cellular band and be operational over the amplitude range of -50 to +40 dBm. External attenuators and/or amplifiers may be used to meet these power requirements and may be considered as part of the equipment.

b) Reserved

2.4.4.3 Base Station Equipment

a) Transmitter Equipment

The base station transmitter shall be capable of generating the following channels at the specified output power (relative to the total power):

- Pilot Channel: -5 to -10 dB or off.
- Paging Channel: -7 to -20 dB or off.
- Sync Channel: -7 to -20 dB or off.
- Traffic Channel: -7 to -20 dB or off for full rate power output. Lower rates will reduce the Traffic Channel power so as to maintain a constant energy per bit.
- Power Control Subchannel: This is always transmitted at the same power as the full rate speech bits.
- OCNS: 0 to -6 dB or off. The OCNS may, as an option, be composed of Paging, Sync, or Traffic Channels operating on different Walsh channels than the channel being used for test.

In addition, the base station transmitter shall meet the following requirements:

- Frequency accuracy: ±0.2 ppm
- Frequency resolution: 10 Hz
- Output range: 0 to -110 dBm/1.23 MHz
- Amplitude resolution: 0.1 dB for all channels
- Output accuracy (relative levels between any two channels): ±0.1 dB

External calibration may be required for this.

- Absolute output accuracy: ±2.0 dB
- Minimum waveform quality factor (ρ): greater than 0.966 (excess power is less than 0.15 dB)
- Source VSWR: 2.0: 1

b) Receiver Equipment

Input Range -50 to +40 dBm. External attenuators and/or amplifiers may be used to meet these power requirements and may be considered as part of the equipment.

Reporting capability of time of arrival with a resolution of 1/8 chip or shorter in duration.

c) Protocol Support

The base station shall be capable of supplying the protocols required by this document.

d) Timing Signals

The base station shall provide the following system timing signals referenced to the base station antenna port for use as triggers by other measurement equipment:

- 20 ms frame clock.
- 26.67 ms clock: Short sequence rollover.
- 80 ms clock: Alignment of frame clock and zero PN offset 26.67 ms clock.
- Even second time mark.
- 1.25 ms power control group clock.

Signals synchronized to the following events:

- Insertion of bad frames (or frames deleted).
- Start of power control bit sequences.

2.4.4.4 AWGN Generator

The AWGN generator shall meet the following minimum performance requirements:

- Minimum equivalent noise bandwidth: 1.8 MHz.
- Frequency resolution: 1 kHz.
- Output accuracy: ±2 dB for outputs greater than or equal to -80 dBm/1.23 MHz.
- Amplitude resolution: 0.1 dB.
- Output range: -20 to -95 dBm/ 1.23 MHz.
- The AWGN generator shall be uncorrelated to the ideal transmitter signal. See 2.4.4.3.

2.4.4.5. CW Generator

The CW generator shall meet the following minimum performance requirements:

- Output frequency range: Tunable over applicable range of radio frequencies.
- Frequency accuracy: ±10 ppm.
- Frequency resolution: 1 kHz.
- Output range: -50 dBm to -10 dBm, and off.
- Output accuracy: ±1.0 dB for above output range and frequencies.
- Amplitude resolution: 0.1 dB.
- Output phase noise: As required.

2.4.4.6. Spectrum Analyzer

The spectrum analyzer shall provide the following functionality:

- General purpose frequency domain measurements.
- Integrated channel power measurements (power spectral density in 1.23 MHz).

The spectrum analyzer shall meet the following minimum performance requirements:

- Frequency range: Tunable over the applicable radio frequency range.

- Frequency settability: 1 kHz.
- Frequency accuracy: ±0.2 ppm.
- Displayed dynamic range: 70 dB.
- Display log scale fidelity: ±1 dB over the above displayed dynamic range.
- Amplitude measurement range for signals from 10 MHz to either 2.6 GHz for Band 800 MHz
  - Power measured in 30 kHz resolution bandwidth: -90 to +20 dBm.
  - Integrated 1.23 MHz channel power: -70 to +40 dBm.
  - Noise floor: -140 dBm/Hz.
  - External attenuation may be used to meet the high power end of the range and may be considered as part of the equipment.
- Absolute amplitude accuracy in the CDMA transmit and receive bands (for integrated channel power measurements):
  - ±1 dB over the range of -40 dBm to +20 dBm.
  - ±1.3 dB over the range of -70 dBm to +20 dBm.
- Relative flatness: ±1.5 dB over frequency range 10 MHz to either 2.6 GHz for Band Class 0
- Resolution bandwidth filter: Synchronously tuned or Gaussian (at least 3 poles) with 3 dB bandwidth selections of 1 MHz, 300 kHz, 100 kHz, and 30 kHz.
- Post detection video filters: Selectable in decade steps from 100 Hz to at least 1 MHz.
- Detection modes: Selectable to be either peak or sample.
- RF input impedance: Nominal 50 ohms.

The spectrum analyzer may also provide the functionality of time domain (zero span) measurements with true average power determination. If this functionality is provided, the spectrum analyzer shall meet the following additional minimum performance requirements:

- Time domain sweep time: Selectable from 50 μs to 100 ms.
- Delayed sweep trigger Selectable from 5 μs to 40 ms.
- External sweep trigger.
- Sufficient bandwidths to make the time domain measurements.

2.4.4.7. Average Power Meter

The power meter shall provide the following functionality:

- Average power measurements.

- True RMS detection for both sinusoidal and non-sinusoidal signals.
- Absolute power in linear (watt) and logarithmic (dBm) units.
- Relative (offset) power in dB and percentage units.
- Automatic calibration and zeroing.
- Averaging of multiple readings.

The power meter shall meet the following minimum performance requirements:

- Frequency range: 10 MHz to either 1 GHz for Band 800 MHz.
- Power range: -70 dBm (100 pW) to + 40 dBm (10 W).

Different sensors may be required to optimally provide this power range. External attenuation may be used to meet the high power end of the range and may be considered as part of the equipment.

- Absolute and relative power accuracy: ±0.2 dB (5%).

Excludes sensor and source mismatch (VSWR) errors, zeroing errors (significant at bottom end of sensor range), and power linearity errors (significant at top end of sensor range).

- Power measurement resolution: Selectable between 0.1 or 0.01 dB.
- Sensor VSWR: 1.15:1.

2.4.5. Functional System Setups

2.4.5.1. Functional Block Diagrams

Figures 17 through 20 show the functional block diagrams of the set-up for different tests:

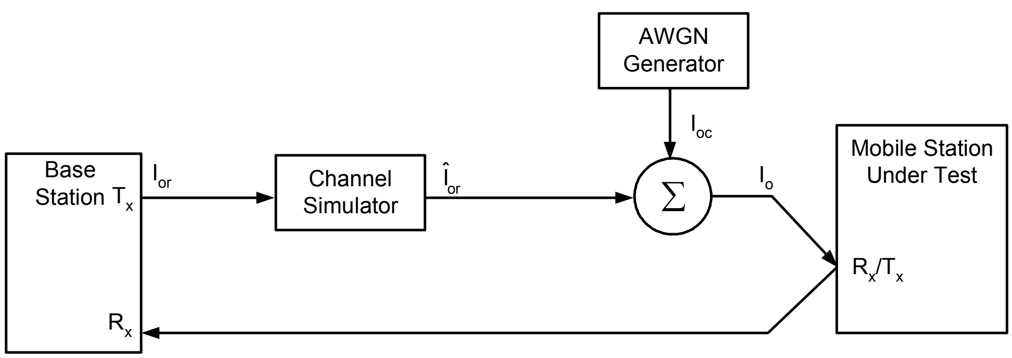

Figure 17: Functional Set-up for Traffic Channel Tests in Fading Channel

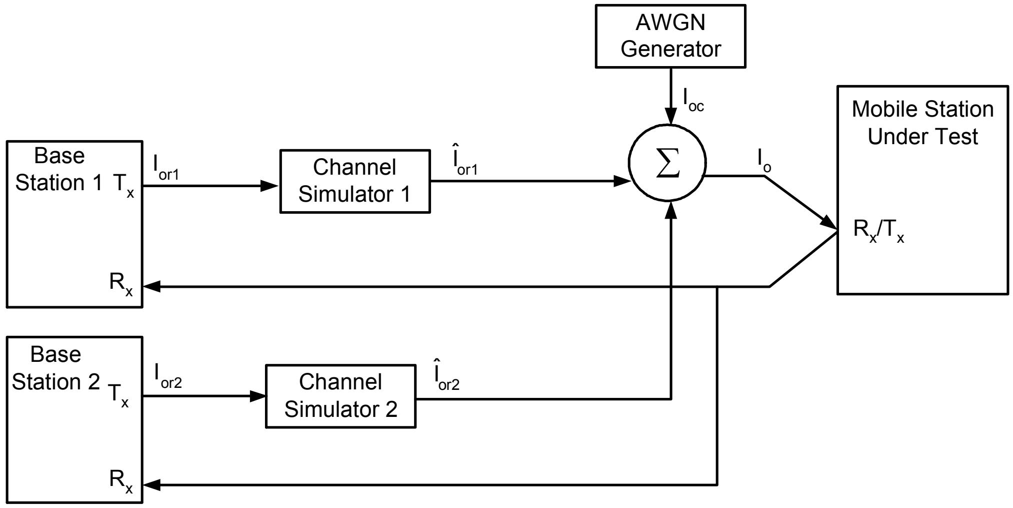

Figure 18 - Functional Set-up for Traffic Channel Tests in Soft Handoff

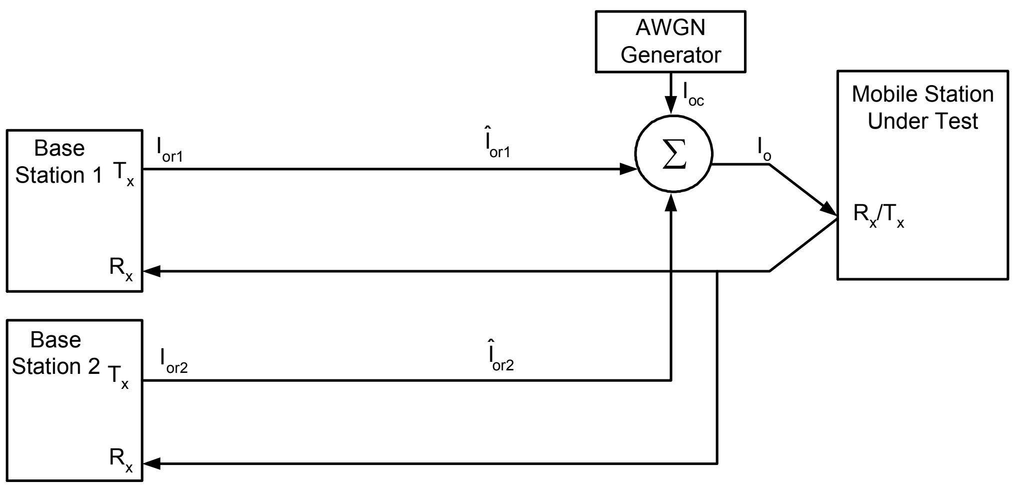

Figure 19 - Functional Set-up for Searcher Tests in Soft Handoff

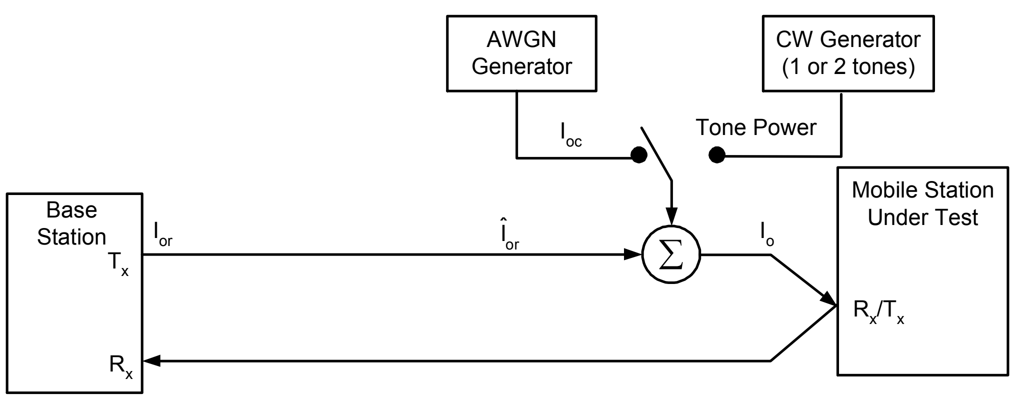

Figure 20 - Functional Set-up for Tests without Fading

2.4.5.2. General Comments

The following comments apply to all CDMA tests:

8. The Forward CDMA Channel may be comprised of a Pilot Channel, a Sync Channel, a Paging Channel, a Traffic Channel, and other orthogonal channels (OCNS).
9. Whenever Sync and Paging Channels are needed to perform a test, and their power ratios are not specified in the test parameters table, use Sync E_c/I_{or} equal to -16 dB and Paging E_c/I_{or} equal to -12 dB with Paging Channel data rate at 4800 bps.
10. Adjust the OCNS gain such that the power ratios (E_c/I_{or}) of all specified forward channels add up to one.
11. During handoff tests, Channel 2 from base station 2 always has a relative delay of 12 μs from Channel 1 from base station 1 at the mobile station antenna connector.
12. Pilot PN sequence offset indices are denoted by P_i (i = 1, 2, 3,...). The following assumptions hold unless otherwise specified:
   - $0 \leq P_i \leq 511$
   - $P_i \neq P_j$ if $i \neq j$
   - P_i mod PILOT_INC = 0
13. Base stations should be configured for normal operation unless specifically stated differently in a specific test.
14. Unless otherwise specified, the Reverse Traffic Channel should be operated at a sufficiently high E_b/N_0 to ensure insignificant (for example, less than 10^{-5}) frame error rate.
15. For a mobile station with an integral antenna, the manufacturer shall provide a calibrated RF coupling fixture to provide connection to the standard test equipment.
16. Overhead message fields should be those needed for normal operation of the base station unless stated differently below or in a specific test.

Special field values of *System Parameters Message:*

Field	Value (Decimal)
REG_PRD	0 (timer-based registration off)
SRCH_WIN_A	8 (60 chips)
SRCH_WIN_N	8 (60 chips)
SRCH_WIN_R	8 (60 chips)
NGHBR_MAX_AGE	0 (minimum amount of Neighbor Set aging)
PWR_THRESH_ENABLE	0 (threshold reporting off)
PWR_PERIOD_ENABLE	0 (periodic reporting off)
T_ADD	28 (-14 dB E_c/I_0)
T_DROP	32 (-16 dB E_c/I_0)
T_COMP	5 (2.5 dB)
T_TDROP	3 (4 sec)

Special field values of *Extended System Parameters Message:*

Field	Value (Decimal)
SOFT_SLOPE	0 (0)

Special field values of *Access Parameters Message:*

Field	Value (Decimal)
NOM_PWR	0 (0 dB)
NOM_PWR_EXT	0 (0 dB)
INIT_PWR	0 (0 dB)
PWR_STEP	0 (0 dB)
NUM_STEP	4 (5 probes per sequence)

Special field values of *General Neighbor List Message* for Base Station 1:

Field	Value (Decimal)
PILOT_INC	12 (768 chips)
NGHBR_SRCH_MODE	0 (no priorities or windows)
NUM_NGHBR	8 (8 neighbors)
NGHBR_CONFIG	0
NGHBR_PN	P_2
NGHBR_CONFIG	0
NGHBR_PN	P_3
NGHBR_CONFIG	0
NGHBR_PN	P_4
NGHBR_CONFIG	0
NGHBR_PN	P_5
NGHBR_CONFIG	0
NGHBR_PN	P_6
NGHBR_CONFIG	0
NGHBR_PN	P_7
NGHBR_CONFIG	0
NGHBR_PN	P_8
NGHBR_CONFIG	0
NGHBR_PN	P_9

Special field values of *General Neighbor List Message* for Base Station 2:

Field	Value (Decimal)
PILOT_INC	12 (768 chips)
NGHBR_SRCH_MODE	0 (no priorities or windows)
NUM_NGHBR	8 (8 neighbors)
NGHBR_CONFIG	0
NGHBR_PN	P_1
NGHBR_CONFIG	0
NGHBR_PN	P_3
NGHBR_CONFIG	0
NGHBR_PN	P_4
NGHBR_CONFIG	0
NGHBR_PN	P_5
NGHBR_CONFIG	0

NGHBR_PN	P_6
NGHBR_CONFIG	0
NGHBR_PN	P_7
NGHBR_CONFIG	0
NGHBR_PN	P_8
NGHBR_CONFIG	0
NGHBR_PN	P_9

Values of time limits and other constants should be as specified in TIA/EIA-95-B. Values of some time limits and constants are listed below for reference.

Constant	Value	Unit
N_{1m}	9	frames
N_{2m}	12	frames
N_{11m}	1	frame
T_{5m}	5	seconds
T_{40m}	3	seconds
T_{61m}	0.08	seconds
T_{72m}	1	seconds

2.5. Subscriber Interface Requirements

Means shall be provided at the subscriber interface for the following

2.5.1. Functional Controls

- Means shall be provided to control the main battery power to the mobile station. The on/off power control shall be designed to minimize accidental operation.
- Means for initiating a call shall be provided.
- Means for terminating a call shall be provided.
- Whenever any two or more keys are activated simultaneously, or nearly so, the data output from the unit shall be null, or the code of the first key pressed, but not a false code.

2.5.2. Indicating Means

Indicating means shall be provided to alert the subscriber to an incoming call in addition, the following indicating means are preferable:

- Power On
- Call In Process (In Use)
- No Service
- Roam

2.5.3. Ear Protection

To protect the user from possible ear damage, earpiece acoustic output shall be limited so as not to exceed 120 dB_{SPL} when placed to the ear as measured in accordance with IEEE Standard 269-1992, with the exception that the six cubic centimeter acoustic coupler specified shall be replaced by the IEC Audiometric Coupler.

3. MANAGEMENT REGULATIONS

Handsets use CDMA technology must comply with requirements in this technical regulation.

4. RESPONSIBILITY OF ORGANISATIONS/INDIVIDUALS

Organisations/individuals in Vietnam are responsible to comply with this technical regulation and to accept supervision of regulatory authority as existing regulations.

5. IMPLEMENTATION

5.1. Vietnam Telecommunication Authority and local departments of Information and Communications are responsible for guidance and implementation of this technical regulation.

5.2. This Technical Regulation replace standard TCN 68-222:2004 “CDMA mobile station - Technical Requirements”.

5.3. In cases of having referencing regulations specified in this technical regulation changed, modified or superseded, the new reference versions are applied.