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Over the Air Interoperability Test Specification for cdma2000 Air Interface

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FOREWORD

(This foreword is not part of this specification)

This Specification was prepared by Technical Specification Group C of the Third Generation Partnership Project 2 (3GPP2). This Specification is the second revision of the document and tests over-the-air interoperability for CDMA mobile stations or access terminals. This version of the specification supersedes all previous revisions. Other Interoperability test specifications such as C.S0044-A (Interoperability Specification for cdma2000®[1] Air Interface) are meant to test interoperability in a cabled environment.

[1] cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

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NORMATIVE REFERENCES

This section provides references to other specifications and standards that are necessary to implement this document.

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

1. **3GPP2** C.S0002-E, *Physical Layer Standard for cdma2000 Spread Spectrum Systems*
2. **3GPP2** C.S0004-E, *Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems*
3. **3GPP2** C.S0005-E, *Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems*
4. **3GPP2** C.S0015-B, *Short Message Services for Wideband Spread Spectrum Cellular Systems*
5. **3GPP2** C.S0017-0, *Data Service Options for Wideband Spread Spectrum Systems*
6. ***Reserved***
7. **3GPP2** S.R0006 *Wireless Features Description*
8. **3GPP2** C.S0024-B, *cdma2000 High Rate Packet Data Air Interface Specification*
9. **3GPP2** C.S0022-B, *Position Determination Service Standards for Dual Mode Spread Spectrum Systems*
10. **3GPP2** A.S0007-A, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Access Network Interfaces*
11. **3GPP2** C.S0037-0, *Signaling Conformance Specification for cdma2000 Wireless IP Networks*
12. **3GPP2** C.S0057-D, *Band Class Specification for cdma2000 Spread Spectrum Systems*
13. **3GPP2** C.S0075-0, *Interworking Specification for cdma2000 1x and High Rate Packet Data Systems*
14. **3GPP2** S.R0108-0, *HRPD-cdma2000 1x Interoperability for Voice and Data System Requirements*
15. **3GPP2** C.S0063-A, *cdma2000 High Rate Packet Data Supplemental Services*
16. **3GPP2** X.S0011-001-C, *cdma2000 Wireless IP Network Standard: Introduction*

INFORMATIVE REFERENCES

References in this section are informative.

IR 1. **3GPP2** C.R1001-E, Administration of Parameter Value Assignment for cdma2000 Spread Spectrum Standards.

1 Introduction

1.1 Scope

This document defines air interface interoperability tests for CDMA mobile stations/access terminals and base stations/access networks. This document defines test cases for cdma2000 1x base stations and mobile stations with protocol revision equal to or less than seven and/or revision B of [8].

In this document, 'mobile station' or 'access terminal' refers to a subscriber terminal, handset, PDA, wireless local loop unit, or any other CDMA subscriber terminal that communicates with the base station at the air interface. 'Base station' or 'access network' refers to the composite functionality of the base station and connected network elements. These tests are performed over-the-air in a live network environment.

1.2 Testing Objective

The objective of this document is to provide tests to demonstrate the interoperability of mobile stations/access terminals and base stations/access networks compliant with the cdma2000 family of standards. References to the applicable standard functionality are listed in the traceability section of each test case.

1.3 Execution Strategy

All the test cases are performed over-the-air. Base stations should be configured for normal operation. Multiple test cases may be executed together as a single test case execution.

Unless specified otherwise, all test cases shall be executed in favorable conditions. A favorable channel condition shall allow the BS to receive valid messages from the MS and the MS to receive valid messages from the BS with high probability. A favorable condition should consist of both a good channel condition and low network congestion. Pilot pollution, electromagnetic interference and jammers should be kept to a minimum in a favorable channel condition. The received signal strengths should be between -35dBm and -75dBm with Pilot Ec/Io greater than -10dB. The Pilot Ec/Io requirement is not applicable in handoff cases.

All verification steps in the "Method of Measurement" section of a test are requirements for that test case in addition to the requirements stated in the "Minimum Standard" section. Each test case should be executed as completely as possible according to the "Method of Measurement" section even if any of the verification steps fail.

A test case failure does not necessarily indicate a failure of a mobile station or a base station. In some scenarios a test case may fail due to network congestion or poor channel conditions. If a test case fails it is recommended that the test case be repeated preferably under different conditions such as a different time, a different location, and a different infrastructure. More analysis to determine the reason for failure may be required e.g., analyze test logs, perform a similar test case in cabled environment etc.

1.4 Personalities for HRPD Tests

HRPD Tests refer to HRPD Revision A and HRPD Revision B based personalities. In general, unless otherwise stated, HRPD Rev A personality should be considered to be a personality that uses Multi-Flow Packet Application or Enhanced Multi-Flow Packet Application bound to the service network, subtype 2 Physical Layer Protocol, Enhanced CCMAC Protocol, Enhanced ACMAC Protocol, Enhanced Idle State Protocol, Enhanced FTCMAC Protocol and Subtype 3 RTCMAC Protocol with defaults for other protocols.HRPD Rev B personality should be considered to be a personality that uses Multi-Link Multi-Flow Packet Application bound to the service network, Subtype 3 Physical Layer Protocol, Enhanced CCMAC, Enhanced ACMAC, Quick Idle State Protocol or Enhanced Idle State Protocol, Subtype 1 Route Update Protocol, Subtype 2 FTCMAC and Subtype 4 RTCMAC with defaults for other protocols.

1.5 Supplementary Terms, Definitions, Symbols and Abbreviations

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.

Acknowledgment. A Layer 2 response by the mobile station or the base station confirming that a signaling message was received correctly.

Action Time. The time at which the action implied by a message should take effect.

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

AN. Access Network

AT. Access Terminal

Authentication. A procedure used by a base station to validate a mobile station's identity.

AWGN. Additive White Gaussian Noise.

Band Class. A set of frequency channels and a numbering scheme for these channels as described in [12].

Base Station. A fixed station used for communicating with mobile stations. In this document, the term base station refers to the entire cellular system infrastructure including transceiver equipment and Mobile Switching Center.

Bps. Bits per second.

BS. See base station.

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

CDMA. See Code Division Multiple Access.

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

CFNA. Call Forwarding No Answer

Chip. See PN Chip.

Code Channel. A subchannel of a Forward CDMA Channel. A Forward CDMA Channel contains 64 code channels. Code channel zero is assigned to the Forward 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.

Code Division Multiple Access (CDMA). A technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences.

Configuration Change Indicator. A one-bit datum, sent on the Quick Paging Channel. Appearance of the Configuration Change Indicator in the Quick Paging Channel serves to alert a slotted mode mobile station, operating in the idle state, that, after performing an idle handoff, it should monitor the Paging Channel, in order to determine if it should update its stored parameters.

CPN. Calling Party Number

dBm. A measure of power expressed in terms of its ratio to one milliwatt.

Dedicated Control Channel. A portion of a Traffic Channel (Forward or Reverse) that carries a combination of user data, signaling, and power control information.

DTMF. See Dual-Tone Multifrequency.

Dual-Tone Multifrequency (DTMF). Signaling by the simultaneous transmission of two tones, one from a group of low frequencies and another from a group of high frequencies. Each group of frequencies consists of four frequencies.

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

E_b/N_o. Energy-per-bit-to noise-per-hertz ratio.

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.

E_C. Average energy per PN chip for the Forward pilot channel, Sync Channel, Paging Channel, Forward Traffic Channel, power control subchannel.

E_c/I_o. A notation used to represent a dimensionless ratio of the average power of some code-distinguished CDMA signal channel, typically a pilot, to the total power comprised of signal plus interference, within the signal bandwidth. It is usually expressed in dB units.

E_c/I_{or}. The ratio of the average transmit energy per PN chip for the Forward pilot channel, Sync Channel, Paging Channel, Forward Traffic Channel, power control subchannel,to the total transmit power spectral density.

ESN. Electronic Serial Number.

FA. Foreign Agent.

f-csch. Forward common signaling logical channel.

f-dsch. Forward dedicated signaling logical channel.

FER. Frame Error Rate of Forward Traffic Channel. The value of FER may be estimated by using Service Option 2, 9, 30, or 31 (see TIA/EIA-126-C).

Flash. An indication sent on the CDMA Channel indicating that the receiver is to invoke special processing.

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 Forward pilot channel, Sync Channel, Paging Channels, and Traffic Channels. The Forward CDMA Channel always carries a Forward pilot channel and may carry up to one Sync Channel, up to seven Paging Channels, and up to 63 Traffic Channels, as long as the total number of channels, including the Forward pilot channel, is no greater than 64.

Forward Fundamental Channel (F-FCH). A portion of a Forward Traffic Channel that can carry a combination of primary data, secondary data, signaling, and power control information.

Forward Supplemental Channel (F-SCH). An optional portion of a Forward Traffic Channel (Radio Configurations 3 and above) that operates in conjunction with a Fundamental Channel and or the Dedicated Control Channel in that Traffic Channel, and (optionally) with other Supplemental Channels to provide higher data rate services.

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

FPC. Forward Power Control.

Frame. A basic timing interval in the system. For the Access Channel and Paging Channel a frame is 20 ms long. For the Traffic Channel, the frame may be 20 ms or 5 ms long. For the Sync Channel, a frame is 26.666... ms long.

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

FTP. File Transfer Protocol

GHz. Gigahertz (10^9 Hertz).

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

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

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 AMPS voice channel. See also Soft Handoff.

Hash Function. A function used by the mobile station to select one out of N available resources. The hash function distributes the available resources uniformly among a random sample of mobile stations.

HRPD. High Rate Packet Data.

HSPD. High Speed Packet Data.

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

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

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.

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

$\hat{I}_{or}$. The received power spectral density of the Forward CDMA Channel as measured at the mobile station antenna connector.

ITU. International Telecommunication Union

LAC. Link Access Control

Layering. A method of organization for communication protocols in which the transmitted or received information is transferred in pipeline fashion, within each station, in well-defined encapsulated data units between otherwise decoupled processing entities (“layers”). A layer is defined in terms of its communication protocol to a peer layer in another entity and the services it offers to the next higher layer in its own entity.

Layer 1. Layer 1 provides for the transmission and reception of radio signals between the base station and the mobile station. Also see Physical Layer.

Layer 2. Layer 2 provides for the correct transmission and reception of signaling messages, including partial duplicate detection. Layer 2 makes use of the services provided by Layer 1.

Layer 3. Layer 3 provides the control messaging for the cellular or PCS telephone system. Layer 3 originates and terminates signaling messages according to the semantics and timing of the communication protocol between the base station and the mobile station. Layer 3 makes use of the services provided by Layer 2.

Locked Mode. A mode of operation where the AT selects the same serving sector across the Sub-Active Sets.

Long Code. A PN sequence with period (2^{42}) - 1 that is used for scrambling on the Forward CDMA Channel and spreading on the Reverse CDMA Channel. The long code uniquely identifies a mobile station on both the Reverse Traffic Channel and the Forward Traffic Channel. The long code provides limited privacy. The long code also separates multiple

Access Channels on the same CDMA Channel. See also Public Long Code and Private Long Code.

Long Code Mask. A 42-bit binary number that creates the unique identity of the long code. See also Public Long Code, Private Long Code, Public Long Code Mask, and Private Long Code Mask.

MOB_P_REV. Protocol revision number supported by a mobile station.

Mobile Station (MS). A station that communicates with a base station while in motion or during halts at unspecified points.

Mobile Station Originated Call. A call originating from a mobile station.

Mobile Station Terminated Call. A call received by a mobile station (not to be confused with a disconnect or call release).

MS. See Mobile Station

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

Network. A network is a subset of a cellular or PCS system, such as an area-wide cellular network, a private group of base stations, or a group of base stations set up to handle a special requirement. A network can be as small or as large as needed, as long as it is fully contained within a system. See also System.

Network Identification (NID). A number that uniquely identifies a network within a cellular or PCS system. See also System Identification.

NID. See Network Identification.

Non-Rectangular Configuration. A configuration of neighboring sectors supporting the either unequal number of frequencies or different frequencies for HRPD revision B operation.

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

NULL. Any value that is not in the specified range of a field.

Order. A type of message that contains control codes for either the mobile station or the base station.

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

P_REV. Protocol revision level supported by a base station

P_REV_IN_USE. Protocol revision level currently in use by a mobile station

Packet. The unit of information exchanged between the service option applications of the base station and the mobile station.

Paging. The act of seeking a mobile station when a call has been placed to that mobile station.

Paging Channel. A code channel in a CDMA channel used for transmission of control information and pages from a base station to a mobile station.

Paging Channel Slot. An 80 ms interval on the Paging Channel. Mobile stations operating in the slotted mode are assigned specific slots in which they monitor messages from the base station.

Paging E_c. Average energy per PN chip for the Paging Channel.

$\frac{\textbf{Paging Ec}}{\textbf{Ior}}$**.** The ratio of the average transmit energy per PN chip for the Paging Channel to the total transmit power spectral density.

Paging Indicator. A one-bit datum, sent on the Quick Paging Channel. Quick paging indicators are associated with mobile stations, in pairs, via a hashing algorithm. Appearance of both of its indicators in its assigned Quick Paging Channel slot serves to alert a slotted mode mobile station, operating in the idle state, that it should monitor the Paging Channel starting in the next slot. See also Quick Paging Channel.

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

PCCC. Preferred Control Channel Cycle.

PCS. See Personal Communications Services.

PCS System. See Personal Communications Services System.

Personal Communications Services (PCS). A family of mobile and portable radio communications services for individuals and businesses that may be integrated with a variety of competing networks. Broadcasting is prohibited and fixed operations are to be ancillary to mobile operations.

Personal Communication Services System. A configuration of equipment that provides PCS radiotelephone services.

Personal Communications Switching Center (PCSC). See Mobile Switching Center (MSC).

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

PI. See Paging Indicator.

Pilot E_c. Average energy per PN chip for the Forward pilot channel.

$\frac{\textbf{Pilot Ec}}{\textbf{Io}}$**.** The ratio of the combined pilot energy per chip, E_C, to the total received power spectral density (noise and signals), I_O, of at most K usable multipath components at the mobile station antenna connector (see 1.4). K is the number of demodulating elements supported by the mobile station.

$\frac{\text{Pilot Ec}}{\text{Ior}}$. The ratio of the average transmit energy per PN chip for the Forward pilot channel to the total transmit power spectral density.

Pilot PN Sequence Offset. The time offset of a Forward Pilot Channel from CDMA System time, as transmitted by the base station, expressed modulo the pilot period.

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

Pilot Strength. The ratio of pilot power to total power in the signal bandwidth of a CDMA Forward or Reverse Channel. See also Ec/Io.

PN. Pseudonoise.

PN Chip. One bit in a PN sequence, or the time duration of such a bit. It corresponds to the smallest modulation interval in a CDMA system.

PN Sequence. Pseudo-random noise sequence. A deterministic, periodic binary sequence having limited statistical similarity to a Bernoulli (coin-tossing).

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.

$\frac{\text{Power Control Ec}}{\text{Ior}}$. The ratio of the average transmit energy per PN chip for the power control subchannel to the total transmit power spectral density.

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

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

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

PPP. Point-to-Point Protocol.

Primary Traffic. The main traffic stream carried between the mobile station and the base station on the Traffic Channel. See also Secondary Traffic and Signaling Traffic.

Private Long Code. The long code characterized by the private long code mask. See also Long Code.

Private Long Code Mask. The long code mask used to form the private long code. See also Public Long Code Mask and Long Code.

Private Neighbor Set. The set of pilots associated with the private system base stations that are probable candidates for idle handoff. See also Active Set, Neighbor Set, Remaining Set, and CDMA Tiered Services.

Public Long Code. The long code characterized by the public long code mask.

Public Long Code Mask. The long code mask used to form the public long code. The mask contains a permutation of the bits of the ESN, and also includes the channel number when

used for a Supplemental Code Channel. See also Private Long Code Mask and Long Code.

QPCH. See Quick Paging Channel.

Quick Paging. A feature that permits mobile stations to further conserve battery power beyond the savings achieved by slotted mode operation. See also Paging Indicator and Configuration Change Indicator.

Quick Paging Channel (QPCH). An uncoded, on-off-keyed (OOK) spread spectrum signal sent by base stations to inform slotted mode mobile stations, operating in the idle state, whether to monitor the Paging Channel. See also Quick Paging, Paging Indicator, and Configuration Change Indicator.

Quick Paging Channel Slot. An 80 ms interval on the Quick Paging Channel. See also Paging Indicator and Configuration Change Indicator.

RATI. Random Access Terminal Identifier. See [8].

r-csch. Reverse common signaling logical channel.

r-dsch. Reverse dedicated signaling logical channel.

Radio Configuration (RC). A set of Forward Traffic Channel and Reverse Traffic Channel transmission formats that are characterized by physical layer parameters such as transmission rates, modulation characteristics and spreading rate.

RC. See Radio configuration.

Rectangular Configuration. A configuration of neighboring sectors supporting the same frequencies for HRPD revision B operation.

Registration. The process by which a mobile station identifies its location and parameters to a base station.

Registration Zone. A collection of one or more base stations treated as a unit when determining whether a mobile station should perform zone-based registration. See also User Zone, with which it should not be confused.

Relay Mode. Relay Layer R_m Interface Protocol Option as defined in [5].

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

Remaining Set. The set of all allowable pilot offsets as determined by PILOT_INC, excluding the pilot offsets of the pilots in the Active Set, Candidate Set, and Neighbor Set. See also Active Set, Candidate Set, and Neighbor Set.

Request. A layer 3 message generated by either the mobile station or the base station to retrieve information, ask for service, or command an action.

Response. A layer 3 message generated as a result of another message, typically a request.

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

Reverse Fundamental Channel (R-FCH). A portion of a Reverse Traffic Channel that can carry a combination of primary data, secondary data, signaling, and power control information.

Reverse Pilot Channel (R-PICH). A non-data-bearing direct-sequence spread spectrum signal transmitted by each CDMA mobile station whenever the Enhanced Access Channel, Reverse Common Control Channel, or Reverse Traffic Channel is enabled. The Reverse Pilot Channel allows a base station to acquire the timing of the Reverse CDMA Channel and provides a phase reference for coherent demodulation. The Reverse Pilot Channel may be transmitted either continuously or in gated mode.

Reverse Supplemental Channel (R-SCH). An optional portion of a Reverse Traffic Channel (Radio Configurations 3 and above) that operates in conjunction with a Fundamental Channel and or the Dedicated Control Channel in that Traffic Channel, and (optionally) with other Supplemental Channels to provide higher data rate services.

RF. Radio Frequency.

RLP. Radio Link Protocol.

RRP. Mobile IP Registration Reply.

RRQ. Mobile IP Registration Request.

SCR. Service Configuration Record.

Secondary Traffic. An additional traffic stream that can be carried between the mobile station and the base station on the Traffic Channel. See also Primary Traffic and Signaling Traffic.

Service Configuration. The common attributes used by the mobile station and the base station to build and interpret Traffic Channel frames. A service configuration consists of Forward and Reverse Traffic Channel multiplex options, Forward and Reverse Traffic Channel transmission rates, and service option connections. Service Configuration is signaled via the Service Configuration information record and the Non-Negotiable Service Configuration information record.

Service Negotiation. The procedures used by the mobile station and base station to establish a service configuration. See also Service Option Negotiation.

Service Option (SO). A service compatibility of the system. Service options may be applications such as voice, data, or facsimile. See (17).

Service Option Connection. A particular instance or session in which the service defined by a service option is used. Associated with a service option connection are a reference, which is used for uniquely identifying the service option connection, a service option, which specifies the particular type of service in use, a Forward Traffic Channel traffic type, which specifies what type of Forward Traffic Channel traffic is used to support the service option connection, and a Reverse Traffic Channel traffic type, which specifies what type of Reverse Traffic Channel traffic is used by the service option connection.

Service Option Negotiation. The procedures used by the mobile station and base station to establish a service configuration. Service option negotiation is similar to service

negotiation, but allows less flexibility for specifying the attributes of the service configuration. See also Service Negotiation.

Shared Secret Data (SSD). A 128-bit pattern stored in the mobile station (in semi-permanent memory) and known by the base station. SSD is a concatenation of two 64-bit subsets: SSD_A, which is used to support the authentication procedures, and SSD_B, which serves as one of the inputs to the process generating the encryption mask and private long code.

Short Message Services (SMS). A suite of services such as SMS Text Delivery, Digital Paging (i.e., Call Back Number - CBN), and Voice Mail Notification (VMN).

SID. See System Identification.

Signaling Traffic. Control messages that are carried between the mobile station and the base station on the Traffic Channel. See also Primary Traffic and Secondary Traffic.

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

SME. Short Message Entity.

SMS. See Short Message Service.

SO. See Service Option.

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.

SSD. See Shared Secret Data.

Subnet. On TCP/IP networks, subnets are defined as all devices whose IP addresses have the same prefix.

Supplemental Code Channel (SCCH). An optional portion of a Traffic Channel (Forward or Reverse) which operates in conjunction with a Fundamental Channel in that Traffic Channel, and (optionally) with other Supplemental Code Channels to provide higher data rate services. On this channel a combination of primary data, secondary data, or both (but never signaling information) are transmitted.

Supplemental E_c. Average energy per PN chip for one Forward Supplemental Code Channel.

$\frac{\textbf{Supplemental Ec}}{\textbf{Ior}}$**.** The ratio of the average transmit energy per PN chip for one Forward Supplemental to the total transmit power spectral density.

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

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

Sync E_c. Average energy per PN chip for the Sync Channel.

$\frac{\text{Sync Ec}}{\text{Ior}}$. The ratio of the average transmit energy per PN chip for the Sync Channel to the total transmit power spectral density.

System. A system is a cellular telephone service or personal communications service that covers a geographic area such as a city, metropolitan region, county, or group of counties. See also Network.

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

System Time. The time reference used by the system. System Time is synchronous to UTC time (except for leap seconds) and uses the same time origin as GPS time. All base stations use the same System Time (within a small error). Mobile stations use the same System Time, offset by the propagation delay from the base station to the mobile station. See also Universal Coordinated Time.

TDSO. Test Data Service Option.

TE2. Terminal Equipment 2.

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

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

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.

Traffic Channel Preamble. A sequence of all-zero frames that is sent by the mobile station on the Reverse Traffic Channel as an aid to Traffic Channel acquisition.

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

$\frac{\text{Traffic Ec}}{\text{Ior}}$. The ratio of the average transmit energy per PN chip for the Forward Traffic Channel to the total transmit power spectral density.

UATI. Unicast Access Terminal Identifier. See [8].

Unique Challenge-Response Procedure. An exchange of information between a mobile station and a base station for the purpose of confirming the mobile station's identity. The procedure is initiated by the base station and is characterized by the use of a challenge-specific random number (i.e., RANDU) instead of the random variable broadcast globally (RAND).

Universal Coordinated Time (UTC). An internationally agreed-upon time scale maintained by the Bureau International de l'Heure (BIH) used as the time reference by nearly all commonly available time and frequency distribution systems i.e., WWV, WWVH, LORAN-C, Transit, Omega, and GPS.

Unlocked Mode. A mode of operation where the AT may select different serving sector on each of the Sub-Active Sets.

User Zone. An area within which CDMA Tiered Services may be provided. It may correspond to an RF coverage area, or it may be established independent of RF topology. User Zones are classified as broadcast versus mobile-specific, and as active versus passive. See Broadcast **User Zone.** Mobile-Specific User Zone, Active User Zone, and Passive User Zone. See also Registration Zone, with which it should not be confused.

UTC. Universal Temps Coordiné. See Universal Coordinated Time.

VMN. Voice Mail Notification.

Voice Privacy. The process by which user voice transmitted over a CDMA Traffic Channel is afforded a modest degree of protection against eavesdropping over the air.

Zone-Based Registration. An autonomous registration method in which the mobile station registers whenever it enters a zone that is not in the mobile station's zone list. See also User Zone Registration, with which it should not be confused.

Zone Timer. A timer used by the mobile station to remove outdated entries from its list of zones in which it has previously registered.

2 cdma2000 1x Basic Air Interface Tests

2.1 Mobile Station Response to *Status Request Message*

2.1.1 Definition

This test verifies that the mobile station responds to a *Status Request Message* with an *Extended Status Response Message* or *Status Response Message* containing the correct information record(s).

2.1.1 Traceability

(See [3]):

2.6.4.1.2	*Service Configuration and Negotiation*
2.6.4.1.14	*Processing the Service Configuration Record*
2.6.4.1.15	*Processing the Non-Negotiable Service Configuration Record*
2.6.4.2	*Traffic Channel Initialization Substate*
2.7.1.3.2.4	Origination Message
2.7.1.3.2.5	Page Response Message
2.7.1.3.2.10	Extended Status Response Message
2.7.2.3.2.14	Service Connect Completion Message
2.7.2.3.2.16	Status Response Message
3.6.3.5	Response to Origination Message
3.6.4.1.2	*Service Configuration and Negotiation*
3.7.2.3.2.15	Status Request Message
3.7.2.3.2.21	Extended Channel Assignment Message
3.7.3.3.2.20	Service Connect Message
3.7.5.7	*Service Configuration*
3.7.5.20	*Non-Negotiable Service Configuration*
Annex D	*Information Records*

2.1.2 Method of Measurement

a. Perform an action with the mobile station that will trigger the base station to send a *Status Request Message* (e.g., power up, call origination, hard handoff).

b. Ensure that the base station sends a *Status Request Message*.

c. Verify the mobile station responds *to Status Request Message* with an *Extended Status Response Message* or *Status Response Message* with the correct record type and correct information as supported by the mobile station. The record types are specified in [3].

2.1.1 Minimum Standard

The mobile stations shall comply with step c.

2.2 Reverse traffic channel DTMF tone signaling

2.2.1 Definition

The purpose of this test is to verify mobile station initiated DTMF tones operate properly during a CDMA call.

2.2.2 Traceability

(See [3]):

2.6.10.2 *Conversation Substate*
2.7.2.3.2.7 Send Burst DTMF Message
2.7.3 *Orders*

2.2.3 Method of Measurement

a. Configure mobile station to send short DTMF tones (i.e., mobile station sends *Send Burst DTMF Message*)

b. Set up a call.

c. Perform the following steps in succession after the call is set up.

d. Press and hold any number key for approximately 5 seconds.

e. Verify mobile station sends *Send Burst DTMF Message* with the DIGIT field set to the correct value.

f. Press characters 0123456789#*. Repeat with a random digit order. Note the order of digits to verify sequential order.

g. Verify that the mobile station sends one or more *Send Burst DTMF Messages* with the DIGIT fields containing the digits in the correct order.

h. Configure the mobile station to send long DTMF tones (i.e., the mobile station sends *Continuous DTMF Tone Order*) and repeat steps b to g.

1. The verification steps should be modified as below:

a. Instead of a *Send Burst DTMF Message* with DIGIT field, the mobile station sends a *Continuous DTMF Tone Order* with ORDQ field set to the proper value followed by *Continuous DTMF Tone Order* with ORDQ field set to '11111111'.

2.2.4 Minimum Standard

The mobile station shall comply with steps e, g, and h.

2.3 Service configuration and negotiation

2.3.1 Definition

This test verifies that the initial service configuration is according to the value specified in the GRANTED_MODE field of the *Channel Assignment Message* or *Extended Channel*

Assignment Message. This test also verifies the service configuration in use is the one specified by SCR and NN-SCR agreed upon during service negotiation. This test case is applicable to all P_REV_IN_USE except 2.

2.3.2 Traceability

(See [3]):

2.6.4.1.2 *MS Service Configuration and Negotiation procedures*
2.6.4.1.14 *Processing the Service Configuration Record*
2.6.4.1.15 *Processing the Non-Negotiable Service Configuration Record*
2.6.4.2 *Traffic Channel Initialization Substate*
2.7.1.3.2.4 Origination Message
2.7.1.3.2.5 Page Response Message
2.7.2.3.2.12 Service Request Message
2.7.2.3.2.13 Service Response Message
2.7.2.3.2.14 Service Connect Completion Message
2.7.4.18 *Service Configuration information record*
3.6.4.1.2 *BS Service Configuration and Negotiation procedures*
3.7.2.3.2.8 Channel Assignment Message
3.7.2.3.2.21 Extended Channel Assignment Message
3.7.3.3.2.18 Service Request Message
3.7.3.3.2.19 Service Response Message
3.7.3.3.2.20 Service Connect Message
3.7.3.3.2.31 General Handoff Direction Message
3.7.3.3.2.36 Universal Handoff Direction Message
3.7.5.7 *Service Configuration information record*
3.7.5.20 *Non-Negotiable Service Configuration information record*

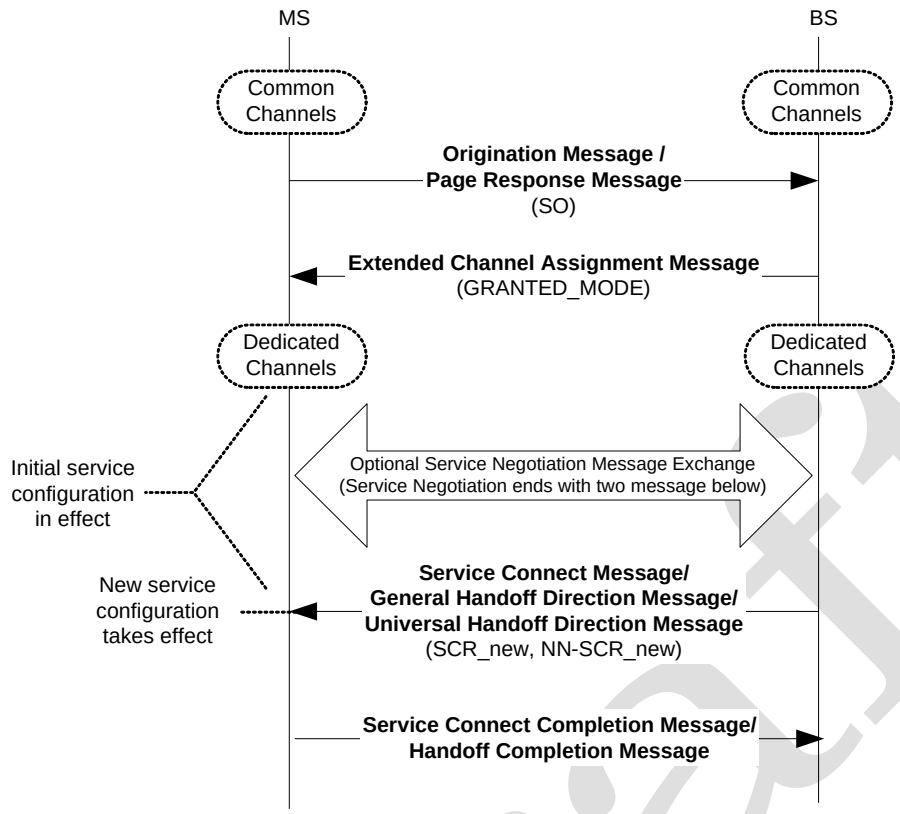

Figure 1 – Reference call flow for service configuration and negotiation

2.3.3 Method of Measurement

a. Allow the mobile station to acquire cdma2000 1x service.

b. If the mobile station supports voice calls, initiate a mobile station originated voice call. Otherwise go to step 5.

c. After base station sends a *Channel Assignment Message* or an *Extended Channel Assignment Message* to the mobile station, a service negotiation may occur between base station and mobile station. The service negotiation ends when the base station sends *Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message* with SCR and NN-SCR to the mobile station and mobile station accepts the service configuration by sending *Service Connect Completion Message/Handoff Completion Message/Extended Handoff Completion Message*.

d. Verify the following:

1. If base station sends *Channel Assignment Message* or *Extended Channel Assignment Message* with GRANTED_MODE field set to '00' in step 3 above:

a. Prior to the new service configuration sent in the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message taking effect, verify the following:

1. The service configuration in use is the one jointly specified by the DEFAULT_CONFIG value sent in the *Channel Assignment Message* or *Extended Channel Assignment Message* and the default Non-Negotiable part of the service configuration parameters specified in the Traffic Channel Initialization substate.

b. When the service configuration sent in the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message takes effect, verify the following:

1. The service configuration in use is the one specified by SCR and NN-SCR in the *Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message* sent by the base station.

2. Verify user traffic in both directions.

c. The mobile station sends a Service Connect Completion Message (if the base station sends a Service Connect Message) or a Handoff Completion Message/Extended Handoff Completion Message (if the base station sends a General Handoff Direction Message/Universal Handoff Direction Message) to the base station.

2. If base station sends *Channel Assignment Message* or *Extended Channel Assignment Message* with GRANTED_MODE field set to '01' in step 3 above

a. Prior to the new service configuration sent in the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message taking effect, verify the following:

1. If the mobile station received *Extended Channel Assignment Message*, then verify the following: The service configuration in use is the one jointly specified by the default multiplex option that is derived from the radio configuration corresponding to Table 3.7.2.3.2.21-2 in [3] and the default Non-Negotiable part of the service configuration parameters specified in the Traffic Channel Initialization substate.

2. If the mobile station received *Channel Assignment Message*, then verify the following: The service configuration in use is the default multiplex option and transmission rates corresponding to the service option requested by the mobile station either in the *Origination Message or Page Response Message*.

b. When the new service configuration sent in the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message takes effect, verify the following:

1. The service configuration in use is the one specified by SCR and NN-SCR in the *Service Connect Message* sent by the base station.

2. Verify user traffic in both directions.

c. The mobile station sends a Service Connect Completion Message (if the base station sends a Service Connect Message) or a Handoff Completion Message/Extended Handoff Completion Message (if the base station sends a General Handoff Direction Message/Universal Handoff Direction Message) to the base station.

3. If base station sends *Channel Assignment Message* or *Extended Channel Assignment Message* with GRANTED_MODE field set to '10' in step 3 above

a. Prior to the new service configuration sent in the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message taking effect, verify the following:

1. The service configuration in use is the one jointly specified by the default multiplex option that is derived from the radio configuration corresponding to Table 3.7.2.3.2.21-2 in [3] and the default Non-Negotiable part of the service configuration parameters specified in the Traffic Channel Initialization substate.

b. When the new service configuration sent in the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message takes effect, verify the following:

1. The service configuration in use is the one specified by SCR and NN-SCR in the *Service Connect Message* sent by the base station.

2. Verify user traffic in both directions.

c. The mobile station sends a Service Connect Completion Message (if the base station sends a Service Connect Message) or a Handoff Completion Message/Extended Handoff Completion Message (if the base station sends a General Handoff Direction Message/Universal Handoff Direction Message) to the base station.

d. The mobile station does not send a Service Request Message to the base station prior to the Service Connect Message/General Handoff Direction Message/Universal Handoff Direction Message is received from the base station.

4. If the base station sends a *Service Connect Message* to the mobile station with a valid service configuration that is unacceptable to the mobile station based on mobile station capability, verify the following:

a. Upon receiving this message, the mobile station sends a Mobile Station Reject Order with ORDQ set to '00000111'.

b. The mobile station does not send a *Service Connect Completion Message*.

c. The mobile station does not send a *Service Request Message* with REQ_PURPOSE set to either '0000' or '0001'.

d. The mobile station does not send a *Service Response Message* with RESP_PURPOSE set to either '0000' or '0001'.

e. The service configuration previously in use continues to be in effect without any interruptions.

f. Verify user traffic (e.g., Audio) on both directions.

5. If the base station sends a *Service Request Message* or *Service Response Message* with REQ_PURPOSE set to '0001' to reject the service configuration and the base station does not propose another service configuration, verify the following:

   a. Upon receiving the *Service Request Message* or *Service Response Message* from the base station, the mobile station terminates this service negotiation session. This can be verified by the following conditions:

      1. The mobile station does not a send a *Service Connect Completion Message* to the base station, and

      2. The mobile station does not send a *Service Response Message* or *Service Request Message* to the base station.

      3. The base station does not send a *Service Request Message* or *Service Response Message* to the mobile station with the same SERV_REQ_SEQ sent in the rejected *Service Request Message* or *Service Response Message*.

   b. The service configuration previously in use continues to be in effect without any interruptions.

e. If mobile station supports data calls, initiate a data call and repeat steps c through d.

2.3.4 Minimum Standard

The mobile station shall comply with step d.

2.4 Release order on access channel

2.4.1 Definition

This test verifies that the mobile station can send a *Release Order* on the Access Channel, and that the base station acknowledges it. The *Release Order* is sent when the mobile station user releases the call (e.g., hits the END key) while waiting for a call to connect, but has not been assigned a dedicated channel yet.

2.4.2 Traceability

(See [3]):

3.6.3 Access Channel Processing
3.6.3.4 Response to Orders
2.6.3 System Access State
2.6.3.1.4 System Access State Exit Procedures
2.6.3.5 Mobile Station Origination Attempt Substate

(See[2]):

2.1.1.2.2.1 Overview of Transmission and Retransmission Procedures

2.4.3 Method of Measurement

a. Power up the mobile station and wait for registration to occur.

b. Attempt a mobile station originated call. Press the "SEND/TALK" key and immediately press the "END" key to cancel the call.

c. Verify the mobile station sends a *Release Order* on the r-csch before receiving an *Extended Channel Assigment Message or Channel Assignment Message.*

2.4.4 Minimum Standard

The mobile station shall comply with step c.

2.5 Voice Call set-up with RC 11/12 and RC 8

2.5.1 Definition

This tests mobile station's inclusion of RC 11/12 and RC 8 in the Channel Configuration Capability Information record in a origination and page response messages during mobile station originated and terminated calls respectively. Note, the base station may assign RC 12 on the forward channel if the mobile station indicates support for RC 12 in the *Origination* or *Page Response* Message.

2.5.2 Traceability

(See [3])
2.7.1.3.2.5 Page Response Message
2.7.1.3.2.2.4 Origination Message
2.7.2.3.2.14 Service Connect Completion Message
3.7.2.3.2.17 General Page Message
3.7.2.3.2.21 Extended Channel Assignment Message
3.7.3.3.2.20 Service Connect Message
3.7.5.7 Service Configuration

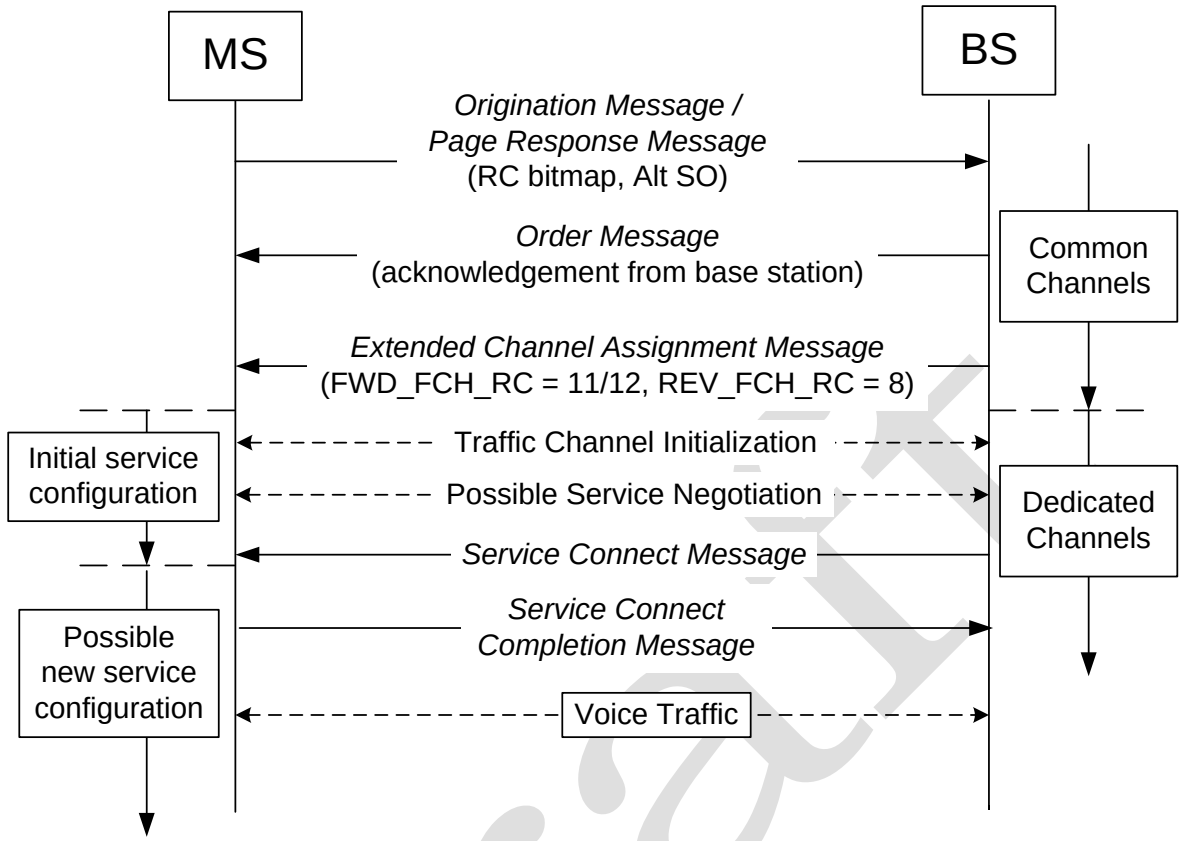

Figure 2 – Reference call flow for RC 8 and RC 11/12 based voice call establishment

2.5.3 Method of Measurement

a. Allow the mobile station to acquire cdma2000 1x service in a sector that supports RC 8 on reverse link and RC 11/12 on the forward link.

b. If the mobile station supports voice calls, initiate a mobile station originated voice call.

c. Verify that the mobile station includes support for RC 11/12 in FOR_FCH_RC_MAP and RC 8 in REV_FCH_RC_MAP in the *Origination Message*.

d. Verify that the base station sends an *Extended Channel Assignment Message* with FOR_FCH_RC / FOR_RC set to 11/12 and REV_FCH_RC / FOR_RC set to 8. Note the base station may send this message in a *General Extension Message*.

e. Verify that the base station sends a *Service Connect Message* and assigns a service option for voice services that is supported by the mobile station.

f. Verify that the mobile station transmits a *Service Connect Completion Message*.

g. Verify that the mobile station and base station start sending and receiving frames for voice traffic.

h. Terminate the voice call.

i. Repeat steps a through h for mobile station terminated calls. In this case, *Origination Message* is replaced by *Page Response Message*.

2.5.4 Minimum Standard

The mobile station shall comply with step c, f, and g.

The base station shall comply with step d, e, and g.

2.6 Processing of Radio Configuration Parameters Message

2.6.1 Definition

This test verifies that mobile station changes the RC 11/12 and RC 8 parameters received in the Radio Configuration Parameters message. This test is only applicable when the base station transmits a Radio Configuration Parameters Message in order to change the default values of RC 8 and / or RC 11/12.

2.6.2 Traceability

Same as 2.5.2.

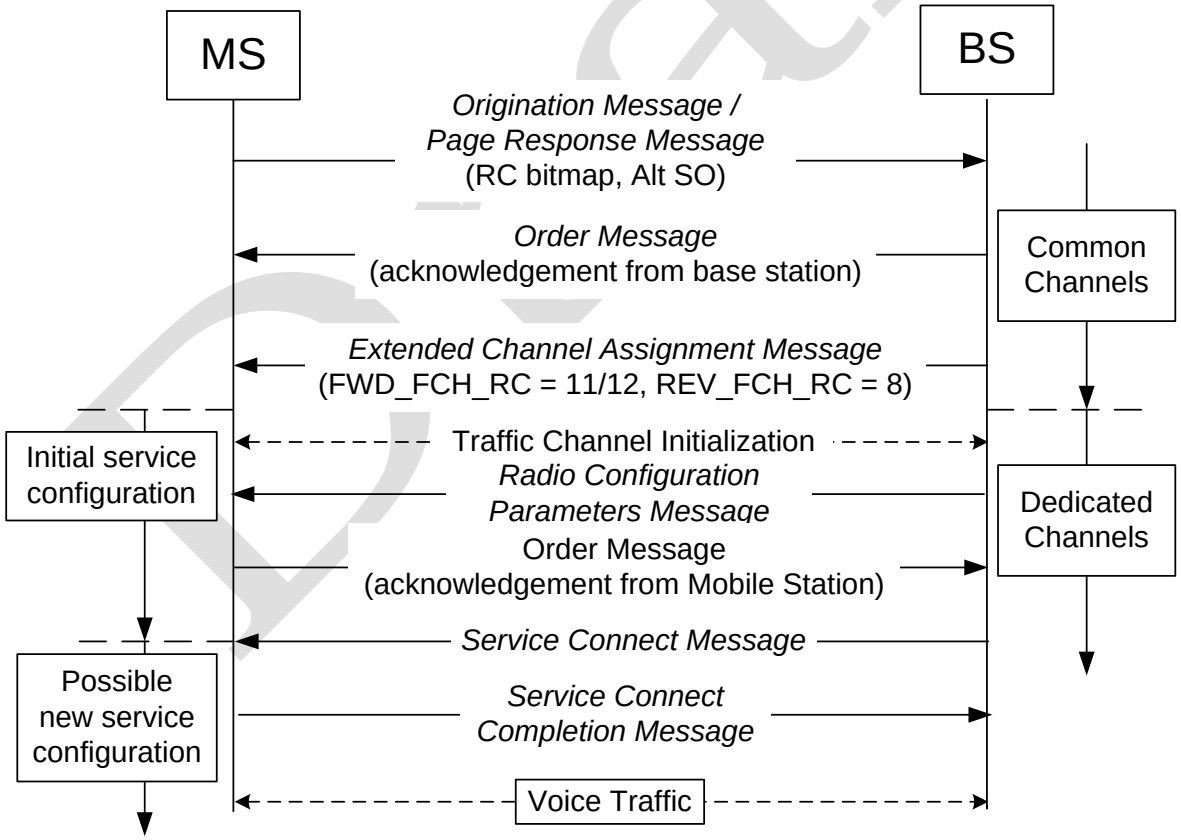

Figure 3 – Reference call flow for Processing of Radio Configuration Parameters Message

2.6.3 Method of Measurement

a. Allow the mobile station to acquire cdma2000 1x service in a sector that supports RC 8 on reverse link and RC 11/12 on the forward link. Ensure that the base station needs to change the default parameters for RC 8 and / or RC 11/12 and uses Radio Configuration Parameters Message for this purpose.

b. If the mobile station supports voice calls, initiate a mobile station originated voice call.

c. Ensure that the mobile station includes support for RC 11 in FOR_FCH_RC_MAP and RC 8 in REV_FCH_RC_MAP in the *Origination Message*.

d. Ensure that the base station sends an *Extended Channel Assignment Message* with FOR_FCH_RC / FOR_RC set to 11/12 and REV_FCH_RC / FOR_RC set to 8.

e. Verify that the base station sends a *Radio Configuration Parameters Message* to the mobile station.

f. If the base station transmits the *Radio Configuration Parameters Message* in assured mode of delivery, verify that the access terminal transmits an *Order Message* acknowledging the receipt of *Radio Configuration Parameters Message*.

g. Ensure that the base station transmits Service Connect Message specifying a SO for voice services that is supported by the mobile station.

h. Ensure that the mobile station transmits *Service Connect Completion Message* to the base station.

i. Verify that the mobile station starts transmitting and receiving frames for voice traffic.

2.6.4 Minimum Standard

The mobile station shall comply with steps f and i.

The base station shall comply with steps e and i.

2.7 GEM Processing for Radio Configuration Parameters Record Processing

2.7.1 Definition

This test verifies that mobile station changes the RC 11/12 and RC 8 parameters received in the Radio Configuration Parameters Record, when this record is received along with an *Extended Channel Assignment Message* in a *General Extension Message*. Note that the base stations may not support this test as transmission of *GEM* is not mandatory.

2.7.2 Traceability

Same as 2.5.2.

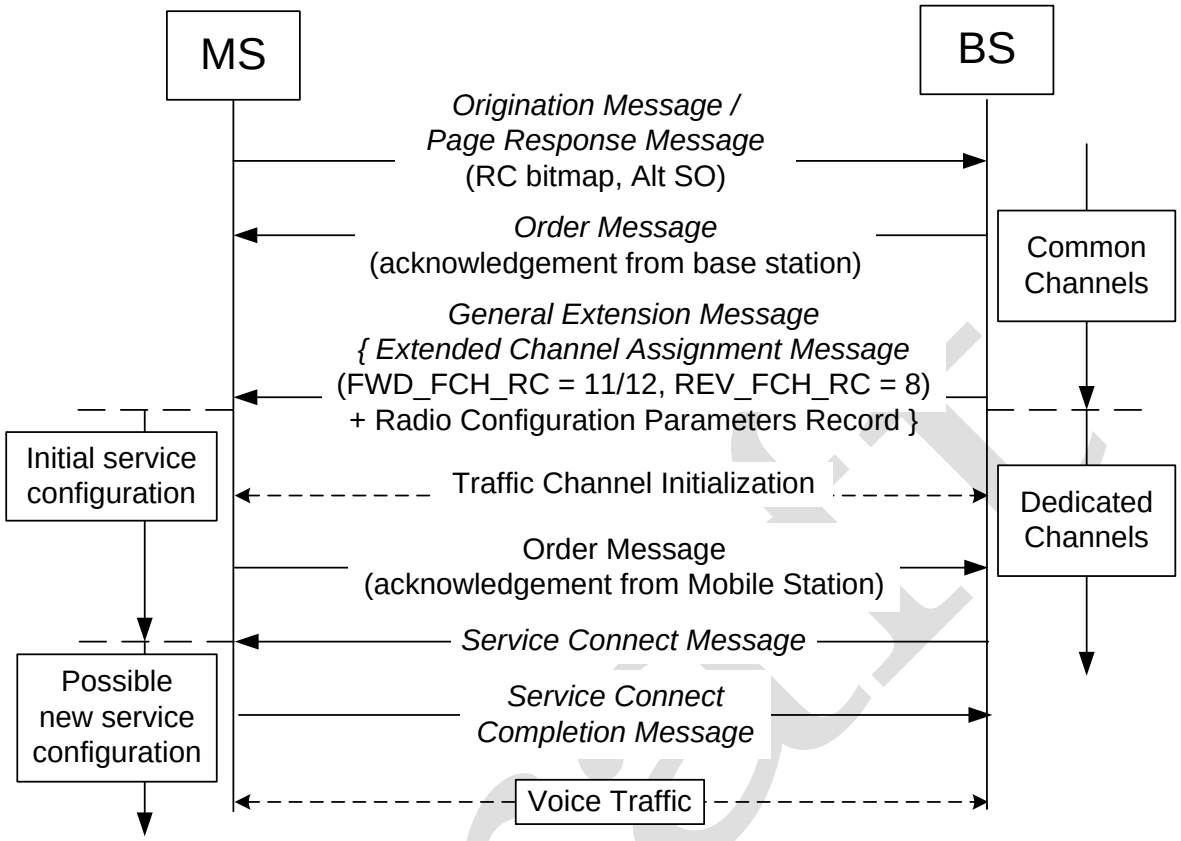

Figure 4 – Reference call flow for Processing of General Extension Message

2.7.3 Method of Measurement

a. Allow the mobile station to acquire cdma2000 1x service in a sector that supports RC 8 on reverse link and RC 11/12 on the forward link. Ensure that the base station needs to change the default parameters for RC 8 and / or RC 11/12 and uses *General Extension Message* for this purpose.

b. If the mobile station supports voice calls, initiate a mobile station originated voice call.

c. Ensure that the mobile station includes support for RC 11 in FOR_FCH_RC_MAP and RC 8 in REV_FCH_RC_MAP in the *Origination Message*.

d. Verify that the base station sends an *Extended Channel Assignment Message* with FOR_FCH_RC / FOR_RC set to 11/12 and REV_FCH_RC / FOR_RC set to 8 and includes a Radio Configuration Parameters Record.

e. Verify that the mobile station is able to process the *General Extension Message* and establish the traffic channel.

f. Ensure that the base station transmits *Service Connect Message* specifying a SO for voice services that is supported by the mobile station.

g. Ensure that the mobile station transmits *Service Connect Completion Message* to the base station.

h. Verify that the mobile station starts transmitting and receiving frames for voice traffic.

2.7.4 Minimum Standard

The mobile station shall comply with steps e and h.

The base station shall comply with steps d and h.

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3 cdma2000 1x Handoff Tests

For test cases in this chapter the locations where handoff scenarios occur should be identified with help from network operator.

3.1 Soft handoff

3.1.1 Definition

This test verifies the mobile station and base station perform soft handoff. This test verifies proper functionality of the mobile station and the base station when pilots are added or dropped from the Active Set.

3.1.2 Traceability

(See [3]):

2.6.2.2.5 Extended System Parameters Message
2.6.4.1.4 Processing the In-Traffic System Parameters Message
2.6.6.2.3 Handoff Drop Timer
2.6.6.2.5.1 Processing of Forward Traffic Channel Handoff Messages
2.6.6.2.5.2 Processing of Reverse Traffic Channel Handoff Messages
2.6.6.2.6.2 Maintenance of the Candidate Set
2.6.6.2.6.3 Maintenance of the Neighbor Set
2.6.6.2.8.2.1 Restoring the Configuration
2.6.6.3 Examples
2.7.2.3.2.5 Pilot Strength Measurement Message
3.6.6.2.1.1 System Parameters
3.7.2.3.2.13 Extended System Parameters Message
3.7.3.3.2.7 In-Traffic System Parameters Message
3.7.3.3.2.31 General Handoff Direction Message

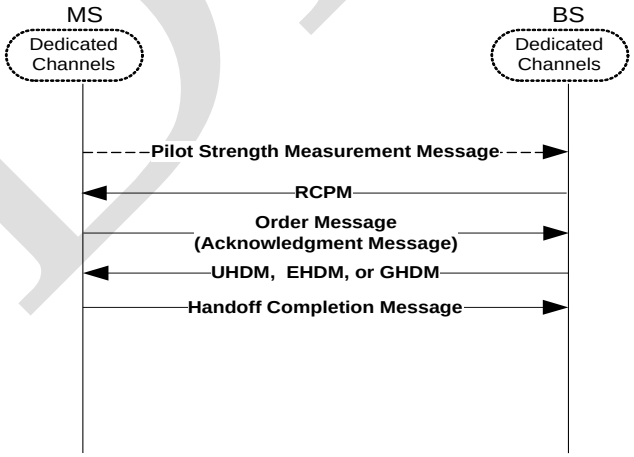

Figure 5 – Reference call flow for Processing of Radio Configuration Parameters Message before the handoff message

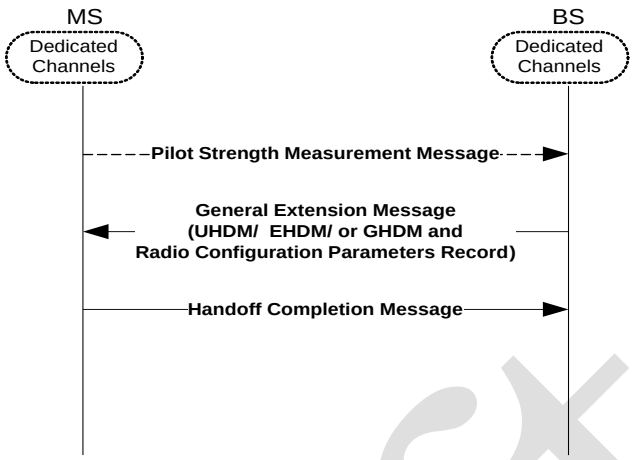

Figure 6 – Reference call flow for Processing of General Extension Message containing the handoff message and the Radio Configuration Parameters

3.1.3 Method of Measurement

a. Select a route where the mobile station only acquires base station 1, then does a soft handoff between two base stations (1 and 2), and then only acquires base station 2.

b. Allow the mobile station to acquire base station 1.

c. Set up a call with the mobile station.

d. Verify user data in both directions.

e. Verify that only base station 1's pilot is in the active set.

f. Move (e.g., drive) along the selected route until the mobile station is in a soft handoff region between base stations 1 and 2.

g. Verify that the mobile station sends an autonomous *Pilot Strength Measurement Message* as a message requiring an acknowledgment and containing measurements.

h. Verify that the base station sends an Extended Handoff Direction Message, a General Handoff Direction Message, or a Universal Handoff Direction Message to the mobile station.

i. If the base station assigned RC 8 on the reverse channel or RC 11/12 on the forward channel in step c, verify that the base station sends either a Radio Configuration Parameters Message or sends a General Extension Message carrying the Radio Configuration Parameters Record along with the EHDM/GHDM/UHDM in step h.

j. Verify that the mobile station updates its active set accordingly and sends a *Handoff Completion Message*/*Extended Handoff Completion Message*.

k. Continue driving until the mobile station is only within the coverage of base station 2.

l. Verify that the mobile station sends an autonomous *Pilot Strength Measurement Message* as a message requiring an acknowledgment and containing measurements.

m. Verify that the base station sends an *Extended Handoff Direction Message*, *General Handoff Direction Message*, or *Universal Handoff Direction Message* to the mobile station, with only the pilot belonging to base station 2.

n. If the base station assigned RC 8 on the reverse channel or RC 11/12 on the forward channel in step c, verify that the base station sends either a Radio Configuration Parameters Message or sends a General Extension Message carrying the Radio Configuration Parameters Record along with the EHDM/GHDM/UHDM in step h.

o. Verify that the mobile station updates its active set with the base station 2 pilot and sends a *Handoff Completion Message*/*Extended Handoff Completion Message*.

p. Verify user data in both directions.

q. End the call.

3.1.4 Minimum Standard

The mobile station shall comply with g, j, l, o and q.

The base station shall comply with i, m, n and q.

3.2 Hard handoff between frequencies in the same band class

3.2.1 Definition

This test verifies the mobile station and the base station perform a hard handoff between different CDMA channels in the same band class.

3.2.2 Traceability

(See [3]):

2.6.6.1.1 Types of Handoff
2.6.6.2.5 Handoff Messages
2.6.6.2.8 CDMA-to-CDMA Hard Handoff
3.6.6.1.1 Types of Handoff
3.6.6.2.2 Call Processing During Handoff

3.2.3 Method of Measurement

a. Select a route where mobile station acquires base station 1 and performs a hard handoff to base station 2 with different frequency in the same band class as base station 1.

b. Allow the mobile station to acquire base station 1. Initiate a call.

c. Verify user data in both directions.

d. Verify that only base station 1's pilot is in the active set.

e. Move (e.g., drive) along the selected route towards base station 2.

f. Upon receiving an Extended Handoff Direction Message, General Handoff Direction Message, or Universal Handoff Direction Message specifying base station 2 pilot, the mobile station shall send a Handoff Completion Message/Extended Handoff Completion Message to base station 2.

g. Verify user data on both directions.

h. Verify that only base station 2's pilot is in the active set.

i. End the call.

3.2.4 Minimum Standard

The mobile station shall comply with g and h.

3.3 Hard handoff between different band classes

3.3.1 Definition

This test verifies hard handoff between two different band classes.

3.3.2 Traceability

(See [3]):

2.6.6.1.1 Types of Handoff
2.6.6.2.5 Handoff Messages
2.6.6.2.8 CDMA-to-CDMA Hard Handoff
3.6.6.1.1 Types of Handoff
3.6.6.2.2 Call Processing During Handoff

3.3.3 Method of Measurement

a. Select a route where a hard handoff from one Band Class (base station 1) to a different Band Class (base station 2) will occur, for example, from Band Class 0 to Band Class 1.

b. Initiate a CDMA call in one Band Class (base station 1) coverage area.

c. Verify user data in both directions.

d. Move (e.g., drive) along the selected route towards a second Band Class coverage area (base station 2).

e. Verify that upon receiving a Extended Handoff Direction Message, General Handoff Direction Message, or Universal Handoff Direction Message specifying base station 2 pilot, the mobile station sends a Handoff Completion Message/Extended Handoff Completion Message to the base station.

f. Verify user data in both directions.

3.3.4 Minimum Standard

The mobile station shall comply with e and f.

3.4 Handoff on same frequency with different radio configurations

3.4.1 Definition

This test verifies handoff on the same frequency, but between different radio configurations.

3.4.2 Traceability

(See [3]):

2.6.6.1.1 Types of Handoff
2.6.6.2.5 Handoff Messages
2.6.6.2.8 CDMA-to-CDMA Hard Handoff
3.6.6.1.1 Types of Handoff
3.6.6.2.2 Call Processing During Handoff

(See [1]):

2.1.3.1 Reverse CDMA Channel Signals

3.4.3 Method of Measurement

a. Select a route where base station 1 and base station 2 are operating on the same frequency with different radio configurations, and it is known a HHO from one RC to another RC (e.g., RC-3 to RC-1) will occur.

b. Set up a mobile station originated call on base station 1.

c. Verify user data in both directions.

d. Move (e.g., drive) from base station 1 to base station 2 until a handoff occurs i.e., mobile station receives a General Handoff Direction Message/Universal Handoff Direction Message and sends a Handoff Completion Message/Extended Handoff Completion Message.

e. Verify user data in both directions.

f. Repeat 1 through 5 for HHO on same frequency for all possible combinations of RCs (e.g., RC-1 to RC-3, RC-5 to RC-2, RC-2 to RC-5 etc.).

3.4.4 Minimum Standard

The mobile station shall comply with e and f.

3.5 Hard handoff while in the waiting for mobile station answer substate

3.5.1 Definition

This test verifies that if a hard handoff occurs while the mobile station is in the Waiting for Mobile Station Answer Substate, the hard handoff shall be completed successfully and the mobile station enters the Conversation Substate on the new channel. This test is applicable only if call forwarding and voice mail can be disabled from the mobile station, or if handoff

can be triggered during Mobile Station Answer Substate.

3.5.2 Traceability

(See [3]):

2.6.4 Mobile Station Control on the Traffic Channel State
2.6.4.3.2 Waiting for Mobile Station Answer Substate
2.6.4.4 Conversation Substate
2.6.6.2.5.1 Processing of the Forward Traffic Channel Handoff Messages
2.6.6.2.8 CDMA to CDMA Hard Handoff
3.6.4.3.1 Waiting for Order Substate
3.6.6.2.2 Call Processing during Handoff
3.7.3.3.2.17 Extended Handoff Direction Message
3.7.3.3.2.31 General Handoff Direction Message
3.7.3.3.2.36 Universal Handoff Direction Message

3.5.3 Method of Measurement

a. Select a route where the hard handoff occurs between base stations 1 and 2, where the two base stations operate on different frequencies.

b. Ensure that the mobile station is operating in the Mobile Station Idle State on base station 1. Disable call forwarding and voice mail from the mobile station if supported.

c. Initiate a mobile station terminated voice call.

d. While the mobile station is ringing (i.e., is in the Waiting for Mobile Station Answer Substate), move (e.g., drive) towards base station 2 from base station 1 until mobile station receives an *Extended Handoff Direction Message*, a *General Handoff Direction Message*, or an *Universal Handoff Direction Message* directing the mobile station to base station 2.

e. Verify, when call is answered by the user, the mobile station enters the Conversation Substate on base station 2 and user traffic (i.e., audio) is present in both directions.

f. End the call.

3.5.4 Minimum Standard

The mobile station shall comply with d and e.

4 cdma2000 1x Power Control Tests

The network operator should provide the target FER value for test cases in this chapter. Typical values of target FER are 1% for voice calls and 5% for data calls.

4.1 Forward traffic channel power control

4.1.1 Definition

This test verifies that the forward link FER is maintained approximately at the target FER value.

4.1.2 Traceability

(See [3]):

2.6.4.1.1 *Forward Traffic Channel Power Control*
2.7.2.3.2.6 Power Measurement Report Message
3.6.4.1.1 *Forward Traffic Channel Power Control*
3.7.3.3.2.10 Power Control Parameters Message
Applicability: Forward Link: RC 1 through RC 5, RC 11, RC 12; Reverse Link: RC 1 through RC 4, RC 8

4.1.3 Method of Measurement

a. Select a route where the mobile station mean receive power is approximately -75dBm and the mean receive pilot Ec/Io is larger than -12 dB. Conditions along the route should include pilot variations that pass through the T_ADD and T_DROP thresholds. The base station parameters are set as follows:

    1. PWR_THRESH_ENABLE – '1' (Enable threshold reporting)
    2. PWR_PERIOD_ENABLE – '0' (Disable periodic reporting)

b. Initiate a Markov voice or loop back call from the mobile station and move (e.g., drive) along the selected route.

c. Monitor the forward link FER at the mobile station.

d. Verify the forward link FER is maintained approximately at the target FER value.

e. End the call.

f. Repeat steps a to e with the exception that the base station parameters are set as follows:

    1. PWR_THRESH_ENABLE – '0' (Disable threshold reporting)
    2. PWR_PERIOD_ENABLE – '1' (Enable periodic reporting)

g. Verify the forward link FER is maintained approximately at the target FER value.

h. End the call.

4.1.4 Minimum Standard

The mobile station shall comply with d and g.

4.2 Fast forward power control for Voice and Data

Fast forward power control in different FPC_MODE and in soft handoff.

4.2.1 Definition

This test verifies that the forward link FER is maintained approximately at the target FER value during voice and data calls for the F-FCH and F-SCH.

Table 1. Reverse power control subchannel configurations for Radio Configuration 3

FPC_MODE	**Reverse Power Control Subchannel Allocations (Power Control Group Numbers 0-15)**	
	Primary Reverse Power Control Subchannel	**Secondary Reverse Power Control Subchannel**
'000'	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	Not supported
'001'	0,2,4,6,8,10,12,14	1,3,5,7,9,11,13,15
'010'	1,5,9,13	0,2,3,4,6,7,8,10,11,12,14,15
'011'	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	Not supported
'100'	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	Not supported
'101'	0,2,4,6,8,10,12,14	1,3,5,7,9,11,13,15
'110'	0,2,4,6,8,10,12,14	1,3,5,7,9,11,13,15

Table 2. Reverse power control subchannel configurations for Radio Configuration 8

FPC_MODE	**Reverse Power Control Subchannel Allocations (Power Control Group Numbers 0-15)**	
	Primary Reverse Power Control Subchannel	**Secondary Reverse Power Control Subchannel**
'000'	0,3,5,7,9,11,13,15	Not supported
'001'	3,7,11,15	Not supported
'010'	3,7,11,15	1,5,9,13
All other values	Reserved	Reserved

4.2.2 Traceability

(See [3]):

2.1.3.1.10 Reverse Power Control Subchannel
3.7.2.3.2.21 Extended Channel Assignment Message
3.7.5.20 Service Connect Message

(See [IR 1]):

3 *SERVICE OPTION NUMBER ASSIGNMENTS*

4.2.3 Method of Measurement

a. Select a predetermined route where the mobile station would go through soft handoff pilot add/drop conditions and for which the mean receive power is approximately -75 dBm and the mean receive Pilot Ec/Io is larger than -12 dB.

b. Initiate a voice call using radio configuration RC3 and start driving along the selected route.

c. Monitor the forward link FER at the mobile station.

d. Verify that the forward link FER on the FCH is maintained approximately at the target FER value. Note that target FER can be verified by FPC_FCH_FER which is carried in *Extended Channel Assignment Message*, *Power Control Message*, *Service Connect Message*, *General Handoff Direction Message* and *Universal Handoff Direction Message*.

e. End the call at the mobile station.

f. Repeat steps a through e above using SO 33.

g. Verify that the F-FCH and F-SCH FER is maintained approximately at the target FER values. Note that target FER for F-FCH can be verified by FPC_FCH_FER which is carried in *Extended Channel Assignment Message*, *Power Control Message*, *Service Connect Message*, *General Handoff Direction Message* and *Universal Handoff Direction Message*, and target FER for F-SCH can be verified by FPC_SCH_FER which is carried in *Power Control Message* and *Extended Supplemental Channel Assignment Message*.

h. Repeat step a to g after selecting a route where the mobile station will get each FPC mode in Table 1 supported by the base station. Note that FPC_MODE can be verified by FPC_MODE and FPC_MODE_SCH fields. FPC_MODE field is carried in *Power Control Message*, *Service Connect Message*, *General Handoff Direction Message*, and *Universal Handoff Direction Message*. FPC_MODE_SCH field is carried in *Extended Supplemental Channel Assignment Message*.

i. Repeat steps a-h with the following changes

    a. Use RC8 instead of RC3 in step b.

    b. Use Table 2 instead of Table 1 in step h.

1 4.2.4 Minimum Standard

2 The mobile station shall comply with d and g.

5 cdma2000 1x Subscriber Calling Features Tests

5.1 Call Forwarding

5.1.1 Definition

These tests verify that Call Forwarding can be activated and deactivated from the mobile station. Call forwarding features tested in this test are Call Forwarding Unconditional (CFU), Call Forwarding Busy (CFB), Call Forwarding Default (CFD), and Call Forwarding No-Answer (CFNA). Call Forwarding features can be successfully activated or deactivated from the mobile station only if the network supports the call forwarding features.

5.1.1.1 Call Forwarding Unconditional (CFU)

CFU permits a called subscriber to send incoming calls addressed to the called subscriber's Directory Number to another Directory Number (forward-to number) or to the called subscriber's designated voice mailbox. If this feature is active, calls are forwarded regardless of the condition of the termination.

5.1.1.2 Call Forwarding Busy (CFB)

CFB permits a called subscriber to have the system send incoming calls to another Directory Number (forward-to number) or to the called subscriber's designated voice mailbox, when the subscriber is engaged in a call or service.

5.1.1.3 Call Forwarding Default (CFD)

CFD permits a called subscriber to have the system send incoming calls to another Directory Number (forward-to number) or to the called subscriber's designated voice mail box, when the subscriber is engaged in a call, does not answer the call within a specified period after being alerted or the mobile station is otherwise inaccessible.

5.1.1.4 Call Forwarding No Answer (CFNA)

CFNA permits a called subscriber to have the system send incoming calls addressed to the called subscriber's Directory Number to another Directory Number (forward-to number) or to the called subscriber's designated voice mailbox, when the subscriber fails to answer.

5.1.2 Traceability

(See [3]):

3.7.5.5 Signal

5.1.3 Method of Measurement

5.1.3.1 Call Forwarding, Unconditional

a. Power on the mobile station and wait until it goes into Mobile Station Idle State.

b. Activate the Call Forwarding Unconditional (CFU) feature for the mobile station (e.g., dial the CFU feature activation code, followed by the forward-to number).

c. Attempt a call to the mobile station.

d. Verify the call is forwarded and if the network directs the mobile station to "Ping Ring" it does so (e.g., plays a single burst).

e. Answer the call on the forwarded line.

f. Verify the audio path.

g. End call.

h. Deactivate the CFU feature (e.g., dial the CFU deactivation feature).

i. Set up a call to the mobile station.

j. Verify that the mobile station rings and call completes when answered.

k. If supported by the network, repeat the test except for at step 2, dial the CFU activation feature code, followed by voice mail number.

5.1.3.2 Call Forwarding, Busy

a. Power on the mobile station and wait until it goes into Mobile Station Idle State.

b. Activate the Call Forwarding Busy (CFB) feature for the mobile station (e.g., dial the CFB activation feature code, followed by the forward-to number). Ensure all other call forwarding features are disabled.

c. Place the mobile station in a voice call.

d. Attempt a call to the mobile station.

e. Verify the call is forwarded to the forward-to number or voice mail and if the network directs the mobile station to "Ping Ring" it does so (e.g., plays a single ring burst).

f. Answer the call on the forward line.

g. Verify the audio path.

h. End all calls.

i. Attempt a call to the mobile station while the mobile station is in idle state.

j. Verify that the call is not forwarded.

k. End the call.

l. Deactivate the CFB feature (e.g., dial the CFB deactivation feature code).

m. Set up a call to the mobile station.

n. Verify the call completes at the mobile station. Release the call.

o. Place the mobile station in a voice call.

p. Set up a call to the mobile station.

q. Verify the call is not forwarded.

r. If supported by the network repeat the test except that at step 2, dial the CFB activation feature code, followed by voice mail number.

5.1.3.3 Call Forwarding, Default

a. Power on the mobile station and wait until it goes into Mobile Station Idle State.

b. Activate the Call Forwarding Default (CFD) feature for the mobile station (e.g., dial the CFD activation feature code, followed by the forward-to number).

c. Set up a call to the mobile station. Do not answer the call when mobile station is alerting.

d. Verify the call is forwarded and if the network directs the mobile station to “Ping Ring” it does so (e.g., plays a single ring burst).

e. Answer the call on the forward line.

f. Verify the audio path.

g. End call.

h. Place the mobile station in a voice call.

i. Attempt a call to the mobile station.

j. Verify the call is forwarded to the forward-to number or voice mail.

k. Answer the call on the forward line.

l. Verify the audio path.

m. Deactivate the CFD feature (e.g., dial the CFD deactivation feature code).

n. Set up a call to the mobile station.

o. Verify the call completes at the mobile station. Release the call.

p. Set up a call to the mobile station. Do not answer the call when mobile station is alerting.

q. Verify the call is not forwarded.

r. If supported by the network repeat the test except that at step 2, dial CFD activation feature code, followed by voice mail number.

5.1.3.4 Call Forwarding, No Answer

a. Power on the mobile station and wait until it goes into Mobile Station Idle State.

b. Activate the Call Forwarding No-Answer (CFNA) feature for the mobile station (e.g., dial the CFNA activation feature code, followed by the forward-to number). Ensure all other call forwarding features are disabled, and call waiting is enabled

c. Set up a call to the mobile station. Do not answer the call when mobile station is alerting.

d. Verify the call is forwarded to the forward-to number or voice mail and if the network directs the mobile station to "Ping Ring" it does so (e.g., plays a single ring burst).

e. Answer the call on the forward line.

f. Verify the audio path.

g. End all calls.

h. Place the mobile station in a voice call.

i. Set up a call to the mobile station.

j. Verify that the user receives call waiting indication. Do not answer the call waiting call.

k. Verify the call is forwarded to the forward-to number or voice mail and if the network directs the mobile station to "Ping Ring" it does so (e.g., plays a single ring burst).

l. Deactivate the CFNA feature (e.g.dial the CFNA deactivation feature code).

m. Set up a call to the mobile station.

n. Verify the call completes at the mobile station. Release the call.

o. Set up a call to the mobile station. Do not answer the call when mobile station is alerting.

p. Verify the call is not forwarded.

q. If supported by the network repeat the test except that at step 2, dial CFNA activation feature code, followed by voice mail number.

5.1.4 Minimum Standard

Verify steps, e, g, k, n, o, and q.

5.2 Three-way calling

5.2.1 Definition

This test verifies that a mobile station authorized for Three-Way Calling can add a third party to an established two-way call.

5.2.2 Traceability

(See [3]):

2.7.2.3.2.3 Flash with Information Message

2.7.2.3.2.33 Extended Flash With Information Message

5.2.3 Method of Measurement

a. Set up a call from the mobile station to called party 1.

b. Verify audio in both directions.

c. Instruct the mobile station to put called party 1 on hold.

d. Verify the mobile station sends a *Flash with Information Message*/*Extended Flash with Information Message* to put called party 1 on hold, and called party 1 is put on hold.

e. Using the mobile station, dial called party 2 number.

f. Verify that the mobile station sends a Flash with Information Message/Extended Flash with Information Message.

g. When the called party 2's phone rings, answer the call from called party 2 (second leg of the three-way call).

h. Verify audio in both directions.

i. Instruct the mobile station to initiate the three-way connection.

j. Verify the mobile station sends a Flash with Information Message/Extended Flash with Information Message.

k. Verify the three-way connection is established.

l. If supported, instruct the mobile station to initiate the disconnection of the third-leg of the three-way call (e.g., press SEND key), otherwise go to step 14.

m. Verify that a *Flash with Information Message*/*Extended Flash with Information Message* is sent from the mobile station. Verify the three-way connection is disconnected and the call is returned to its original two-way state.

n. End call from the mobile station.

5.2.4 Minimum Standard

The mobile station shall comply with d, f, h, j, k, and m.

5.3 Call waiting

5.3.1 Definition

This test verifies that a mobile station in a two-way conversation with call waiting enabled, will receive notification of waiting calls. This test will verify that the mobile station will send a flash request to connect to the waiting call. Call Waiting Blocked feature is also checked.

5.3.2 Traceability

(See [3]):

3.7.5.5 Signal

3.6.7.2 Requirements

5.3.3 Method of Measurement

a. Ensure call waiting is enabled for the mobile station under test.

b. Make a mobile station to called party call.

c. Verify user data in both directions.

d. Set up a call from calling party to the mobile station. Wait for a ringback on calling party and the call waiting notification on the mobile station.

e. Press SEND on the mobile station.

f. Verify the mobile station sends a *Flash With Information Message*/*Extended Flash with Information Message* to the base station to switch over to calling party.

g. Verify called party is on hold, and that a voice path is established between the mobile station and calling party.

h. Press SEND on the mobile station to put calling party on hold, and reconnect the voice path to called party.

i. Verify the mobile station sends a Flash With Information Message/Extended Flash with Information Message to the base station.

j. End called party call.

k. Press SEND on the mobile station.

l. Verify the mobile station sends a *Flash With Information Message*/*Extended Flash with Information Message* to the base station to switch over to calling party.

m. Verify user data between the mobile station and calling party.

n. End call.

o. Disable call waiting.

p. Set up a mobile station originated call to called party.

q. Verify user data in both directions.

r. Set up a call from calling party to the mobile station. Wait for the busy tone on calling party. Ensure that there is no call-waiting notification on the mobile station. End calls.

s. Enable call waiting.

t. If Call Waiting Blocked feature is available to the mobile station, repeat dialing the called party from the mobile station, but with a Call Waiting Blocked feature code before the dialed number (e.g., *70+number). Repeat steps r to s.

u. Verify no Call Waiting Notification is observed on the mobile station, and the caller should be routed directly to Voice Mail or given a busy tone or a recording.

v. End all calls.

w. Establish a call from the mobile station without a Call Waiting Blocked feature code before the dialed number.

x. Set up a call from calling party to the mobile station.

y. Verify call waiting notification on the mobile station.

z. Release all calls.

5.3.4 Minimum Standard

The mobile station shall comply with f, g, i, l, m, u, and y.

5.4 Caller ID

5.4.1 Definition

This test will verify Calling Number Identification Presentation (CNIP) provides the number identification of the calling party to the called subscriber.

5.4.2 Traceability

(See [3]):

2.7.4: Information Records
3.7.2.3.2.12: Feature Notification Message
3.7.3.3.2.3: Alert with Information Message
3.7.3.3.2.14: Flash with Information Message
3.7.3.3.2.45: Extended Flash With Information Message
3.7.5: Information Records

5.4.3 Method of Measurement

a. Ensure that Calling Number Identification Presentation (CNIP) is activated for the mobile station under test.

b. Set up a call to the mobile station from a phone that allows calling party number presentation.

c. Verify the mobile station receives and displays the Calling Party number.

d. End the call.

e. Set up a call to the mobile station from a phone that restricts calling party number presentation (e.g., by prefixing the dialed number with the mobile station Caller ID Blocked feature code).

f. Verify that the mobile station does not display the Calling Party Number.

g. End the call.

h. If the mobile station supports call waiting, repeat the steps a to g with following modification: The mobile station is in conversation state instead of idle state.

5.4.4 Minimum Standard

The mobile station shall comply with c, and f.

5.5 Call Waiting Call Back

5.5.1 Definition

This test will verify Call Waiting Call Back. This feature forces the base station to call the mobile station in the following scenario:

- Mobile station is in conversation state with user 1.
- Mobile station receives a call from user 2 and switches to user 2 using call waiting.
- Mobile station terminates the call without switching back to user 1.
- Base station will automatically call the mobile station with user 1's calling party number, if user 1 is still holding.

5.5.2 Traceability

(See [3]):

3.7.5: Information Records
3.7.5.5 Signal

(See [7]):

5.7 Call Waiting

5.5.3 Method of Measurement

a. Set up a mobile station originated call to user 1.
b. Verify user data in both directions.
c. Initiate a call from user 2 to the mobile station under test.
d. Answer the incoming call from the mobile station under test.
e. Once the mobile station is in conversation state with user 2, end the call from the mobile station (e.g., press the END key).
f. Verify that the base station calls the mobile station.

5.5.4 Minimum Standard

The base station shall comply with f.

5.6 Voice Privacy

5.6.1 Definition

This test is for Voice Privacy as activated by the subscriber. The Voice Privacy feature allows the subscriber the ability to switch to the private long code mask that encodes the vocoder data. Check with the network operator to see if Voice Privacy is enabled.

5.6.2 Traceability

(See [3]):

2.3.12.3: Voice Privacy
2.6.4.1.6: Long Code Transition Request Processing
2.7.1.3.2.4: Origination Message
2.7.1.3.2.5: Page Response Message
2.7.3: Orders
3.3.3: Voice Privacy
3.6.4.1.5: Long Code Transition Request Processing
3.6.4.3: Traffic Channel Substate
3.6.4.4: Release Substate
3.7.4: Orders

5.6.3 Method of Measurement

a. If the network supports voice privacy, activate Voice Privacy on the mobile station.

b. Initiate a mobile station originated call.

c. Verify the mobile station indicates to the user that Voice Privacy is active on the call. Verify the Voice Privacy Mode Indicator is set to '1' in the *Origination Message*, the base station sends a *Long Code Transition Request Order*, and the mobile station responds with a *Long Code Transition Response Order.*

d. If the mobile station's user interface supports activation of voice privacy, make another call, this time wait until after the call is in progress before activating Voice Privacy.

e. Verify the mobile station indicates to the user that Voice Privacy is now active on the call. Verify that the mobile station sends a *Long Code Transition Request Order*, the base station sends a *Long Code Transition Request Order*, and the mobile station responds with a *Long Code Transition Response Order*.

5.6.4 Minimum Standard

The mobile station shall comply with c and e.

5.7 CDMA Authentication

5.7.1 Definition

This test is for CDMA Authentication using CDMA Layer 3 messages as the transport. The network operator should provide the location where authentication is used in the network. The network operator shall identify the scenarios that trigger authentication to be activated in the network. The scenarios could include registrations, originations, terminations, and base station initiated unique challenge procedures.

5.7.2 Traceability

(See [3]):

2.3.12.1: Authentication

2.3.12.1.4: Unique Challenge-Response Procedure
2.3.12.1.5: Updating the Shared Secret Data (SSD)
2.6.5.1.3: Timer-Based Registration
2.7.1.3.2.6: Authentication Challenge Response Message
2.7.2.3.2.2: Authentication Challenge Response Message (r-dsch)
3.3.1: Authentication
3.7.2.3.2.1: System Parameters Message (f-csch)
3.7.3.3.2.2: Authentication Challenge Message (f-dsch)
3.7.2.3.2.10: Authentication Challenge Message (f-csch)
3.7.2.3.2.11: SSD Update Message (f-csch)

5.7.3 Method of Measurement

a. Verify that network authentication is activated by checking that AUTH field is set to '01' in *Access Parameters Message* or SENDING_RAND field is set to '1' in *MC-RR Parameters Message*.

b. Originate a voice call.

c. Verify that the mobile station includes AUTHR and RANDC fields in *Origination Message* and the call is successful.

d. Make a mobile station terminated voice call.

e. Verify that the mobile station includes AUTHR and RANDC fields in *Page Response Message* and the call is successful.

f. Cause the mobile station to send a *Registration Message*.

g. Verify that the mobile station includes AUTHR and RANDC fields in *Registration Message* and the registration is successful.

5.7.4 Minimum Standard

The mobile station shall comply with c, e, and g.

5.8 Voice Mail Notification

5.8.1 Definition

This tests the Voice Mail Notification (VMN) feature. After a new voice mail message is left by a caller, the base station attempts to notify the mobile station. After the VMN is successfully delivered, a Voice Mail Message Waiting Indicator is displayed on the mobile station. This test also verifies that mobile station is able to display a missed call indication.

5.8.2 Traceability

(See [4]):

4.3.5: Voice Mail Notification (VMN)
4.5.12 Number of Messages

(See [3]):

3.7.5.6: Message Waiting
3.7.2.3.2.12: Feature Notification Message

(See [7]):

1: Message Waiting Notification

5.8.3 Method of Measurement

a. Ensure that there are no voice mail messages pending for the mobile station. With the mobile station powered off, leave 3 Voice Mail Messages for it.

b. Power on the mobile station. After some time the base station will send VMN.

c. Ensure that the MSG_COUNT (or MESSAGE_CT) is greater than 0 in the VMN sent by base station.

d. The mobile station may alert the user and may display a Voice Mail Message Waiting Indicator.

e. If the mobile station is capable of indicating the number of new voice mail messages, verify the mobile station indicates the number of messages specified by MSG_COUNT or MESSAGE_CT received in step c..

f. While the mobile station is in the idle state, attempt a mobile station terminated call. Do not answer the call at the mobile station, and leave a voice mail message.

g. Wait for a VMN.

h. Verify VMN is successful and accurate. The mobile station may display an indication of a missed call.

i. Make a call with the mobile station. While the mobile station is in the conversation state, initiate a call to the mobile station, but do not answer the call. Leave a voice mail message.

j. Keep the first call going, and wait for a VMN while in the conversation state. The VMN may be sent in a *Flash with Information Message*/*Extended Flash with Information Message*.

k. End the call.

l. Verify the VMN is successful and accurate. The mobile station may alert the user and may display a Voice Mail Message Waiting Indicator.

5.8.4 Minimum Standard

The mobile station shall comply with e, h, and l.

5.9 Voice Mail Retrieval

5.9.1 Definition

This test verifies a mobile station can retrieve voice mail messages. After all the voice mail messages stored for the mobile station are accessed, the base station sends a layer 3 message instructing the mobile station to turn off its Voice Mail Message Waiting Indicator.

5.9.2 Traceability

(See [4]):

4.3.5: Voice Mail Notification (VMN)
4.5.12 Number of Messages

(See [3]):

3.7.5.6: Message Waiting
3.7.2.3.2.12: Feature Notification Message

5.9.3 Method of Measurement

a. Ensure that there is no Voice Mail Notification in the mobile station.

b. Initiate a call to the mobile station. Do not answer the call and leave a voice mail message.

c. After receiving a new voice mail notification, attempt to retrieve the voice mail message by calling the mobile station voice mail access number from the mobile station.

d. After listening to the Voice Mail Message end the call.

e. Verify the base station sends VMN (e.g., Flash with *Information Message* or *Data Burst Message)*, with MSG_COUNT (or MESSAGE_CT) = 0. Verify the mobile station voice mail message waiting indicator has been turned off after VMN is received (either before or after ending the call).

f. If the voice mail system supports a Call Back Number, activate it.

g. Verify the call completes to the correct number, if Call Back Number is activated.

5.9.4 Minimum Standard

The mobile station shall comply with g.

5.10 No Answer with Release Order

5.10.1 Definition

For an incoming call, while in the Waiting for Mobile Station Answer Substate, the mobile station may send a *Release Order* at the command of the subscriber, e.g., pressing the END button. This causes the base station to immediately release the traffic channel, and the caller to go directly to voice mail or a recording. In alternative implementation, the END button simply silences the mobile station ringer and makes the base station and caller wait for the maximum number of rings.

5.10.2 Traceability

(See [3]):

2.7.3 Orders

5.10.3 Method of Measurement

a. Attempt a mobile station terminated call.

b. If supported, cause the mobile station to send a *Release Order* during the waiting for mobile station answer substate (e.g., press the END button).

c. Verify the mobile station sends a *Release Order*.

5.10.4 Minimum Standard

The mobile station shall comply with step c.

5.11 Mobile Station originated SMS

5.11.1 Definition

This test verifies that a short message can be sent by the mobile station on the common channel and on the traffic channel.

5.11.2 Traceability

(See [4]):

2.4.1.1.1.2: Mobile SMS Message Origination
2.4.1.1.2.4: Mobile Station Message Origination in the Conversation Substate
2.4.2.1.1.1: Mobile SMS Message Origination
2.4.2.1.2.2: Base Station Traffic Channel Procedures

(See [IR 1]):

3 SERVICE OPTION NUMBER ASSIGNMENTS

5.11.3 Method of Measurement

a. Verify mobile station is in idle state.

b. If supported create a short message that the mobile station will send on r-csch and instruct the mobile station to send the short message to a destination SME.

c. Verify the mobile station sends a *Data Burst Message* on r-csch, with the fields set as follows:

Field	Value
MSG_NUMBER	1 (‘00000001’)
BURST_TYPE	3 (‘000011’)
NUM_MSGS	1 (‘00000001’)
NUM_FIELDS	Greater than 0

d. Verify the destination SME receives the short message.

e. Repeat steps a through d with following modifications: In step 2 create message that the mobile station will send on the traffic channel. In step 3 verify that the mobile

station sets up a call with SO 6 or SO 14 and then sends *Data Burst Message* on the traffic channel.

5.11.4 Minimum Standard

The mobile station shall comply with c.

5.12 Mobile Station originated SMS in Conversation Substate

5.12.1 Definition

This test verifies that a short message can be sent by the mobile station when it is in the *Conversation Substate*.

5.12.2 Traceability

(See [4]):

2.4.1.1.1.2: Mobile SMS Message Origination
2.4.1.1.2.4: Mobile Station Message Origination in the Conversation Substate
2.4.2.1.1.1: Mobile SMS Message Origination
2.4.2.1.2.2: Base Station Traffic Channel Procedures

5.12.3 Method of Measurement

a. Set up a mobile station originated voice call from mobile station.

b. While the mobile station is in the *Conversation Substate*, create a short message and instruct the mobile station to send the short message to a destination SME.

c. Verify the mobile station sends a *Data Burst Message*, with the fields set as follows:

Field	Value
MSG_NUMBER	1 ('00000001')
BURST_TYPE	3 ('000011')
NUM_MSGS	1 ('00000001')
NUM_FIELDS	Greater than 0

d. Verify the destination SME receives the short message.

e. Verify that upon sending the short message, the mobile station does not release the dedicated channels.

5.12.4 Minimum Standard

The mobile station shall comply with c.

5.13 Mobile Station terminated SMS

5.13.1 Definition

This test verifies that a short message can be received by the mobile station on the common channel and on the traffic channel.

5.13.2 Traceability

(See [4]):

2.4.1.1.1.2: Mobile SMS Message Origination
2.4.1.1.2.4: Mobile Station Message Origination in the Conversation Substate
2.4.2.1.1.1: Mobile SMS Message Origination
2.4.2.1.2.2: Base Station Traffic Channel Procedures

(See [IR 1]):

3 SERVICE OPTION NUMBER ASSIGNMENTS

5.13.3 Method of Measurement

a. Verify the mobile station is in idle state.

b. Create a short message that the base station will send on f-csch and instruct an originating SME to send a short message to the mobile station.

c. Verify the mobile station receives the *Data Burst Message* on f-csch, with the fields set as follows:

Field	Value
MSG_NUMBER	1 (‘00000001’)
BURST_TYPE	3 (‘000011’)
NUM_MSGS	1 (‘00000001’)
NUM_FIELDS	Greater than 0

d. Repeat steps a through b with following modifications: In step 2 create message that the base station will send on the traffic channel. In step 3 verify that the base station sets up a call with SO 6 or SO 14 and then sends *Data Burst Message* on the traffic channel.

5.13.4 Minimum Standard

The mobile station shall comply with c.

5.14 Mobile Station terminated SMS in Conversation Substate

5.14.1 Definition

This test verifies that a short message can be received by the mobile station when it is in

the *Conversation Substate*.

5.14.2 Traceability

(See [4]):

2.4.1.1.1.2: Mobile SMS Message Origination
2.4.1.1.2.4: Mobile Station Message Origination in the Conversation Substate
2.4.2.1.1.1: Mobile SMS Message Origination
2.4.2.1.2.2: Base Station Traffic Channel Procedures

5.14.3 Method of Measurement

a. Set up a mobile station originated voice call from the mobile station.

b. While the mobile station is in the *Conversation Substate*, create a short message and instruct an originating SME to send the short message to the mobile station.

c. Verify the mobile station receives the *Data Burst Message*, with the fields set as follows:

Field	Value
MSG_NUMBER	1 (‘00000001’)
BURST_TYPE	3 (‘000011’)
NUM_MSGS	1 (‘00000001’)
NUM_FIELDS	Greater than 0

d. Verify that upon receiving the short message, the mobile station does not release the dedicated channels.

5.14.4 Minimum Standard

The mobile station shall comply with c and d.

6 cdma2000 1x High-speed Packet Data

For handoff test cases in this chapter the locations where handoff scenarios occur should be identified with help from network operator.

6.1 Forward file transfer

6.1.1 Definition

This test verifies that the mobile station can successfully complete a forward file transfer using the F-FCH and F-SCH, if supported, during a HSPD call.

6.1.2 Traceability

(See [3]):

2.7.2.3.2.18: Supplemental Channel Request Message
2.7.2.3.2.28: Supplemental Channel Request Mini Message
3.6.6.2.2.12: Processing of Extended Supplemental Channel Assignment Message
3.7.3.3.2.24: Supplemental Channel Assignment Message
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [5]):

2.2.3: Initialization and Connection of Packet Data Service Options
2.2.7: High Speed Operation

6.1.3 Method of Measurement

a. Select a time to perform the test that is off peak hours. Select a location where the mobile station has one pilot in the active set and receive power averages approximately -75dBm.

b. Allow the mobile station to acquire a cdma2000 1x service.

c. At the remote host prepare an 800 kbyte binary file to be transferred using FTP to the data terminal connected to the mobile station. If the mobile station or the base station does not support Forward Supplemental Channel, use a 200 kbyte binary file.

d. Set up an FTP session using Service Option 33 with the remote host.

e. Transfer the file from the remote host to the mobile station using the binary “get” command.

f. Verify the file is transferred successfully.

g. After the file transfer is completed, end the FTP session. Record the elapsed time the file transfer took place.

6.1.4 Minimum Standard

The mobile station shall comply with f.

6.2 Bidirectional file transfer

6.2.1 Definition

This test verifies that the mobile station can successfully complete a reverse file transfer using the R-FCH and R-SCH, if supported, during the HSPD call.

6.2.2 Traceability

(See [3]):

2.7.2.3.2.18: Supplemental Channel Request Message
2.7.2.3.2.28: Supplemental Channel Request Mini Message
3.6.6.2.2.12: Processing of Extended Supplemental Channel Assignment Message
3.7.3.3.2.24: Supplemental Channel Assignment Message
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [5]):

2.2.3: Initialization and Connection of Packet Data Service Options
2.2.7: High Speed Operation

6.2.3 Method of Measurement

a. Select a time to perform the test that is off peak hours. Select a location where the mobile station has one pilot in the active set and receive power averages approximately -75dBm.

b. Allow the mobile station to acquire a cdma2000 1x service.

c. Prepare an 800 kbyte binary file to be transferred using FTP from the data terminal connected to the mobile station. If the mobile station or the base station does not support Reverse Supplemental Channel, use a 200 kbyte binary file.

d. Set up an FTP session using Service Option 33 with the remote host.

e. Transfer the file from the mobile station to the remote host using the binary “put” command.

f. Verify the file is transferred successfully.

g. After the file transfer is completed, end the FTP session. Record the elapsed time the file transfer took place.

6.2.4 Minimum Standard

The mobile station shall comply with f.

6.3 Bidirectional file transfer

6.3.1 Definition

This test verifies the mobile station can successfully complete a bi-directional file transfer during the HSPD.

6.3.2 Traceability

(See [3]):

2.7.2.3.2.18: Supplemental Channel Request Message
2.7.2.3.2.28: Supplemental Channel Request Mini Message
3.6.6.2.2.12: Processing of Extended Supplemental Channel Assignment Message
3.7.3.3.2.24: Supplemental Channel Assignment Message
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [5]):

2.2.3: Initialization and Connection of Packet Data Service Options
2.2.7: High Speed Operation

6.3.3 Method of Measurement

a. Select a time to perform the test that is off peak hours. Select a location where the mobile station has one pilot in the active set and receive power averages approximately -75dBm.

b. Allow the mobile station to acquire a cdma2000 1x system.

c. At the remote host and the data terminal connected to the mobile station, prepare an 800 kbyte binary file to be transferred using FTP to and from the mobile station. If the mobile station or the base station does not support Supplemental Channel, use a 200 kbyte binary file.

d. Set up an FTP session using Service Option 33 with the remote host.

e. Simultaneously start the transfer of the files from the mobile station to the remote host using the binary “put” command and the transfer of the file from the Remote Host to the mobile station using the binary “get” command.

f. Verify both files are transferred successfully.

g. After the file transfer is completed, end the FTP session. Record the elapsed time the file transfer took place.

6.3.4 Minimum Standard

The mobile station shall comply with f.

6.4 Soft handoff of fundamental channel and supplemental channels

6.4.1 Definition

A CDMA call is established on one sector of base station 1. The mobile station will be moving to base station 2 such that soft handoff occurs for both F-FCH and F-SCH. This test is applicable only if the base station supports soft handoff for F-SCH.

6.4.2 Traceability

(See [3]):

2.6.6.2.7: Soft Handoff
3.6.6.2.4: Soft Handoff
2.7.4.25: Capability Information
2.7.4.27.3: FOR_SCH Type-Specific Field
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [5]):

2.2.3: Initialization and Connection of Packet Data Service Options
2.2.7: High Speed Operation

6.4.3 Method of Measurement

a. Allow the mobile station to acquire a cdma2000 1x system. Ensure that the mobile station is served by one sector of base station 1 only.

b. Place a HSPD data call from the mobile station and start forward file transfer. Ensure that the file size is such that the file transfer will continue until step 8.

c. Verify the base station sends the *Extended Supplemental Channel Assignment Message* to assign Supplemental Channels supported by the system. Verify only one pilot is in the active set.

d. Verify the file is being transferred from base station 1 to the mobile station.

e. Move (e.g., drive) to an area where the mobile station is in the boundary between the two base stations such that the second pilot level is higher than T_ADD.

f. Verify that the mobile station receives the data using the F-FCH and F-SCH of the two base stations (two pilots are in the active set for Fundamental Channel and Supplemental Channel).

g. Move (e.g., drive) away from the first base station toward the second base station until the mobile station has completely handed off to the second base station.

h. Verify only one pilot is in the active set for the Fundamental Channel and Supplemental Channel, and the mobile station receives the data using the forward Fundamental Channel and Supplemental Channel of the second base station.

i. Verify that the file transfer is successful.

j. End the call.

6.4.4 Minimum Standard

The mobile station shall comply with i.

6.5 Soft handoff of fundamental channel only

6.5.1 Definition

A CDMA call is established on a sector of base station 1. The mobile station will be moving

to base station 2 such that soft handoff occurs for F-FCH. The mobile station and base station perform soft handoff of the fundamental channel. The Supplemental Channels remains active on either base station 1 or base station 2, but not both.

6.5.2 Traceability

(See [3]):

2.6.6.2.7: Soft Handoff
3.6.6.2.4: Soft Handoff
2.7.4.25: Capability Information
2.7.4.27.3: FOR_SCH Type-Specific Field
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [5]):

2.2.3: Initialization and Connection of Packet Data Service Options
2.2.7: High Speed Operation

6.5.3 Method of Measurement

a. Let the mobile station acquires cdma2000 1x system. Ensure that the mobile station is served by one sector of base station 1 only.

b. Place a HSPD data call from the mobile station and start forward file transfer. Ensure that the file size is such that the file transfer will continue until step 8.

c. Verify that the first base station sends the *Extended Supplemental Channel Assignment Message* to assign Supplemental Channel. Verify only one pilot is in the active set.

d. Verify the file is being transferred from base station 1 to the mobile station.

e. Move (e.g., drive) to an area where the mobile station is in the boundary between two base stations such that the second pilot level is higher than T_ADD.

f. Verify that the mobile station shall receive the data using the F-FCH of base station 1 and base station 2 but the F-SCH of one base station (two pilots are in active set for Fundamental Channel and one pilot is in active set for Supplemental Channel).

g. Move (e.g., drive) away from base station 1 towards base station 2 until the mobile station has completely handed off to base station 2.

h. Verify that the mobile station receives the data using the forward Fundamental Channel and Supplemental Channel of the second base station.

i. Verify that the file transfer is successful.

j. End the call.

6.5.4 Minimum Standard

The mobile station shall comply with i.

6.6 Hard handoff to HSPD-capable system

6.6.1 Definition

A data-call hard handoff is performed to a different CDMA channel, and optionally to a different RC.

6.6.2 Traceability

(See [3]):

2.6.6.2.7: Soft Handoff
3.6.6.2.4: Soft Handoff
2.7.4.25: Capability Information
2.7.4.27.3: FOR_SCH Type-Specific Field
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [5]):

2.2.3: Initialization and Connection of Packet Data Service Options
2.2.7: High Speed Operation

6.6.3 Method of Measurement

a. Prepare a predetermined route where hard handoff can occur from base station 1 to base station 2.

b. Allow the mobile station to acquire a cdma2000 1x system.

c. At the remote host prepare a 1 Mbyte binary file to be transferred using FTP to the mobile station. If the mobile station or base station does not support F-SCH, use 200 kbytes file size.

    1. Base station 1 should be P_REV=6 or higher.

    2. Base station 2 should be P_REV=6 or higher operating on a different frequency channel from base station 1.

d. Set up a mobile station originated call with Service Option 33 on base station 1.

e. Begin forward file transfer from the remote host to the mobile station.

f. While the file is being transferred, move (e.g., drive) towards base station 2 until the mobile station is in the coverage area of base station 2.

g. Verify that hard handoff is successful and the file transfer continues after the hard handoff.

h. End FTP session.

i. If a route is available where base station 2 uses a different RC than the RC used by base station 1, then repeat steps d to h on this route.

6.6.4 Minimum Standard

The mobile station shall comply with g.

6.7 HSPD PPP or IP Expiration

6.7.1 Definition

This test verifies that HSPD PPP connection maintenance is performed correctly in good coverage. This test also verifies expiration close of PPP connection during various timer expiration conditions. The PPP connection may be closed due to a PPP inactivity timer at the PDSN or a Mobile IP registration timer, or possibly some other timer. Note that in relay mode PPP inactivity timer may be configurable at TE2.

6.7.2 Traceability

(See [11]):

4.7 Registration Lifetime Processing
7.7 Mobile IP Registration Expires
7.18 PDSN Terminates Simple IP Session Due to PDSN PPP Inactivity Timer Expiration

6.7.3 Method of Measurement

a. Identify from the network operator any network or mobile station timers for PPP inactivity or IP registration expiration.

b. Allow the mobile station to acquire cdma2000 1x service.

c. Make a HSPD connection to an internet site. Note down mobile station IP address.

d. Cease activity and allow the call to go to the PPP Dormant State.

e. If a timer is identified then continue with no activity for enough time for the first timer to expire. Ping the mobile station IP address.

f. Verify that the ping fails.

6.7.4 Minimum Standard

The base station shall comply with step f.

6.8 HSPD Mobile IP Inter-PDSN Active Handoff

6.8.1 Definition

This is a Mobile IP test for handoff from one PDSN to another, while a HSPD call is active.

6.8.2 Traceability

(See [3]):

2.7.4.25: Capability Information
2.7.4.27.3: FOR_SCH Type-Specific Fields
3.7.5.7.1: Channel Configuration for the Supplemental Channel

(See [11]):

Inter-PDSN Handoff, Mobile Station in Active State

6.8.3 Method of Measurement

a. Select a drive route that will include a handoff from one PDSN to another.

b. Allow the mobile station to acquire cdma2000 1x service.

c. Starting on one side of the boundary, make a HSPD connection to an internet site.

d. Keep the SO33 call active i.e., do not allow the call to go dormant, while traveling across the PDSN boundary. This can be accomplished with file transfers, or by sending a repeated ping to a known IP address (e.g., ping www.XXXX – t).

e. Verify the handoff is successful.

6.8.4 Minimum Standard

The mobile station shall comply with e.

6.9 HSPD Mobile IP Inter-PDSN Dormant Idle Handoff

6.9.1 Definition

This is a Mobile IP test to check mobile station dormant idle handoff to a different PDSN. For a SID or NID change a CDMA (HLR) registration on r-csch may accompany the MIP registration.

6.9.2 Traceability

(See [3]):
2.6.2.1.2 Quick Paging Channel Monitoring Procedures.
2.6.5.1.6: Parameter-Change Registration
2.6.7.1 Hash Function
2.7.1.3.2.1 Registration Message
3.6.5: Registration
3.7.2.3.2.1: System Parameters Message
3.7.2.3.2.13 Extended System Parameters Message
3.7.2.3.2.30 ANSI-41 System Parameters Message
(See [11]):
5.2 Inter-PDSN handoff, Mobile Station in Dormant State

6.9.3 Method of Measurement

a. Select a drive route which includes crossing a PDSN boundary.

b. Allow the mobile station to acquire a cdma2000 1x system.

c. Starting on one side of the boundary, make a HSPD connection to an internet site.

d. Cease activity and allow the call to go to the PPP Dormant State.

e. Travel across the PDSN boundary while in the PPP Dormant State.

f. Verify a new Packet Zone ID or SID or NID in the *Extended System Parameters Message/ANSI-41 System Parameters Message*. Verify that a SO33 call is originated for PPP negotiation and IP registration for a PDSN change.

6.9.4 Minimum Standard

The mobile station shall comply with f.

6.10 HSPD Ping while Dormant

6.10.1 Definition

The ability of the mobile station to respond to a ping of its IP address, while in the PPP Dormant State is verified.

6.10.2 Traceability

(See [3]):

2.6.2.1.2 Quick Paging Channel Monitoring Procedures
2.6.3.3 Page Response Substate
2.7.1.3.2.5 Page Response Message
3.7.2.3.2.17 General Page Message
3.7.2.3.2.36 Universal Page Message

6.10.3 Method of Measurement

a. Allow the mobile station to acquire cdma2000 1x service.

b. Make a HSPD connection to an internet site.

c. Record the IP address assigned to the mobile station.

d. Cease activity and allow the call to go to the PPP Dormant State.

e. Ping the mobile station IP address. Due to the latency of radio access, remember to employ the ping–w-timeout usage (e.g., set to 10000 milliseconds or more).

f. Verify that the ping is successful. A valid response to the ping command should occur approximately within the slot cycle (e.g., 5 seconds for slot cycle index 2) if the mobile station is in good coverage.

6.10.4 Minimum Standard

The mobile station shall comply with f.

6.11 Service configuration and negotiation

6.11.1 Definition

This is a test for mobile station behavior when a HSPD call is dropped or temporarily stays out of coverage in the PPP Dormant State.

6.11.2 Traceability

(See [3]):

2.6.2.1.1.4 Common Channel Supervision
2.6.4.1.8 Forward Traffic Channel Supervision

6.11.3 Method of Measurement

NOTE: Steps c through g should be executed before the expiration on any base station, PDSN, or mobile station PPP inactivity timer(s) expire.

a. Allow the mobile station to acquire cdma2000 1x service.

b. Make a HSPD connection to an internet site.

c. Move (e.g., drive) out of CDMA coverage area or shield the mobile station from the CDMA signal (e.g., put in a shield box).

d. If the mobile station was in the PPP Active State, the call will drop.

e. If the mobile station was in the Dormant State prior to losing service, it should show loss of service or roaming indication.

f. Verify that the mobile station PPP session is still connected, and the mobile station has retained its IP address.

g. Return to good CDMA coverage within a few minutes (prior to expiration of PPP inactivity timer or Mobile IP registration timer).

h. Ping the mobile station IP address.

i. Verify that the ping is successful.

6.11.4 Minimum Standard

The mobile station shall comply with i.

6.12 HSPD and SMS

6.12.1 Definition

This test checks interaction of SMS and HSPD calls.

6.12.2 Traceability

(See [4]):

2.4.1.1.2.2 Mobile SMS Message Termination
2.4.2.1.2 Base Station Traffic Channel Procedures
2.4.2.1.2.4 Mobile Station Message Termination in the Conversation Substate

6.12.3 Method of Measurement

a. Allow the mobile station to acquire cdma2000 1x service.

b. Make a HSPD connection to an internet site.

c. Ensure that the call stays in the active state. This can be accomplished with file transfers, or by sending a continuous ping to a known IP address, e.g., ping www.XXXX – t.

d. If a mobile station can support SMS origination while in HSPD active state, send a mobile station originated SMS message.

e. Verify that a mobile station originated SMS message can be sent successfully while in a HSPD active state.

f. Send a mobile station terminated SMS message.

g. Verify that the mobile station terminated SMS message can be received successfully while in a HSPD active state.

h. Cease activity and allow the HSPD call to go to the HSPD Dormant State.

i. Send mobile station originated SMS message.

j. Verify that a mobile station originated SMS message can be sent successfully while in a HSPD dormant state.

k. Send a mobile station terminated SMS message.

l. Verify that the mobile station terminated SMS message can be received successfully while in a HSPD dormant state.

6.12.4 Minimum Standard

The mobile station shall comply with e, g, j, and l.

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7 cdma2000 1x Packet Data Services Tests

7.1 File Transfer

This test is required for mobile station operation in P_REV_IN_USE <= 3.

7.1.1 Definition

This test demonstrates the ability of the mobile station to transfer files to and from a remote host.

7.1.2 Traceability

(See [5]):

4.1 RFC-959

7.1.3 Method of Measurement

a. Select a time to perform the test that is off peak hours. Select a location where the mobile station is in single sector coverage and in a close proximity to the sector's antenna.

b. Allow the mobile station to acquire a CDMA system with P_REV less than or equal to 3.

c. At the remote host prepare a 200 kbytes binary file to be transferred using FTP from/to the mobile station.

d. Initiate an FTP session with the remote host.

e. Transfer a file from the mobile station to a remote host using the binary "put" command and record transfer time.

f. Transfer a file from the remote host to the mobile station using the binary "get" command and record transfer time.

g. Verify both file transfers are completely successfully.

h. End the call.

7.1.4 Minimum Standard

The mobile station shall comply with g.

7.2 Simple IP Establishment

7.2.1 Definition

This test verifies the proper operation of Simple IP. This test verifies the mobile station can terminate the PPP session.

7.2.2 Traceability

(See [11]):

3.1 Simple IP Establishment without Authentication of the Mobile Station
3.2 Simple IP Establishment with CHAP
3.3 Simple IP Establishment with PAP

7.2.3 Method of Measurement

a. Ensure that the mobile station is in good coverage area where receive power is approximately -75 dBm.
b. Set up a mobile station originated Service Option 33 call.
c. Verify that a session is established with any of the following options based on infrastructure support: no authentication, CHAP or PAP.
d. Terminate the session.
e. Verify the mobile station is in the Null State.

7.2.4 Minimum Standard

The mobile station shall comply with c.

7.3 Registration Lifetime Processing

7.3.1 Definition

This test verifies the mobile station accepts a Mobile IP Registration Reply with the registration lifetime less than the requested lifetime. The network operator should provide a location where MobileIP is used in the network.

7.3.2 Traceability

(See [11]):

4.7 Registration Lifetime Processing

7.3.3 Method of Measurement

a. Set up a mobile station originated Service Option 33 call.
b. Verify the PDSN/FA sends an Agent Advertisement to the mobile station after the PPP session is established.
c. Verify the mobile station sends a valid Mobile IP RRQ with the Lifetime less than or equal to the value in the Agent Advertisement.
d. Verify the PDSN/FA sends the Mobile IP RRP to the mobile station with the Code field set to 0 (Registration Accepted). The PDSN/FA will update the binding information for the mobile station.
e. Verify the mobile station attempts to re-register before the Registration Lifetime value received in the Mobile IP RRP, decreased by the RRP lifetime difference,

expires.

f. Verify the mobile station Mobile IP RRQ uses a valid and unused challenge value.

7.3.4 Minimum Standard

The mobile station shall comply with e and f.

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8 cdma2000 1x Position Determination Tests

The position determination test cases in this chapter are applicable only if position determination can be initiated by some operation on the mobile station, the network supports delivering location information to the mobile station when mobile station cannot calculate the location on its own, and mobile station is able to indicate location to the user. The network operator should identify locations where position determination tests are to be executed.

8.1 Position Determination

8.1.1 Definition

This test verifies the position determination feature.

8.1.2 Traceability

(See [9]):

3.2.1 Position Determination Data Message Processing
3.2.2 Point-to-point Procedures
3.2.4 Reverse Link Message Format
3.2.4.2 Response Element Response Type
Annex B Request/Response Element Types

8.1.3 Method of Measurement

a. Power on the mobile station and wait until it goes into Mobile Station Idle State.

b. For each test location identified by the network operator, perform the following:

1. Initiate an operation on the mobile station that results in the mobile station performing position determination.

2. Verify that the mobile station indicates the location. Record the location.

8.1.4 Minimum Standard

The mobile station shall comply with b.

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9 cdma2000 1x Concurrent Services

Test cases in this chapter are applicable for P_REV_IN_USE equal to 7 or greater.

9.1 Set up Mobile Station Originated Data Call while Voice Call or Teleservice Call is in Progress

9.1.1 Definition

This test verifies that, when a voice call or teleservice call is already in progress, a mobile station originated data call can be established successfully.

9.1.2 Traceability

(See [3]):

2.6.4.1.2.2.5	*Waiting for Service Action Time Subfunction*
2.6.4.1.12	*Processing the Service Configuration Record*
2.6.4.2	*Traffic Channel Initialization Substate*
2.6.4.3	*Traffic Channel Substate*
2.6.4.4	*Release Substate*
2.6.10	*Call Control Processing*
2.7.2.3.2.3	*Flash with Information Message*
2.7.2.3.2.32	*Enhanced Origination Message*
2.7.2.3.2.33	*Extended Flash With Information Message*
2.7.2.3.2.37	*Call Cancel Message*
2.7.2.3.2.29	*Resource Release Request Message*
2.7.2.3.2.30	*Resource Release Request Mini Message*
2.7.3.4	*Mobile Station Reject Order*
2.7.4.25	*Capability Information*
3.6.4.1.7	*Response to Enhanced Origination Message*
3.6.4.1.8	*Processing Resource Release Request Message and Resource Release Request Mini Message*
3.6.4.2	*Traffic Channel Initialization Substate*
3.6.4.3	*Traffic Channel Substate*
3.6.8	*Call Control Processing*
3.7.2.3.2.13	*Extended System Parameters Message*
3.7.2.3.2.30	*ANSI-41 System Parameters Message*
3.7.3.3.2.20	*Service Connect Message*
3.7.3.3.2.36	*Universal Handoff Direction Message*
3.7.3.3.2.43	*Call Assignment Message*
3.7.3.3.2.44	*Extended Alert With Information Message*
3.7.3.3.2.45	*Extended Flash With Information Message*

(See [IR 1]):

3	*SERVICE OPTION NUMBER ASSIGNMENTS*

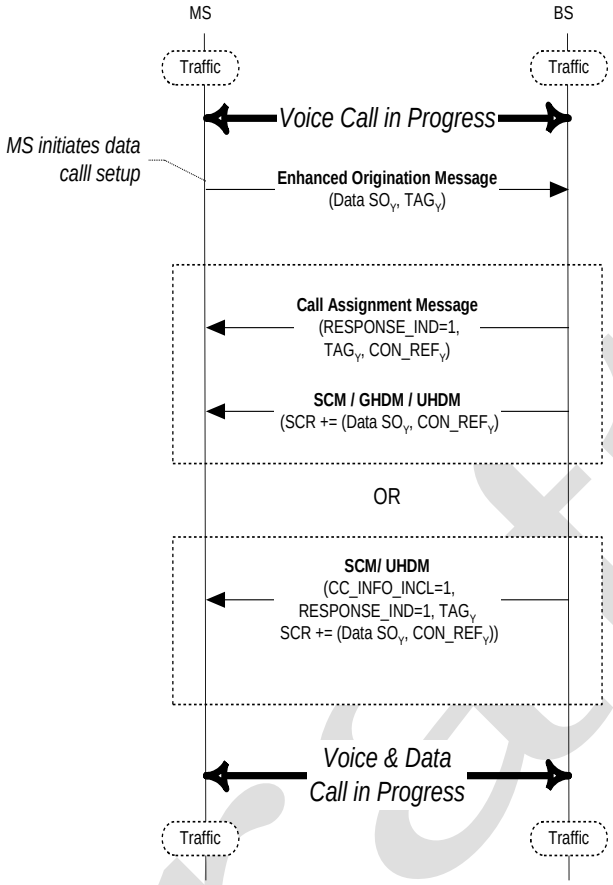

Figure 7 – Reference call flow for MS Originated Data Call while voice or teleservice call is in progress

9.1.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in *Extended System Parameters Message/ANSI-41 System Parameters Message* is set to '1'.

b. Set up a voice call and wait until the voice call is in progress.

c. Ensure retry delay for call origination (i.e., RETRY_DELAYs[001]) is currently not set for the data service option.

d. Initiate a packet data call (e.g., SO33) at the mobile station.

e. Verify that the mobile station sends an *Enhanced Origination Message* with the following fields set as follows:

FIELD	VALUE
TAG	'0001'
SR_ID	'001' or '010'.
SERVICE_OPTION	Service Option corresponding to the data call (e.g., SO33)
DRS	'1' (data ready to send)

f. Verify that data call is set up and data call user traffic is exchanged successfully. Verify that the voice call is not dropped.

g. Repeat steps b to f with the following modifications:

1. In step 2, set up a teleservice call (e.g., SMS, Position Determination, etc.) requiring dedicated channels.

h. In step 6, the teleservice call is not dropped after the establishment of the data call.

9.1.4 Minimum Standard

The mobile station shall comply with e and f.

9.2 Set up Mobile Station terminated Data Call while Voice Call or Teleservice Call is in Progress

9.2.1 Definition

This test verifies that, when a voice call or teleservice call is already in progress, a mobile station terminated data call (for a dormant data session) can be established successfully.

9.2.2 Traceability

Same as section 9.1.2.

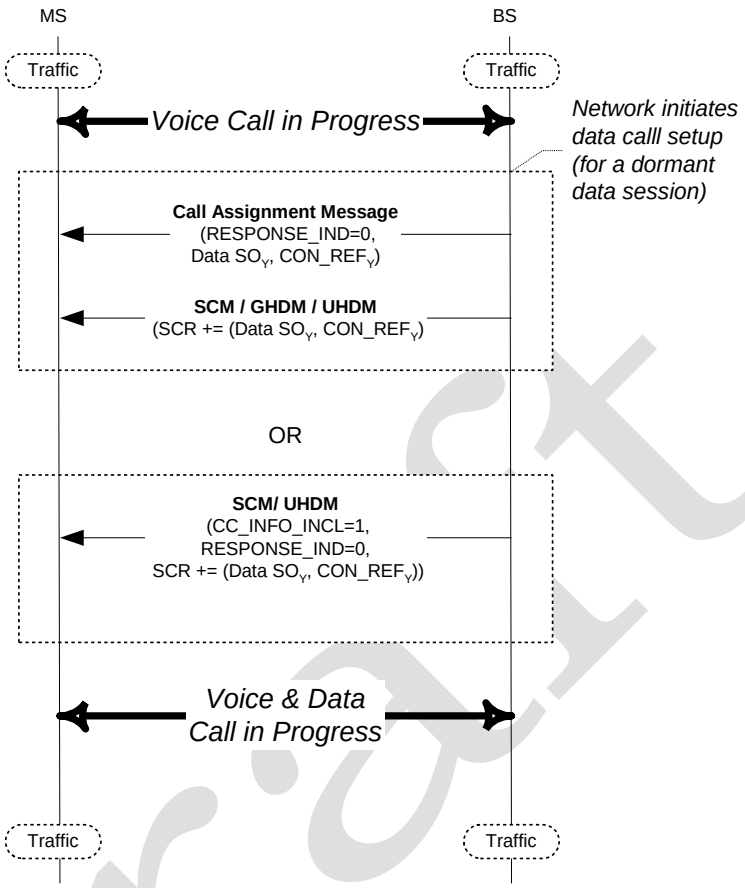

Figure 8 – Reference call flow for MS Terminated Data Call while voice or teleservice call is in progress

9.2.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in *Extended System Parameters Message*/*ANSI-41 System Parameters Message* is set to '1'.

b. Set up a packet data call (e.g., SO33). Ensure that the data call transitions to the dormant state.

c. Set up a voice call and wait until the voice call is in progress.

d. Trigger network-initiated transition to active state for the dormant packet data call.

e. Verify the data call is set up and data call user traffic is exchanged successfully. Verify the voice call is not dropped.

f. Repeat steps b to e with the following modifications:

    1. In step c, set up a teleservice call (e.g., SMS, Position Determination, etc.) requiring dedicated channels.

2. In step e, the teleservice call is not dropped after the establishment of the data call.

9.2.4 Minimum Standard

The mobile station shall comply with e.

9.3 Set up Mobile Station Originated Voice Call while Data Call or Teleservice Call is in Progress

9.3.1 Definition

This test verifies that, when a data call or teleservice call is already in progress, a mobile station originated voice call can be established successfully.

9.3.2 Traceability

Same as section 9.1.2.

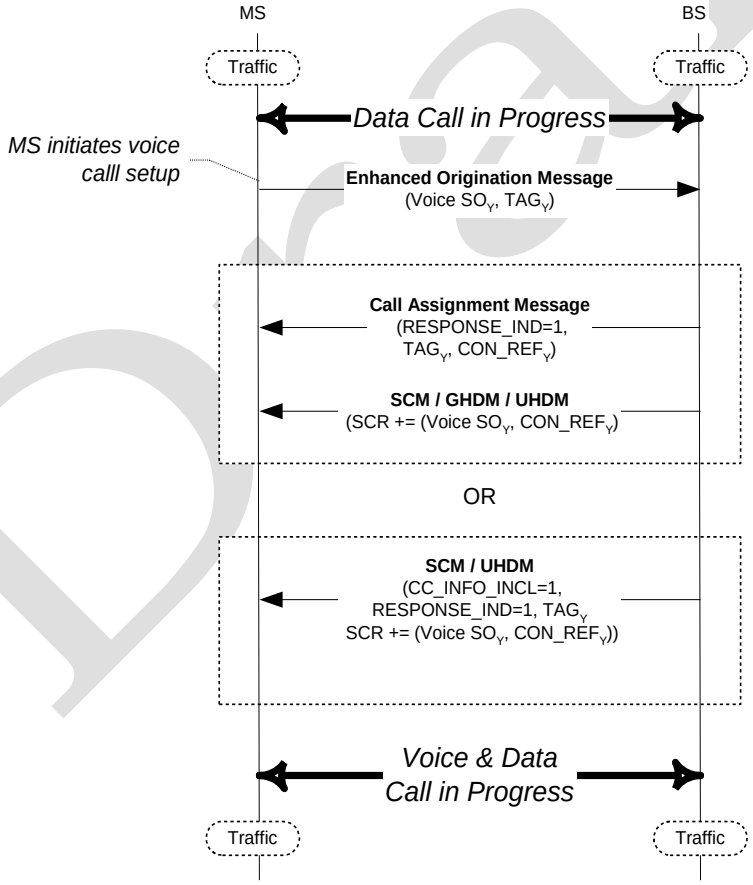

Figure 9 – Reference call flow for MS Originated Voice Call while voice or teleservice call is in progress

9.3.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in overhead messages is set to '1'.

b. Set up a packet data call (e.g., SO33). Wait until the data call is in progress. Ensure sufficient traffic is exchanged to keep the data instance in active state.

c. Initiate a voice call at the mobile station.

d. Verify that the mobile station sends an *Enhanced Origination Message* with the following fields set as follows:

Field	Value
TAG	'0001'
SR_ID	'010'
SERVICE_OPTION	Service Option corresponding to the voice call (e.g., SO 3)

e. Verify the voice call is set up and voice call user traffic is exchanged successfully. Verify the data call is not dropped.

f. Repeat steps b to e with the following modifications:

1. In step b, set up a teleservice call (e.g., SMS, Position Determination, etc.) requiring dedicated channels.

2. In step e, the teleservice call is not dropped after the establishment of the voice call.

9.3.4 Minimum Standard

9.4 Set up Mobile Station terminated Voice Call while Data Call or Teleservice Call is in Progress

9.4.1 Definition

This test verifies that, when a data call or teleservice call is already in progress, a mobile station terminated voice call can be established successfully.

9.4.2 Traceability

Same as section 9.1.2.

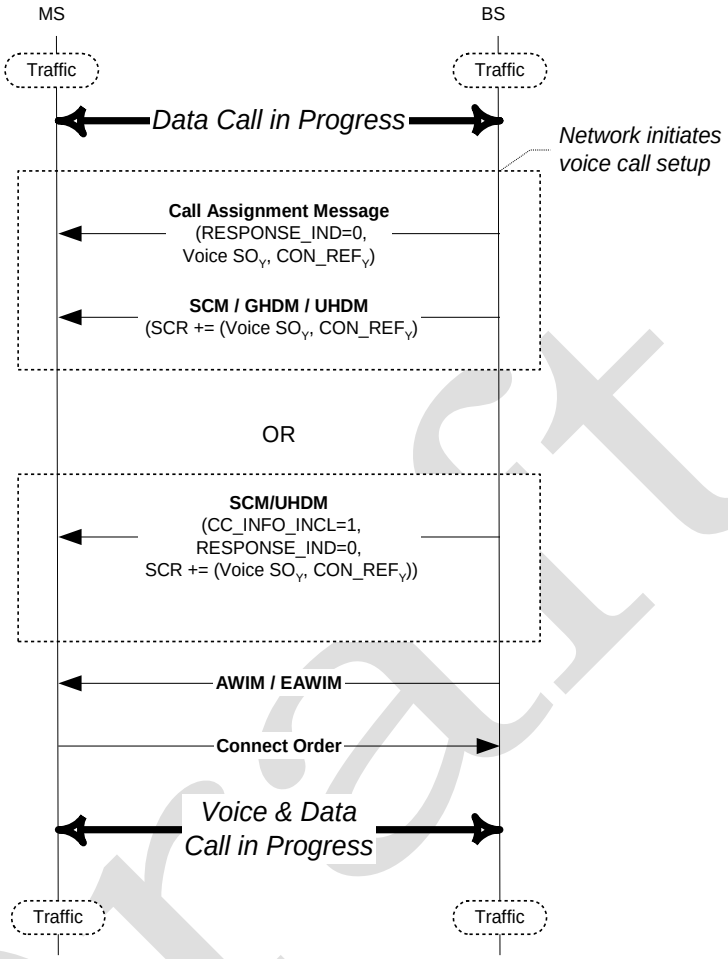

Figure 10 – Reference call flow for MS Terminated Voice Call while voice or teleservice call is in progress

9.4.3 Method of Measurement

a. Method of measurement

b. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in overhead messages is set to '1'.

c. Set up a packet data call (e.g., SO33). Wait till the data call is in progress. Ensure sufficient traffic is exchanged to keep the data instance in active state.

d. Initiate a mobile station terminated voice call. When the mobile station plays an alert to indicate an incoming call, answer the incoming call.

e. Verify the voice call is set up and voice call user traffic is exchanged successfully. Verify the data call is not dropped.

f. Repeat steps b to d with the following modifications:

1. In step b, set up a teleservice call (e.g., SMS, Position Determination, etc.) requiring dedicated channels.
2. In step d, the teleservice call is not dropped after the establishment of the voice call.

9.4.4 Minimum Standard

The mobile station shall comply with e and f.

9.5 Mobile Station Release of a Single Call While Voice and Data Calls are in Progress

9.5.1 Definition

This test verifies that, when both voice and data calls are in progress, mobile station can release one of the calls successfully and the other call continues uninterrupted.

9.5.2 Traceability

(See [3]):

2.6.4.1.2.2.5	*Waiting for Service Action Time Subfunction*
2.6.4.1.12	*Processing the Service Configuration Record*
2.6.4.2	*Traffic Channel Initialization Substate*
2.6.4.3	*Traffic Channel Substate*
2.6.4.4	*Release Substate*
2.6.10	*Call Control Processing*
2.7.2.3.2.3	*Flash with Information Message*
2.7.2.3.2.32	*Enhanced Origination Message*
2.7.2.3.2.33	*Extended Flash With Information Message*
2.7.2.3.2.37	*Call Cancel Message*
2.7.2.3.2.29	*Resource Release Request Message*
2.7.2.3.2.30	*Resource Release Request Mini Message*
2.7.3.4	*Mobile Station Reject Order*
2.7.4.25	*Capability Information*
3.6.4.1.7	*Response to Enhanced Origination Message*
3.6.4.1.8	*Processing Resource Release Request Message and Resource Release Request Mini Message*
3.6.4.2	*Traffic Channel Initialization Substate*
3.6.4.3	*Traffic Channel Substate*
3.6.8	*Call Control Processing*
3.7.2.3.2.13	*Extended System Parameters Message*
3.7.2.3.2.30	*ANSI-41 System Parameters Message*
3.7.3.3.2.20	*Service Connect Message*
3.7.3.3.2.36	*Universal Handoff Direction Message*
3.7.3.3.2.43	*Call Assignment Message*
3.7.3.3.2.44	*Extended Alert With Information Message*
3.7.3.3.2.49	*Extended Flash With Information Message*

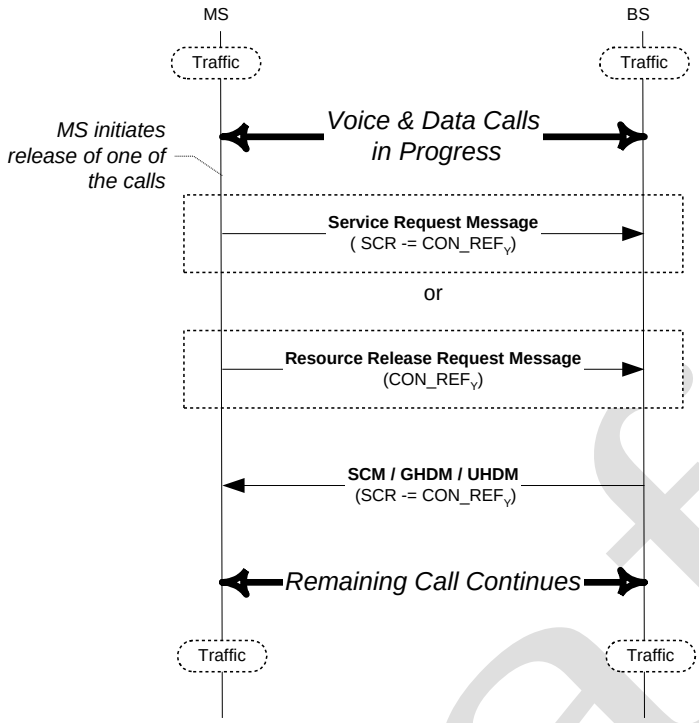

Figure 11 – Reference call flow for MS release of a single call while Voice and Data calls are in progress

9.5.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in overhead messages is set to '1'.

b. Set up both a voice call and a packet data call (e.g., SO33). Wait till both the voice call and the data call are in progress. Ensure sufficient traffic is exchanged to keep the data instance in active state.

c. If supported, initiate the release of the voice call at the mobile station.

d. Verify the following:

1. The mobile station sends a *Service Request Message* or *Resource Release Request (Mini) Message* requesting the release of the voice call.

a. If the mobile station sends a *Service Request Message*, the service option connection record corresponding to the voice call is omitted from the Service Configuration information record included in this message.

b. If the mobile station sends a *Resource Release Request (Mini) Message*, the following fields shall be set as follows:

2. Upon receiving the Service Request Message or Resource Release Request (Mini) Message requesting the release of the voice call, the base station sends a Service Connect Message, General Handoff Direction Message (with a SCR), or Universal Handoff Direction Message (with a SCR) as follows:

    a. The service option connection record corresponding to the voice call is omitted from the Service Configuration information record included in this message.

3. At the action time of the *Service Connect Message*, *General Handoff Direction Message*, or *Universal Handoff Direction Message* used to release the voice call, the voice traffic no longer flows.

4. The data call is not dropped.

e. Repeat steps a though d with the following exception: in step 3, initiate the release of the data call at the mobile station. All the expected results are as in step 4 with the difference that the call being released is the data call.

9.5.4 Minimum Standard

The mobile station shall comply with d.

9.6 Base Station Release of a Single Call While Voice and Data Calls are in Progress

9.6.1 Definition

This test verifies that, when both voice and data calls are in progress, base station can release one of the calls successfully and the other call continues uninterrupted.

9.6.2 Traceability

Same as section 9.5.2.

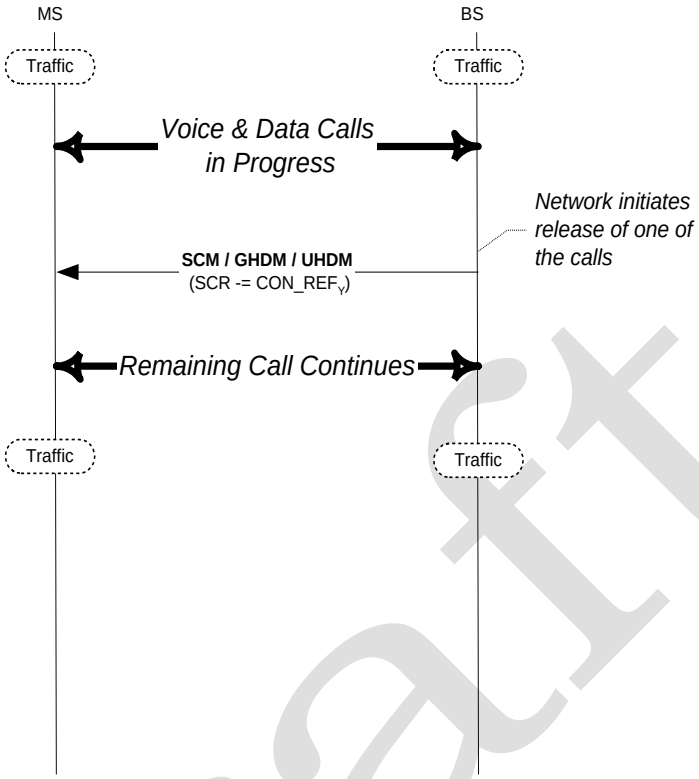

Figure 12 – Reference call flow for Base Station release of a single call while Voice and Data calls are in progress

9.6.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in overhead messages is set to '1'.

b. Set up both a voice call and a packet data call (e.g., SO33). Wait till both the voice call and the data call are in progress. Ensure sufficient traffic is exchanged to keep the data instance in active state.

c. Trigger a network-initiated release of the voice call.

d. Verify the following:

1. The base station sends a *Service Connect Message*, *General Handoff Direction Message* (with a SCR), or *Universal Handoff Direction Message* (with a SCR), where the service option connection record corresponding to the voice call is omitted from the Service Configuration information record included in this message.

2. At the action time of the *Service Connect Message*, *General Handoff Direction Message*, or *Universal Handoff Direction Message* used to release the voice call, the voice traffic no longer flows.
3. The data call is not dropped.

e. Repeat steps b though d with the following exception: in step 3, initiate the release of the data call at the base station if possible (e.g., if inactivity timer at base station is smaller than inactivity timer at mobile station, then not exchanging any data would result in base station releasing a data call). All the expected results are as in step 4 with the difference that the call being released is the data call.

9.6.4 Minimum Standard

The mobile station shall comply with d.

9.7 Correct Handling of Call Control Signaling

9.7.1 Definition

This test verifies that, when one or more calls are in progress, mobile station initiated and network initiated call control signaling messages are handled correctly.

9.7.2 Traceability

Same as section 9.5.2.

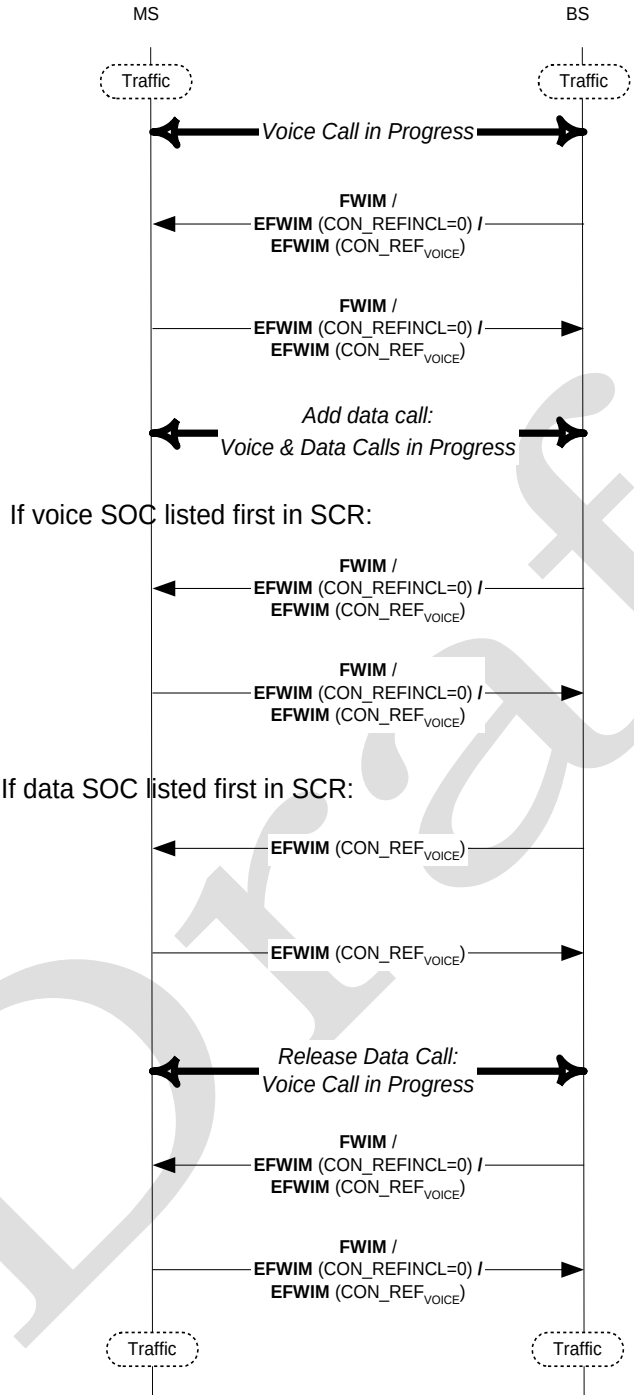

Figure 13 – Reference call flow for Call Control Signaling

9.7.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that CS_SUPPORTED field in overhead messages is set to '1'.

b. Set up a voice call and wait until the voice call is in progress.

c. If applicable, trigger an action at the mobile station that will result in either a *Flash With Information Message* or *Extended Flash With Information Message* for a voice call being transmitted to the base station (e.g., Trigger an action that utilizes the Keypad Facility information record).

d. Verify the following:

    1. The mobile station sends a *Flash With Information Message*, an *Extended Flash With Information Message* with the CON_REF_INCL field set to '0', or an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

    2. If applicable, the information record is delivered correctly in the network.

e. If applicable, trigger an action at the network that will result in either a *Flash With Information Message* or *Extended Flash With Information Message* being transmitted to the mobile station (e.g., Trigger an action that utilizes the Display information record).

f. Verify the following:

    1. The base station sends a *Flash With Information Message*, an *Extended Flash With Information Message* with the CON_REF_INCL field set to '0', or an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

    2. The information record is correctly handled in the mobile station.

g. Set up a mobile station originated or mobile station terminated packet data call (e.g., SO33). When the base station sends a *Service Connect Message*, *General Handoff Direction Message*, or *Universal Handoff Direction Message* to establish the service option connection corresponding to the data call, note whether the service option connection corresponding to the voice call or data call is listed as the first entry in the SCR.

h. If applicable, trigger an action at the mobile station that will result in either a *Flash With Information Message* or *Extended Flash With Information Message* for a voice call being transmitted to the base station (e.g., Trigger an action that utilizes the Keypad Facility information record).

i. Verify the following:

    1. If the service option connection corresponding to the voice call is listed as the first entry in the SCR:

        a. The mobile station sends a *Flash With Information Message*, an *Extended Flash With Information Message* with the CON_REF_INCL field set to '0', or an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

        b. If applicable, the information record is delivered correctly in the network.

2. If the service option connection corresponding to the data call is listed as the first entry in the SCR:

    a. The mobile station sends an *(Extended) Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

    b. If applicable, the information record is delivered correctly in the network.

j. If applicable, trigger an action at the network that will result in either a *Flash With Information Message* or *Extended Flash With Information Message* for a voice call being transmitted to the mobile station (e.g., Trigger an action that utilizes the Display information record).

k. Verify the following:

1. If the service option connection corresponding to the voice call is listed as the first entry in the SCR:

    a. The base station sends a *Flash With Information Message*, an *Extended Flash With Information Message* with the CON_REF_INCL field set to '0', or an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

    b. The information record is correctly handled in the mobile station.

2. If the service option connection corresponding to the data call is listed as the first entry in the SCR:

    a. The base station sends an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

    b. The information record is correctly handled in the mobile station.

l. Perform a mobile station initiated or base station initiated release of the data call. Wait till this operation is successful.

m. If applicable, trigger an action at the mobile station that will result in either a *Flash With Information Message* or *Extended Flash With Information Message* for a voice call being transmitted to the base station (e.g., Trigger an action that utilizes the Keypad Facility information record).

n. Verify the following:

1. The mobile station sends a *Flash With Information Message*, an *Extended Flash With Information Message* with the CON_REF_INCL field set to '0', or an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

2. If applicable, the information record is delivered correctly in the network.

o. If applicable, trigger an action at the network that will result in either a *Flash With*

Information Message or *Extended Flash With Information Message* being transmitted to the mobile station for a voice call (e.g., Trigger an action that utilizes the Display information record).

p. Verify the following:

1. The base station sends a *Flash With Information Message*, an *Extended Flash With Information Message* with the CON_REF_INCL field set to '0', or an *Extended Flash With Information Message* with the CON_REF field set to the connection reference corresponding to the voice call.

2. The information record is correctly handled in the mobile station.

9.7.4 Minimum Standard

The mobile station shall comply with d, i, f, k, n, and p.

9.8 Release A Mobile Station in Concurrent Calls with a Release A Base Station Hand off to Pre-Release A Base Station

9.8.1 Definition

This test verifies that, when a Release A mobile station currently in concurrent calls with a Release A base station is handed off to a Pre-Release A base station, only a single call is maintained and this call continues successfully.

9.8.2 Traceability

Same as section 9.5.2.

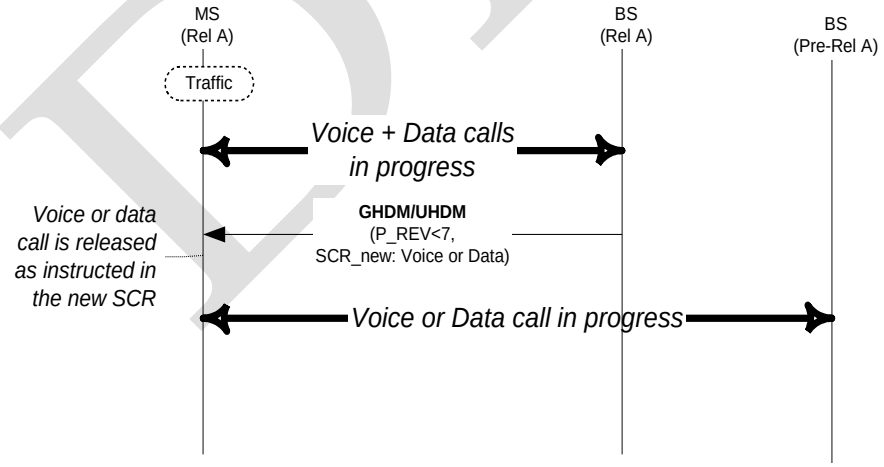

Figure 14 – Reference call flow for concurrent call handoff from Release A to Pre-Release A base station

9.8.3 Method of Measurement

a. Ensure that mobile station is idle on base station with P_REV >= 7. Ensure that

CS_SUPPORTED field in overhead messages is set to '1'.

b. Set up a mobile station originated or mobile station terminated voice call.

c. Set up a mobile station originated or mobile station terminated packet data call (e.g., SO33). Wait till both voice and data calls are in progress. Ensure sufficient traffic is exchanged to keep the data instance in active state.

d. Select a route where mobile station hands off from base station with P_REV >=7 to base station with P_REV < 7. Move (e.g., drive) along the selected route towards base station with P_REV < 7.

e. Verify the following:

1. The base station sends a *General Handoff Direction Message* or a *Universal Handoff Direction Message* to the mobile station, with the Service Configuration information record included and set as follows:

2. The service option connection corresponding to the call to be maintained is included and uses the same connection reference value (CON_REF) as currently used for this call.

3. The service option connection corresponding to the other call is omitted.

4. At the action time of this message, the mobile station shall release the call corresponding to the omitted service option connection and hands off to the base station with P_REV < 7.

5. The remaining call continues successfully.

9.8.4 Minimum Standard

The mobile station shall comply with e.

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10 HRPD System Acquisition and Session Negotiation

10.1 AT initiated HRPD Session Configuration Time

10.1.1 Definition

This test verifies the proper implementation of initial session configuration. This test is applicable for all revisions of HRPD supported by the AN.

10.1.2 Traceability

(See [8]):

7.2 Default Session Management Protocol

10.1.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.

b. Verify that the AT acquires the HRPD system and goes to the idle state. Verify that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

c. Verify that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation using sets of *ConfigRequest* / *ConfigResponse* messages. Verify that the AT receives a *ConfigurationComplete* message.

d. Cause either the AT or the AN to transmit a *SessionClose* message to the AT.

e. Repeat the steps a-d at least 20 times.

f. When multiple personalities are not negotiated, verify that the total time required for session configuration, i.e., the time difference between transmission of UATI request message and reception and *ConfigurationComplete* message

   1. is less than 3 seconds 90% of the time for rev 0 session configuration.
   2. is less than 3 seconds 90% of the time for rev A session configuration.
   3. is less than 3 seconds 90% of the time for rev B session configuration.

g. When the AT negotiates upto 4 personalities, verify that the total time required for session configuration, i.e., the time difference between UATIRequest Message and AN's *SoftConfigurationComplete* message with Continue Field = 0, is less than 6 seconds 90% of the time.

h. Repeat the steps for all revisions of HRPD supported by the AT and the AN.

10.1.4 Minimum Standard

The AT shall comply with steps b and c.

The AN shall comply with steps b and c.

The AT and AN should comply with steps f, and g.

10.2 HRPD Session Configuration and Management with Subnet change

10.2.1 Definition

This test verifies session configuration and management associated with a subnet change. If the AT moves to a new subnet and if the new subnet can retrieve the AT's prior session configuration from the old subnet, new session negotiations are not needed. If the PriorSession attribute is supported by the AN, it can use the previously negotiated set of session parameters. The location where the subnet change occurs should be identified with help from the network operator.

10.2.2 Traceability

(See [8]):

5.3 Default Address Management Protocol

10.2.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.

b. Verify that the AT acquires the HRPD system and goes to the idle state. Verify that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

c. Verify that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation using sets of *ConfigRequest / ConfigResponse* messages.

d. After a HRPD session is opened successfully, move the AT to another subnet where the PriorSession attribute is accepted.

e. Verify that in this subnet, the AT sends a *ConfigRequest* with the current session token and the AN sends back a *ConfigResponse*. Verify that the AT does not go through a new set of session negotiations after receiving the *ConfigResponse message* from the AN.

f. Repeat the steps a through e for revisions A and B of HRPD if these are supported by the AT and the AN.

10.2.4 Minimum Standard

The AT shall comply with steps b and c.

The AT and the AN shall support e.

10.3 Preferred Control Channel Cycle (PCCC) Negotiation

10.3.1 Definition

This test will verify that the AT and the AN successfully perform PCCC negotiation. The AT proposes PCCC attribute during the AT initiated phase of the session negotiation.

10.3.2 Traceability

(See [8]):

6.4.6.1.4 Sleep State

10.3.3 Method of Measurement

a. Ensure that the AT has a closed HRPD session.

b. Power up the AT and place it where receive power is approximately -75 dBm for HRPD system.

c. Verify that the AT acquires the HRPD system and goes to idle state on the HRPD system.

d. Verify that the AT successfully negotiates the Preferred Control Channel cycle and starts the slotted mode idle operation. Note, AT that do not support hybrid mode operation, or support SVDO operation may not negotiate this attribute.

e. Verify the AT can receive *Page Message* on the HRPD system while in dormant state.

f. Ensure that the AT opens a connection on HRPD.

g. While the HRPD connection is open, send a Page message on the cdma2000 1x system.

h. Verify that the AT receives the message and responds on the cdma2000 1x system.

i. Allow the HRPD and cdma20001x connections to become idle.

j. Send a Page message to the mobile on the cdma2000 1x system.

k. Verify that the AT receives the message and responds on the cdma2000 1x system.

l. Allow the cdma20001x connection to become idle.

m. Repeat the steps a-l 20 times.

n. Repeat the steps for all revisions of HRPD supported by the AT and the AN.

10.3.4 Minimum Standard

The mobile station shall comply with d, e, h, and k.

10.4 Access Authentication (AN Authentication)

10.4.1 Definition

This test verifies that the AT and the AN can successfully perform access authentication via

PPP CHAP protocol as outlined in [10]. The AT will enable flow on the stream to which the packet application bound to the access network is mapped. Depending upon the AN implementation, AN will either initiate the authentication processes immediately after a successful session negotiation or just before a data call setup. AN authentication is checked for either case of initial session negotiation or initial data call setup.

10.4.2 Traceability

(See [11]):

3.1 Simple IP Establishment without Authentication of the Mobile Station
3.2 Simple IP Establishment with CHAP
3.3 Simple IP Establishment with PAP
4.1 Successful PPP Negotiation and Termination

10.4.3 Method of Measurement

a. Verify that the CHAP authentication is enabled on the AN side.

b. Verify that the correct username and password are provisioned in the AT for CHAP authentication.

c. Ensure that the AT has a closed HRPD session.

d. Place AT where it can receive a good HRPD signal with receive power of approximately -75 dBm, and allow the AT to negotiate a session.

e. Verify that the AT successfully completes the session negotiation.

f. If the AN performs authentication immediately after the session negotiation:

    1. Verify that the AN sends the *CHAP Challenge* message and initiates the AN authentication.

    2. Set up a data call on HRPD system.

    3. Verify that data can be transferred in both directions.

g. If the AN performs authentication just before the data call setup:

    1. Set up a data call on the HRPD system.

    2. Verify that the AN sends the *CHAP Challenge* message and initiates the AN authentication.

    3. Verify that after completion of the AN authentication, the data call is successfully set up and data can be transferred in both directions.

h. Provision an incorrect username and password in the AT and repeat steps c through g of this procedure with modification to verify steps as follows:

    1. Verify that the AN authentication fails. The AN may close the HRPD session. Ignore verification steps related to successful data call setup and data transfer.

i. Repeat the steps for all revisions of HRPD supported by the AT and the AN.

10.4.4 Minimum Standard

The mobile station shall comply with f, g, and h.

10.5 SlottedMode Attribute Negotiation for Enhanced Idle State Protocol

10.5.1 Definition

This test verifies negotiation and successful setup of the Enhanced Idle State Protocol and negotiation of the SlottedMode attribute. This test is applicable to AT that support revision A and B of HRPD.

10.5.2 Traceability

(See [8]):

Section 8.4.7	*Configuration Attributes*
Section 8.5	*Enhanced Idle State Protocol*
Section 8.5.7.1	*Simple Attributes*

10.5.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm. Ensure that the AT does not have a previously assigned UATI from the AN.

b. Configure the AN and AT to support Enhanced Idle State Protocol. Configure the AN to propose the SlottedMode attribute.

c. Power on the AT.

d. During HRPD session negotiation, verify the AT sends a *ConfigurationRequest* message that includes the following values:

Field	Value
Protocol Type	0x0c (Idle State Protocol)
Protocol Subtype	0x0001 (Enhanced Idle State)

e. Ensure that the AN responds with a *ConfigurationResponse* message including the following:

Field	Value

Protocol Type	0x0c (Idle State Protocol)
Protocol Subtype	0x0001 (Enhanced Idle State)

f. Set up an AT originated HRPD Rev A or Rev B call and allow the data session to go dormant.

g. Wait 60 seconds from the time the data session goes dormant and send an HRPD page to the AT (i.e., Issue a ping request from the AN to the AT).

h. Verify the HRPD page request is successful.

i. Repeat steps b through h with the AN negotiating a non default value for the Enhanced Idle State Protocol by sending a *ConfigurationRequest* message. An example of these values is shown below.

Field	Value
AttributeID	0x01 (SlottedMode)
SlotCycle1	0x6
SlotCycle2	0x6
SlotCycle3	0x9
WakeCount1	1
WakeCount2	2

j. Set up an AT originated HRPD Rev A or Rev B call. Send a ping from the AT to the AN.

k. Wait for the AT to go dormant. After the AT goes dormant, during T12 measure the interval of time that the AT wakes up and looks for pages. Verify this time interval is conformant with the SlotCycle1 value. For example, AT will wake up at every control channel cycle (426.66 ms) when the SlotCycle1= 0x06.

l. Send a Page to the AT during T12 and verify that the AT receives the Page message.

m. Allow the AT to remain dormant. Wait for T23 to expire. Then measure the interval of time that the AT wakes up and looks for pages. Verify this time interval is conformant with the SlotCycle3 value. For example, AT will wake up at 12 control channel cycles (5120 ms) when SlotCycle3= 0x09.

n. Send an HRPD page to the AT (ie. Issue a ping request from the AN to the AT). Verify that the page request is successful.

o. Repeat the test with revision B based personality of HRPD with Enhanced Idle State

Protocol.

10.5.4 Minimum Standard

The AT shall comply with steps h, l, m and n.

The AN shall comply with steps h, l, n.

10.6 SCP Negotiation of HRPD Revision B Protocols

10.6.1 Definition

This test verifies that the AT and AN can negotiate attributes for Subtype 2 FTCMAC Protocol, Subtype 4 RTCMAC Protocol, Subtype 3 Physical Layer Protocol, Subtype 1 RouteUpdate Protocol, and Quick Idle State Protocol. This test is applicable when the AT and the AN support revision B of HRPD.

10.6.2 Traceability

(See [8]):

9.8 Subtype 2 Forward Traffic Channel Medium Access Control

9.13 Subtype 4 Reverse Traffic Channel Medium Access Control

12 Subtype 3 Physical Layer

7.9 Subtype 1 Route Update Protocol

7.6 Quick Idle State Protocol

7.6.7 Configuration Attributes

10.6.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm. Ensure that the AT does not have a stored session.

b. Verify that the AT acquires the HRPD system and goes to the idle state.

c. Verify that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

d. Verify that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation.

e. Verify that, for the personality associated with MMPA, the AT declares support for Subtype 2 FTCMAC Protocol, Subtype 4 RTCMAC Protocol, Subtype 3 Physical Layer Protocol, and Subtype 1 RouteUpdate Protocol in the *ConfigurationRequest* message for the Session Configuration Protocol and that the AN accepts these subtypes in the *ConfigurationResponse* message for the Session Configuration Protocol. The AT may also declare support for Quick Idle State Protocol.

f. Verify that if the AN sends any *ConfigurationRequest* message for negotiating a non-default value for any attribute for Subtype 2 FTCMAC Protocol, Subtype 4 RTCMAC

Protocol, Subtype 3 Physical Layer Protocol, and Subtype 1 RouteUpdate Protocol, the AT accepts the proposed value and sends a *ConfigurationResponse* message. If the AT declared support for Quick Idle State Protocol and the AN sends any *ConfigurationRequest* message for negotiating a non-default value for any attribute for Quick Idle State Protocol verify that the AT accepts the proposed value and sends a *ConfigurationResponse* message.

g. Verify that the session negotiation is completed successfully.

h. Ensure that MMPA based personality is in use.

i. Start a packet data call with an application with bi-directional data transfer requirements.

j. Verify that the data transfer occurs successfully in both directions.

10.6.4 Minimum Standard

The AT shall comply with steps b, c, d, e, f, g and j.

The AN shall comply with steps c, e, g and j.

10.7 GAUP Based Attribute Negotiation for Revision B Protocols

10.7.1 Definition

This test verifies negotiation and successful setup of the Subtype 2 FTCMAC Protocol, Subtype 4 RTCMAC Protocol, Subtype 3 Physical Layer Protocol, Subtype 1 RouteUpdate Protocol, and Quick Idle State Protocols that were introduced for Revision B of HRPD.

10.7.2 Traceability

(See [8]):

9.8 Subtype 2 Forward Traffic Channel Medium Access Control
9.8.7 Configuration Attributes
12 Subtype 3 Physical Layer
12.1.7 Configuration Attributes
7.9 Subtype 1 Route Update Protocol
7.9.7 Configuration Attributes
7.6 Quick Idle State Protocol
7.6.7 Configuration Attributes
13.10 Generic Attribute Update Protocol

10.7.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm. Ensure that the AT does not have a stored session.

b. Ensure that the AT acquires the HRPD system and goes to the idle state.

c. Ensure that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

d. Ensure that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation.

e. Ensure that, for the personality associated with MMPA, the AT declares support for Subtype 2 FTCMAC Protocol, Subtype 3 Physical Layer Protocol, Subtype 1 Route Update Protocol in the *ConfigurationRequest* message for the Session Configuration Protocol and that the AN accepts these subtype in the *ConfigurationResponse* message for the Session Configuration Protocol. If the AT declares support for Quick Idle State Protocol ensure that the AN accepts this subtype in the *ConfigurationResponse* message for the Session Configuration Protocol.

f. Ensure that the session negotiation is completed successfully and that MMPA based personality is in use.

g. Start a packet data call and keep the HRPD connection active by using ping packets.

h. Cause the AN to send an *AttributeUpdateRequest* message negotiating a non-default value for any attribute for Subtype 1 Route Update Protocol.

i. If the AT receives an *AttributeUpdateRequest* message, verify the AT accepts the proposed value and sends an *AttributeUpdateAccept* message.

j. Verify that the data transfer continues successfully in both directions.

k. Cause the AN to send an *AttributeUpdateRequest* message negotiating a non-default value for any attribute for Subtype 2 FTCMAC Protocol.

l. If the AT receives an *AttributeUpdateRequest* message, verify the AT accepts the proposed value and sends an *AttributeUpdateAccept* message.

m. Verify that the data transfer continues successfully in both directions.

n. Cause the AN to send an *AttributeUpdateRequest* message negotiating a non-default value for any attribute for Subtype 3 Physical Layer Protocol.

o. If the AT receives an *AttributeUpdateRequest* message, verify the AT accepts the proposed value and sends an *AttributeUpdateAccept* message.

p. Verify that the data transfer continues successfully in both directions.

q. Cause the AN to send an *AttributeUpdateRequest* message negotiating a non-default value for any attribute for Subtype 1 Route Update Protocol.

r. If the AT receives an *AttributeUpdateRequest* message, verify the AT accepts the proposed value and sends an *AttributeUpdateAccept* message.

s. Verify that the data transfer continues successfully in both directions.

10.7.4 Minimum Standard

The AT shall comply with step i, l, o, and r.

The AN and AT shall comply with steps j, m, p, and s.

1 This page is intentionally left blank.

11 HRPD Connection Layer Tests

11.1 Idle State Channel Hashing

11.1.1 Definition

This test can be performed only if the base station supports more than one HRPD channels. If multiple channels are advertised in the sector parameter message, the AT uses a hash function [8] to select one of the advertised channels for idle state operation. The primary purpose of channel hashing is to equally distribute the AN load on all available channels. If there are "n" channels listed in the sector parameter message and if this test is repeated "m" number of times, the AT will hash to each channel approximately "m/n" times. In a subnet where *SectorParameter* message contains multiple channels, the AT will try to hash to a new channel every time a new session is opened. The AN will page the AT on one or multiple channels. When the AN pages the AT only on the hashed-to channel, the AT needs to be monitoring the correct channel to receive the page. This test verifies that the AT is monitoring the correct channel to receive any pages sent by the AN.

11.1.2 Traceability

(See [8]):

6.4.6.1.5.1.1 CDMA Channel Selection

11.1.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.

b. After receiving the sector parameter messages with multiple channels, the AT will try to hash to a channel listed in *SectorParameter* message (it could be the same channel in some cases).

c. Set up a HRPD data call after channel hashing is complete to ensure that the AT can set up a call on the hashed channel. Let the call go dormant.

d. Send a *Page Message* (e.g., ping) from the AN.

e. Verify the AT receives the page on the hashed channel.

f. Repeat this test (2 x n) times, where n is the number of channels listed in the *SectorParameter* message, by closing the current HRPD session and opening a new HRPD session.

g. Repeat the steps for all revisions of HRPD supported by the AT and the AN.

11.1.4 Minimum Standard

The mobile station shall comply with e.

11.2 AT Initiated Connection Setup Time

11.2.1 Definition

This test verifies that the AT initiated connection setup times are satisfactory. This test is applicable to AN and AT that support any revision of HRPD.

11.2.2 Traceability

(See [8]):

Section 8.4.6.1.6 Connection Setup State

11.2.3 Method of Measurement

a. Power up the AT and place it in an area where receive power is greater than -75dBm.
b. Ensure that the AT establishes a session with the HRPD network.
c. Instruct the AT to establish a connection with the AN.
d. Note the time difference between transmission of ConnectionRequest and TrafficChannelComplete messages. This is the connection establishment time.
e. Allow the AT to do dormant.
f. Repeat steps c-e at least 100 times.
g. Verify that the HRPD connection establishment time is less than 1 second 90% of the time.
h. Repeat this test for all revisions of HRPD supported by the AT and the AN.

11.2.4 Minimum Standard

The AT and AN should comply with step g.

11.3 AN Initiated Connection Set-up Time Default Slotted Mode Attributes

11.3.1 Definition

This test verifies that the AT initiated connection setup times are satisfactory. This test is applicable to AN and AT that support revision A or Revision B of HRPD.

11.3.2 Traceability

(See [8]):

Section 8.4.6.1.6 Connection Setup State

11.3.3 Method of Measurement

a. Power up the AT and place it in an area where receive power is greater than -75dBm.

b. Ensure that the AT establishes a session with the HRPD network. Ensure that AT or the AN do not propose any change to the default values of SlotCycle1, SlotCycle2, Slotcycle3, WakeCount1, WakeCount2 attributes of the Enhanced Idle state protocol or the Quick Idle state protocol.

c. Instruct the AT to start a packet data call with the AN.

d. Ensure that the packet data call is established successfully and that the AT receives an IP address.

e. Cause the AN to send a Page message to the AT. This can be achieved by sending a ping packet with default payload to the AT.

f. If the logging is available at the AN then note the time difference between transmission of the *Page* message and reception of the *TrafficChannelComplete* message. This is the connection establishment time. If the logging of these messages is unavailable at the AN, note the ping response time (T1).

g. Allow the AT to do dormant.

h. Repeat steps e-g at least 100 times.

i. If the logging of messages is unavailable at the AN, perform the following:

   1. Cause the AT to establish a connection with the AT. This can be achieved by sending a ping packet to the AT.

   2. While the HRPD connection is active, send 100 ping packets with default payload at 2 second intervals. Ensure that the AT does not loose HRPD connection during the transmission of these ping packets. Note the ping response time (T2).

   3. Subtract average of T2 from the T1 values to achieve the connection establishment times.

j. Verify that the average HRPD connection establishment time is less than 4 seconds.

k. Repeat this test for revision B of HRPD with the use of Quick Idle State Protocol if it is supported by the AT and the AN.

11.3.4 Minimum Standard

The AT and AN shall comply with steps j.

11.4 AN Initiated Connection Set-up Time Non-Default Slotted Mode Attributes

11.4.1 Definition

This test verifies that the AT initiated connection setup times are satisfactory with non-default slotted mode attributes. This test is applicable to AN and AT that support revision A or Revision B of HRPD.

11.4.2 Traceability

(See [8]):

Section 8.4.6.1.6 Connection Setup State

11.4.3 Method of Measurement

a. Power up the AT and place it in an area where receive power is greater than -75dBm.

b. Ensure that during session negotiation the AN proposes non-default attribute values of Enhanced Idle State Protocol (for revision A of HRPD) or the Quick Idle state protocol (for Revision B of HRPD). An example of these values is shown below:

    1. SlotCycle1 = 0x07
    2. SlotCycle2 = 0x07
    3. Slotcycle3 = 0x07
    4. WakeCount1 = 0xF
    5. WakeCount2 = 0xF

c. Instruct the AT to start a packet data call with the AN.

d. Ensure that the packet data call is established successfully and that the AT receives an IP address.

e. Cause the AN to send a Page message to the AT. This can be achieved by sending a ping packet with default payload to the AT.

f. If the logging is available at the AN then note the time difference between transmission of the *Page* message and reception of the *TrafficChannelComplete* message. This is the connection establishment time. If the logging of these messages is unavailable at the AN, note the ping response time (T1).

g. Allow the AT to do dormant.

h. Repeat steps d-g at least 100 times and ensure that the all Pages are transmitted when SlotCycle1 is in use. Alternatively, the same value can be negotiated for SlotCycle1, SlotCycle2 and SlotCycle3.

i. If the logging of messages is unavailable at the AN, perform the following:

    1. Cause the AT to establish a connection with the AT. This can be achieved by sending a ping packet to the AT.
    2. While the HRPD connection is active, send 100 ping packets with default payload at 2 second intervals. Ensure that the AT does not loose HRPD connection during the transmission of these ping packets. Note the ping response time (T2).
    3. Subtract average of T2 from the T1 values to achieve the connection establishment times.

j. Verify that the HRPD connection establishment time is less than 1 + PagePeriod seconds for 90% of the attempts, where PagePeriod is defined for SlotCyclei as

$2^{SlotCyclei} \times 4$ slots, if SlotCyclei is <= 0x06,

$2^{SlotCyclei-7} \times 768$ slots

For example, if the SlotCycle is 7, the connection establishment time is less than (1+ 1.28) seconds for 90% of the connection.

k. Repeat this test for revision B of HRPD with the use of Quick Idle State Protocol if it is supported by the AT and the AN.

11.4.4 Minimum Standard

The AT and AN shall comply with steps j.

11.5 Carrier Add and Drop with PA Headroom Limitation

11.5.1 Definition

This test verifies the AT and AN behavior when the AT is assigned multiple carriers and becomes headroom limited.

11.5.2 Traceability

(See [8]):

9.13 Subtype 4 Reverse Traffic Channel Medium Access Control

11.5.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm and multiple carriers are available. Ensure that the AT does not have a stored session.

b. Ensure that the AT acquires the HRPD system and goes to the idle state.

c. Ensure that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

d. Ensure that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation.

e. Ensure that, for the personality associated with MMPA, the AT declares support for Subtype 4 RTCMAC in the *ConfigurationRequest* message for the Session Configuration Protocol and that the AN accepts this subtype in the *ConfigurationResponse* message for the Session Configuration Protocol.

f. Ensure that if the AN sends any *ConfigurationRequest* message for negotiating a non-default value for any attribute for Subtype 4 RTCMAC, the AT accepts the proposed value and sends a *ConfigurationResponse* message.

g. Ensure that the session negotiation is completed successfully.

h. Ensure that MMPA based personality is in use.

i. Start a packet data call with an application with bi-directional data transfer requirements.

j. Ensure that the AN sends a *TrafficChannelAssignment* message to the AT with multiple carriers.

k. Verify that the data transfer occurs successfully in both directions.

l. Cause the AT pilot power to increase to a range between -5dBm and +10dBm such that the AT becomes headroom limited. This can be achieved by driving towards cell edge or a poor coverage location.

m. Verify that the AT sends a *ReverseChannelDropped* message with reason set to 0x0.

n. Verify that the AN sends a *ReverseChannelDroppedAck* message followed by the *TrafficChannelAssignment* message that removes the carriers dropped by the AT.

o. Ensure that the AT transmits a *TrafficChannelComplete* message to the AN.

p. Verify that the AN schedules the transmission of pending data from the deleted instances of the QN (dropped carriers) to the existing instances of the QN.

q. Verify that the AT detects gaps in SAR sequence space and transmits *MultiLinkNAK* for missing data.

r. Verify that the data transfer continues successfully in both directions after the deletion of the QN instance(s).

s. Verify that there are no SAR Reset messages transmitted in the 10 second duration after the transmission of *TrafficChannelComplete* message.

t. Ensure that the HRPD connection does not become dormant.

u. Cause the transmit power to decrease such that there is no headroom limitation at the AT. This can be achieved by driving towards the base station or moving to a good coverage location.

v. Verify that the AT sends a *CarrierRequest* message to the AN.

w. Verify that the AN sends a *TrafficChannelAssignment* message containing NumReverseChannels + 1 carrier assignments.

x. If the AT receives a *TrafficChannelAssignment* message verify that the AT sends a *TrafficChannelComplete* message to the AN.

y. Verify that the data transfer continues successfully in both directions using all the carriers assigned to the AT

z. If the AT receives a *TrafficChannelAssignment* message containing NumReverseChannels + 1 carrier assignments verify that a new instance of QN is created on the carrier added through the *TrafficChannelAssignment* message.

aa. If the AT sends a *TrafficChannelComplete* message to the AN, verify that there are no SAR Reset messages transmitted in the 10 second duration after the transmission of *TrafficChannelComplete* message.

1 11.5.4 Minimum Standard

2 The AT shall comply with steps k, m, q, r, s, v, x, y, z and aa.

3 The AN shall comply with steps k, n, p, r, s, y, z and aa.

4 The AN should comply with steps w.

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12 HRPD Packet Application Tests

12.1 AT Data Over Signaling Message Transmission

12.1.1 Definition

This test verifies that the AT can send a packet over the Access Channel to the AN. This is accomplished by using the Data Over Signaling (DoS) Protocol. The size of the data packet that the AT sends must be smaller than the Access Channel capsule size. Specifically, this test validates that the delivery of higher layer packet using a *DataOverSignaling M*essage transmitted by the AT to the AN, and the MessageSequence increment for the *DataOverSignaling M*essages. This test also validates the ability of the AN to acknowledge the *DataOverSignaling M*essage with a DataOverSignalingAck with appropriate AckSequence field when the AckRequired field in the *DataOverSignaling M*essage is set to 1. In the test procedure High Priority Signaling is used as an example application for which DataOverSignaling message can be transmitted. Any such application can be used.

This test is only applicable to AT that support an application that requires *DataOverSignaling* based messaging. Note, in the procedure below MPA attributes are stated. When repeating the test for EMPA or MLMFPA, corresponding attributes should be used.

12.1.2 Traceability

(See [24]):

Section 4.5 Data Over Signaling Protocol

(See [12]):

Chapters 2 and 3

12.1.3 Method of Measurement

a. Power up the AT and place it in an area where receive power is greater than -75dBm.

b. Cause the AT to acquire the AN.

c. Configure the AT to negotiate the use of revision A based personality with Multi-Flow Packet Application.

d. During Session Configuration, set the *ProtocolIdentifier* field of the *FlowNNHigherLayerProtocolRev* (NN = 0xij) and *FlowNNHigherLayerProtocolFwd* (NN = 0xij) to HDLC framing.

e. During Session Configuration, set the Active parameter of *FlowNNIdentificationFwd* (NN = 0xij) attribute and *FlowNNIdentificationRev* (NN = 0xij) attribute to 0x01.

f. Set the ReservationLabel for *FlowNNReservationRev* (NN = 0xij) and *FlowNNReservationFwd* (NN = 0xij) to High Priority Signaling. Set *FlowNNDataOverSignalingAllowedRev* (NN = 0xij) to 0x01. Configure the AN to grant

the QoS request from the AT and to set *ReservationKKIdleStateFwd* and *ReservationKKIdleStateRev* to 0x0 for ReservationLabel kk associated with High Priority Signaling.

g. If the AT does not have an established PPP session, cause the AT to establish a PPP session.

h. Instruct the AT to send a *ReservationOn* message for ReservationLabel kk associated with High Priority Signaling data that is to be carried using *DataOverSignaling* message to the AN and ensure that the AN responds with a *ReservationAccept* message. Instruct the AT to send a *ReservationOn* message for ReservationLabel kk associated with High Priority Signaling data that is to be carried using *DataOverSignaling* message from the AN to the AT and ensure that the AN responds with a *ReservationAccept* message.

i. Allow the HRPD connection to become idle.

j. Transmit a packet from the AT directed to the AN using the *DataOverSignaling* message and setting the *AckRequired* field of the *DataOverSignaling* message to '1'. Ensure that the *DataOverSignaling* message is smaller than the maximum Access Channel capsule size.

k. Verify that the AT transmits a *DataOverSignaling M*essage with *MessageID* field set to 0x14, *AckRequired* field set to 1, Reset field set to 0, *MessageSequence* field set to 0, and the HigherLayerPacket field set to entire higher layer packet.

l. Verify that if the AN received the *DataOverSignaling M*essage, it transmits a *DataOverSignalingAck* with *MessageID* set to 0x15 and *AckSequence* field set to zero and the higher layer packet carried in the DataOverSignaling message is delivered to the higher layer protocol.

m. Transmit a packet from the AT directed to the AN using the *DataOverSignaling* message and setting the *AckRequired* field of the *DataOverSignaling* message to '1'. Ensure that the *DataOverSignaling* message size is smaller than the maximum Access Channel capsule size.

n. Verify that the AT transmits a *DataOverSignaling M*essage with *MessageSequence* field set to 1.

o. Verify that if the AN received the *DataOverSignaling M*essage, it transmits a *DataOverSignalingAck* with the *AckSequence* field set to one and the packet is delivered to the higher layer protocol.

p. Repeat the test with Enhanced Multi-Flow Packet application and Multi-Link Multi-Flow Packet application based personality, if these packet applications are supported by the AT and the AN.

12.1.4 Minimum Standard

The AT shall comply with steps k and n.

The AN shall comply with steps l and o.

12.2 AN Data Over Signaling Message Transmission

12.2.1 Definition

This test verifies that the AN can send a packet over the Control Channel to the AT. This is accomplished by using the Data Over Signaling (DoS) Protocol. Specifically, this test validates the delivery of higher layer packet using of a *DataOverSignaling M*essage transmitted by the AN to the AT, and the *MessageSequence* increment for the *DataOverSignaling M*essages. This test also validates the ability of the AT to acknowledge the *DataOverSignaling M*essage with a *DataOverSignalingAck* with appropriate *AckSequence* field when the *AckRequired* field in the *DataOverSignaling M*essage is set to 1. In the test procedure High Priority Signaling is used as an example application for which *DataOverSignaling* message can be transmitted. Any such application can be used.

This test is only applicable to AT that support an application that requires *DataOverSignaling* based messaging. Note, in the procedure below MPA attributes are stated. When repeating the test for EMPA or MLMFPA, corresponding attributes should be used.

12.2.2 Traceability

(See [24]):

Section 4.5 Data Over Signaling Protocol

(See [12]):

Chapters 2 and 3

12.2.3 Method of Measurement

a. Power up the AT and place it in an area where receive power is greater than -75dBm.

b. Cause the AT to acquire the AN.

c. Configure the AT to negotiate the use of revision A based personality with Multi-Flow Packet Application.

d. During Session Configuration , set the ProtocolIdentifier field of the *FlowNNHigherLayerProtocolRev* (NN = 0xij) and *FlowNNHigherLayerProtocolFwd* (NN = 0xij) to HDLC framing.

e. During Session Configuration, set the Active parameter of *FlowNNIdentificationFwd* (NN = 0xij) attribute and *FlowNNIdentificationRev* (NN = 0xij) attribute to 0x01.

f. Set the ReservationLabel for *FlowNNReservationRev* (NN = 0xij) and *FlowNNReservationFwd* (NN = 0xij) to High Priority Signaling. Set *FlowNNDataOverSignalingAllowedRev* (NN = 0xij) to 0x01. Configure the AN to grant the QoS request from the AT and to set *ReservationKKIdleStateFwd* and *ReservationKKIdleStateRev* to 0x0 for ReservationLabel kk associated with High

Priority Signaling.

g. If the AT does not have an established PPP session, cause the AT to establish a PPP session.

h. Instruct the AT to send a *ReservationOn* message for ReservationLabel kk associated with High Priority Signaling data that is to be carried using *DataOverSignaling* message to the AN and ensure that the AN responds with a *ReservationAccept* message. Instruct the AT to send a *ReservationOn* message for ReservationLabel kk associated with High Priority Signaling data that is to be carried using *DataOverSignaling* message from the AN to the AT and ensure that the AN responds with a *ReservationAccep*t message.

i. Allow the HRPD connection to become idle.

j. Cause the AN to transmit a packet directed to the AT using the *DataOverSignaling* message and setting the AckRequired field of the *DataOverSignaling* message to '1'. Ensure that the *DataOverSignaling M*essage size is less than the ControlChannel capsule size (600 bytes).

k. Verify that the AN transmits a *DataOverSignaling M*essage with *MessageID* field set to 0x14, *AckRequired* field set to 1, Reset field set to 0, *MessageSequenc*e field set to 0, and the *HigherLayerPacke*t field set to entire higher layer packet.

l. Verify that if the AT received the *DataOverSignaling M*essage, it transmits a *DataOverSignalingAck* with *MessageI*D field set to 0x15 and *AckSequenc*e field set to zero and the packet carried in the DataOverSignaling message is delivered to the higher layer protocol.

m. Cause the AN to transmit a packet directed to the AT using the *DataOverSignaling* message and setting the *AckRequired* field of the *DataOverSignalin*g message to '1'. Ensure that the *DataOverSignaling* message size is smaller than the Control Channel capsule size (600 bytes).

n. Verify that the AN transmits a *DataOverSignaling M*essage with *MessageSequence* field set to 1.

o. Verify that if the AT received the *DataOverSignaling M*essage, it transmits a *DataOverSignalingAc*k with the *AckSequence* field set to one and the packet carried in the *DataOverSignaling* message is delivered to the higher layer protocol.

p. Repeat the test with Enhanced Multi-Flow Packet application and Multi-Link Multi-Flow Packet application based personality, if these packet applications are supported by the AT and the AN.

12.2.4 Minimum Standard

The AT shall comply with steps l and o.

The AN shall comply with steps k and n.

12.3 Basic MMPA Functionality

12.3.1 Definition

This test verifies the basic MMPA functionality at the AT and the AN. Specifically, this test verifies the initialization of MMPA variables, successful data transfer, *MultiLinkNAK* transmission and processing, and *Flush* transmission. This test requires logging of RLP packets at the AT and the AN. If any of the attributes for the MMPA are not specified, default values specified in [12] should be used.

12.3.2 Traceability

(See [12]):

Chapter 3

3.10.2.1 FlowNNTimersFwd Attribute
3.5.4.4.6 MultiLinkNak
3.5.4.2.1 SAR Transmit Procedures

12.3.3 Method of Measurement

a. Power up the AT and place it where receive power is such that the PER is close to 1%. Ensure that the AT does not have a stored session.

b. Ensure that the AT acquires the HRPD system and goes to the idle state.

c. Ensure that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

d. Ensure that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation.

e. Ensure that AT negotiates a personality based on revision B of HRPD.

f. Start a packet data call. If the HRPD Rev B based personality is in use, ensure that the AN assigns multiple carriers to the AT.

g. Start a bi-directional data transfer.

h. Verify that the AT and the AN initialize the V(s), V(r) and V(n) to 0.

i. Verify that the AT and the AN use the negotiated value of FlowNNSequenceLengthFwd and FlowNNSequenceLengthRev attributes.

j. Verify that the AT and AN can successfully send and receive data on all the assigned carriers.

k. For each carrier assigned to the AT, verify that the AT transmits a *MultiLinkNAK* packet (QuickNAK) to the AN if the AT does not successfully receive a packet on that carrier, i.e., packet is lost during transmission over the air.

l. Verify that the AN retransmits data requested by the *MultiLinkNAK* packet with DelayedNak field corresponding to the NAK report set to 0 (QuickNAK), if it receives the *MultiLinkNAK* within AbortTimer value of the FlowNNTimersFwd attribute.

m. Verify that the AN transmits a *MultiLinkNAK* packet to the AT if the AN does not successfully receive a packet on any of the carriers, i.e., packet is lost during transmission over the air.

n. Verify that the AT retransmits data requested by the *MultiLinkNAK* packet, if it receives the *MultiLinkNAK* within AbortTimer value of the FlowNNTimersRev attribute and if it has not retransmitted this data before. Note, the AT may retransmit data before receiving the NAK request if the FlowNNPhysicalLayerNAKEnableRev has been set to 1.

o. Verify that if the AT does not receive any missing data within NakDelayTimer duration, then the AT transmits a *MultiLinkNAK* message to the AN with DelayedNak field corresponding to the NAK report set to 1. Note, NakDelayTimer is a field of the Flow*NN*TimersFwd attribute.

p. Stop data transfer in both directions.

q. Verify that the AN sends a Flush message that contains the last transmitted data unit.

r. Verify that the AT sends either Flush message or a SAR packet that contains at least the last transmitted data unit.

12.3.4 Minimum Standard

The AT shall comply with step h, i, j, k, n, o and r.

The AN shall comply with step h, i, j l, m and q.

13 HRPD Quality of Service

13.1 QoS Set-Up

13.1.1 Definition

This test verifies the ability of the AN and the AT to set-up and use QoS for any application. The application may reside at the AT or the TE (Terminal Equipment). Specifically, for setting up the QoS for the application, this test verifies that the QoS request and response, reservation to RLP binding, RLP to RTCMAC flow binding on the reverse link, RLP and RTCMAC flow activation, and opening the reservations. This test also verifies the GAUP messages needed to update various attributes and parameters. Note for this test each of the reservation requests may have multiple ProfileIDs and it is possible for the AN to accept any one or none of the Profiles. Typically, the AN should accept AT's most preferred profile, unless it is not able to support this profile due to resource constraints or other reasons. Unless otherwise specified, this test assumes that the AN will be able to accept any of the proposed profiles.

It is assumed that the application needs one or more higher layer flows that are identified by their ReservationLabels. Each higher layer flow is bound to an RLP. More than one flow may be bound to an RLP. On the reverse link, the RLP ids are in turn bound to 1 or more MAC Flows. For example a Video Telephony application may require three separate higher layer flows (reservations) for audio, video and SIP signaling. The application may be designed to map audio and video higher layer flows to separate RLPs (due to different abort timer requirements for audio and video, for example), but transmit SIP flows' data through the default RLP that is typically used for best effort traffic. On the reverse link RLP ids used by audio and video may be mapped to different MAC flows that are configured to provide different latencies, for example.

Note, in the procedure below MPA attributes are stated. When repeating the test for EMPA or MLMFPA, corresponding attributes should be used. For example, FlowNNActivation should be used instead of FlowNNIndentification.

13.1.2 Traceability

(See [8]):

Chapter 4

(See [15]):

Chapter 2 and 3

(See [IR 1]):

11.4 QoS Profile Type and Profile Value Assignments

(See [16])

13.1.3 Method of Measurement

a. Place the AT in an area with HRPD coverage. If the application resides on the TE connect the TE to the AT.

b. Cause the AT to acquire the AN.

c. Configure the AT to negotiate the use of revision A based HRPD personality.

d. Configure the AN to activate only the default RLP flow during session configuration. This can be done by setting the active parameter of the FlowNNIdentificationFwd and FlowNNIdentificationRev attribute to 0 for all RLP flows with NN ≠ 0.

e. Ensure that the AN activates only the default RLP flow during session configuration.

f. If the AT has an established session with the AN, cause either the AT or the AN to close the session by transmitting a SessionClose message.

g. Cause the AT to negotiate a new session with the AN.

h. Cause the AT to establish a data call with the AN and allow the AT to go idle.

i. Cause the AT to start the application that needs to be tested. The application will generate QoS requests for all forward and reverse link flow(s).

j. Verify that the AT transmits GAUP message(s) with ReservationKKQoSReqFwd with R_QoS_SUB_BLOB containing the specified Profile ID for forward flow(s) and ReservationKKQoSReqRev with R_QoS_SUB_BLOB containing the specified Profile ID for reverse flow(s).

k. Verify that the AT constructs a Traffic Flow Template (TFT) with the desired packet filters and sends an RSVP Resv [Create new TFT] message.

l. Verify that the AN transmits AttributeUpdateAccept message(s) accepting the QoS ReservationKKQoSRequestFwd/ ReservationKKQoSRequestRev attributes from the AT.

m. The AN should GAUP the ReservationKKQoSResponseFwd with G_QoS_BLOB containing the set ID for primary Profile ID for all the higher layer flow(s) of the application.

n. The PDSN should install the desired packet filters and send an RSVP ResvConf message.

o. Verify that the AT transmits AttributeUpdate message(s) to the AN accepting the AN's ReservationKKQosResponseFwd and ReservationKKQosResponseRev for the ReservationLabel(s).

p. Verify that the AN transmits a GAUP message for FlowNNIdentificationFwd and FlowNNIdentificationRev in order to activate the forward and reverse link flow(s).

q. Verify that the AT transmits AttributeUpdateAccept message(s) accepting FlowNNIdentificationFwd and FlowNNIdentificationRev attributes.

r. Verify that the AN transmits a GAUP message for FlowNNReservationFwd and FlowNNReservationRev for binding the reservations to RLP flow(s).

s. Verify that the AT transmits AttributeUpdateAccept message(s) accepting FlowNNReservationFwd and FlowNNReservationRev values.

t. The AN will determine the number of Forward and Reverse Link RLP flows and RTCMAC flows needed to support the accepted QoS requests. The AN may need to transmit AttributeUpdateRequest message(s) negotiating the parameters for Forward and Reverse link and RLP flows and RTCMAC flows.

u. If the AN transmits Attribute Update Request for the Forward and Reverse Link RLP Flows and/or RTCMAC flows, verify that the AT transmits AttributeUpdateAccept message(s) accepting RLP and RTCMAC parameters.

v. Verify that the AN transmits AttributeUpdateRequest message containing AssociatedFlowNN with substream field set to 1 to bind the RLP flow(s) to the RTCMAC flow(s).

w. Verify that the AT transmits AttributeUpdateAccept message(s) to the AN accepting the binding sent by the AN in AssociatedFlowsNN attribute.

x. Ensure that the AN performs GAUP RTCMAC BucketLevelMaxNN with a nonzero value to activate the RTCMAC flow(s).

y. Verify that the AT transmits AttributeUpdateAccept message to the AN accepting the BucketLevelMaxNN value sent by the AN.

z. Verify that the AT sends ReservationOnRequest for both the forward and reverse ReservationLabel(s) using single ReservationOnRequest message.

aa. Verify that AN sends ReservationAccept for both forward and reverse reservations.

bb. Verify that both the forward and reverse RLP flows are activated and all the reservations are in Open state.

cc. Once the application starts data transfer, send ping packets with zero byte payload at every second interval to the access terminal. Note that it should be ensured that the ping packet is transmitted as best effort data by the AN and AT.

dd. Verify that data for the application and the ping packets are sent on the appropriate RLP IDs on the forward link and on the appropriate RLP and MAC flows on the reverse link.

ee. Verify that the remote host receives the response to the ping packets.

ff. The PDSN should send data via the intended filter.

gg. If the AT and the AN support revision B of HRPD, repeat the test for with revision B based HRPD personality negotiated in step c.

13.1.4 Minimum Standard

The AT shall comply with steps j, k, o, q, s, u, w, y, z, bb, dd and ee.

The AN shall comply with steps l, p, r, v, aa, bb, dd and ee.

The AN should comply with steps m and x.

The PDSN should comply with steps n and ff.

14 HRPD Connection and Call Establishment

14.1 Data Call Origination

14.1.1 Definition

This test will verify that the AT can originate HRPD packet data calls while in PPP NULL or PPP dormant state.

14.1.2 Traceability

(See [8]):

6.2.6.1.3 Idle State

14.1.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.

b. Verify that the AT is in idle mode on the HRPD system.

c. Set up a packet data call on the HRPD system.

d. Verify that the AT successfully originates a packet data call, and data can be transferred over the HRPD system.

e. Let the AT go to idle state with session active and PPP dormant. Initiate a FTP/ping from the AT.

f. Verify that the AT comes out of the dormant state and goes to the connected state, and data can be transferred in both directions.

g. Repeat steps a-e for all revisions of HRPD supported by the AT and the AN.

14.1.4 Minimum Standard

The mobile station shall comply with d and f.

14.2 Data Call Termination

14.2.1 Definition

This test will verify that the AT can receive HRPD *Page Message* while the AT is in the idle state with the session active and PPP dormant.

14.2.2 Traceability

(See [8]):

6.2.6.1.3 Idle State

14.2.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.

b. Verify that the AT is in idle mode on HRPD system.

c. Note the IP address assigned to the AT. From a remote host initiate ping to IP address assigned to the AT.

d. Verify the AT goes to the connected state, and data can be transferred in both directions.

e. Let the AT go to idle state with session active and PPP dormant. From a remote host, ping the IP address assigned to the AT by the HRPD network.

f. Verify the AT goes to connected state and ping is successful.

g. Repeat steps a-e for all revisions of HRPD supported by the AT and the AN.

14.2.4 Minimum Standard

The mobile station shall comply with d and f.

14.3 Registration Lifetime Processing

14.3.1 Definition

This test verifies the AT accepts a Mobile IP Registration Reply with the registration lifetime less than the requested lifetime.

14.3.2 Traceability

(See [11]):

4.7 Registration Lifetime Processing

14.3.3 Method of Measurement

a. Set up an AT originated data call.

b. Verify the PDSN/FA sends an Agent Advertisement to the AT after the PPP session is established.

c. Verify the AT sends a valid Mobile IP RRQ with the Lifetime less than or equal to the value in the Agent Advertisement.

d. Verify the PDSN/FA sends the Mobile IP RRP to the AT with the Code field set to 0 (Registration Accepted). The PDSN/FA will update the binding information for the AT.

e. Verify the AT attempts to re-register before the Registration Lifetime, decreased by the RRP lifetime difference value received in the Mobile IP RRP, expires.

f. Verify the AT Mobile IP RRQ uses a valid and unused challenge value.

14.3.4 Minimum Standard

The mobile station shall comply with e and f.

14.4 PPP Session Setup Time

14.4.1 Definition

This test verifies that the AN should be capable of setting up AT initiated PPP connection within satisfactory time. Note, for this test the AT needs to operate in network model mode.

14.4.2 Traceability

(See [8]):

Section 7.2 Default Session Management Protocol

(See [11]):

Section 4.1 Successful PPP Negotiation and Termination

14.4.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.
b. Ensure that the AT establishes a new session with the HRPD network.
c. Instruct the AT to establish a connection with the AN.
d. Note the time difference between first LCP Configuration request to last IPCP Configuration Ack. This time is the PPP session setup time.
e. Repeat the test at least 10 times. Note, there is no need to repeat steps a and b if PPP session can be terminated by other means.
f. Verify that the PPP session setup time is less than 1.5 seconds at least 90% of the time.
g. Repeat the steps b-f for all revisions of HRPD supported by the AT and the AN

14.4.4 Minimum Standard

The AT and AN should comply with step f.

14.5 Mobile IP Registration

14.5.1 Definition

This test verifies that MIP registration is done within satisfactory time.

14.5.2 Traceability

(See [3]):

Section 2.7.1.3.2.1 Registration Message

14.5.3 Method of Measurement

a. Power up the AT and place it where receive power is approximately -75 dBm.

b. Ensure that the AT establishes a new session with the HRPD network.

c. Instruct the AT to establish a connection with the AN.

d. Note the time difference between Mobile IP Registration Request message and Mobile IP Registration Reply with code = 0. This time represents time required for MIP registration.

e. Repeat the test at least 10 times.

f. Verify that the PPP session setup time is less than 1 seconds at least 90% of the time.

g. Repeat the steps a-f for all revisions of HRPD supported by the AT and the AN.

14.5.4 Minimum Standard

The AT and AN should comply with step f.

14.6 Simple IP Establishment

14.6.1 Definition

This test verifies that the AT can be successfully negotiated by the AN's PDSN.

14.6.2 Traceability

(See [11]):

Section 3.1 Simple IP Establishment without Authentication of the Mobile Station

Section 3.2 Simple IP Establishment with CHAP

Section 3.3 Simple IP Establishment with PAP

Section 4.1 Successful PPP Negotiation and Termination

14.6.3 Method of Measurement

a. Wait for a VMN.

b. Place the AT in an area with HRPD coverage.

c. Configure the PDSN at the AN to enable ISP authentication using CHAP or PAP.

d. Configure the AT with correct username and password required for the ISP authentication.

e. Cause the AT to establish a session with the AN.

f. After the session configuration is complete, cause the AT to establish a connection with the AN.

g. Verify that the AT can successfully establish a PPP session and establish a

connection.

h. Configure the AT with invalid username and/or password.

i. Repeat steps d and e.

j. Verify that the PDSN responds with a failure to the CHAP challenge response proposed by the AT.

14.6.4 Minimum Standard

The AT shall comply with step g.

The AN shall comply with steps g and j.

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15 HRPD Handoffs

15.1 Softer handoffs (Sectors from same cell)

15.1.1 Definition

If there is more than one pilot in the active set from the same cell (different sectors), AT is considered to be doing a softer handoff. This test verifies the AT's ability to do softer handoff without any interruption to the data connection. This test is applicable to all revisions of HRPD.

15.1.2 Traceability

(See [8]):

6.6.6.1.6.6 Processing the TrafficChannelAssignment Message

15.1.3 Method of Measurement

a. Choose a location where only one pilot is in the active set. Set up a connection and start a file transfer using FTP.

b. Move to an area where multiple strong pilots from the same cell are present.

c. Verify that 1 or more of these pilots exceeds the PilotAdd threshold, and the AT sends a *RouteUpdate message* to report these pilots.

d. Verify the AN sends a *TrafficChannelAssignment message* with the new softer handoff pilot added to the AT's active set.

e. Verify that SofterHandoff bit in the *TrafficChannelAssignment message* is set to 1 for the pilots in the softer handoff.

f. Verify that during the handoff period, data connection is active and data is being transferred.

g. Move across the sector boundaries such that the AT performs a softer handoff.

h. Verify that the AT and AN can send and receive data from the new sector and the HRPD connection remains active.

i. If HRPD revision B based personality is being used, verify that for each carrier the same instance of QN serves the AT from the two sectors.

j. Repeat step g at least 10 times.

k. Repeat the test for all revisions of HRPD supported by the AT and the AN.

l. If the AT and AN support unlocked mode of HRPD revision B of HRPD, repeat the test with ServingSectorLockAcrossSubActiveSets attribute of the Subtype 2 FTCMAC negotiated to a value of 0x01 (unlocked mode).

15.1.4 Minimum Standard

The AT shall comply with c, f, g and i.

The AN shall comply with steps d, e, f, g and i.

15.2 Soft handoffs (Sectors from different cells)

15.2.1 Definition

If there is more than one pilot in the active set from different cells, AT is considered to be doing a soft handoff. This test verifies the AT's ability to do soft handoff without any interruption to the data connection.

15.2.2 Traceability

(See [8]):

6.6.6.1.6.6 Processing the TrafficChannelAssignment Message

15.2.3 Method of Measurement

a. Choose a location where only one pilot is in the active set. Set up a connection and start a file transfer using FTP.

b. Move to an area where multiple strong pilots from different cells are present.

c. Verify that 1 or more of these pilots exceed the PilotAdd threshold and the AT sends a RouteUpdate message to report those pilots.

d. Verify that the AN sends a TrafficChannelAssignment message with these new pilots added to the AT's active set.

e. Verify that SofterHandoff bit in the TrafficChannelAssignment message is set to 0 for the pilots in the soft handoff.

f. Verify that during the handoff period, data connection is active and data is being transferred.

g. Move across the cell boundary such that the AT performs a soft handoff.

h. Verify that the AT and AN can send and receive data from the new sector and the HRPD connection remains active.

i. Repeat step g and h at least 10 times.

j. If the AT and the AN support revision A of HRPD, repeat the test with a revision A based personality in use.

15.2.4 Minimum Standard

The AT shall comply with c, f and g.

The AN shall comply with d, e, f, and g.

15.3 Rectangular Soft Handoff in Unlocked and Locked Mode

15.3.1 Definition

This test validates the handoff performance of AT and AT for the rectangular soft-handoff scenario. AN 1 and AN 2 are two neighboring base stations that have rectangular carrier configuration. This test should be executed for locked and unlocked mode if these modes are supported by the AT and the AN.

15.3.2 Traceability

(See [8]):

9.8.7.1 Simple Attributes of Subtype 2 FTCMAC

15.3.3 Method of Measurement

a. Power up the AT and place it under AN 1 coverage such that only the pilots from AN 1 are strong enough to be added in the Active-Set. Ensure that the AT does not have a stored session.

b. Ensure that the AT has acquires the HRPD system and is in idle state.

c. Ensure that the AT requests a UATI and the AN assigns it, as specified in the "address management" test case described in this section.

d. Ensure that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation.

e. Ensure that AT negotiates a personality based on revision B of HRPD.

f. Start a packet data call.

    1. Ensure that the AN assigns one or more HRPD revision B capable carriers to the AT.

    2. Ensure that the only the pilots from the serving sector are in the Sub-Active set of the AT.

g. Start a bi-directional data transfer such that the AT and the AN always have data to transmit. This can be achieved by using UDP based data transfer.

h. Move the AT towards a location where the pilots from AN2 become strong enough to be added to the Sub-Active Set.

i. Verify that the AT sends a MC-RUP message to the AN 1.

j. Verify that the AN sends a TCAM and assigns the carrier(s) from AN 2. Ensure that the TCAM assigns the same carriers on AN 1 and AN 2 (rectangular handoff).

k. Move the AT across an AN 1 – AN 2 boundary at least 10 times.

l. Verify that

    1. the HRPD connection remains active across multiple handoffs and that the data transfer continues

2. and there are no RLP resets in the 10 second interval following each instance of the handoff.

m. Repeat the test to cover the configuration of AN 1 and AN 2 to enabling 1, 2 and 3 HRPC Revision B carriers if such configurations are present in the network deployment.

n. If unlocked mode is supported by the AT and the AN, repeat the test with the ServingSectorLockAcrossSubActiveSets attribute of the Subtype 2 FTCMAC negotiated to a value of 0x01 (unlocked mode).

15.3.4 Minimum Standard

The AT shall comply with step i, and l.

The AN shall comply with step j and l.

15.4 Non-Rectangular Soft Handoff

15.4.1 Definition

This test validates the handoff performance of AT and AT for the non-rectangular soft-handoff scenario. AN 1 and AN 2 are two neighboring base stations that have non-rectangular carrier configuration. The test should be conducted in a location where the AN assigns different number of carriers in the sub-active sets or uses different carriers from AN 1 and AN 2. Further, this test is only applicable when the operator has the above non-rectangular configuration as part of the deployed network. This test should be conducted with locked and/or unlocked mode of operation based on the AN configuration and AT support.

15.4.2 Traceability

(See [8]):

9.8.7.1 Simple Attributes of Subtype 2 FTCMAC

15.4.3 Method of Measurement

a. Power up the AT and place it under AN 1 coverage such that only the pilots from AN 1 are strong enough to be added in the Active-Set. Ensure that the AT does not have a stored session.

b. Ensure that the AT has acquires the HRPD system and is in idle state.

c. Ensure that the AT requests a UATI and the AN assigns it, as specified in the “address management” test case described in this section.

d. Ensure that after UATI assignment, the AT opens a new HRPD connection and starts session negotiation.

e. Ensure that AT negotiates a personality based on revision B of HRPD. During the session negotiation, ensure that the AT and the AN negotiate a value of 0x01 for the ServingSectorLockAcrossSubActiveSets attribute of the Subtype 2 FTCMAC

(unlocked mode). Note, this is only applicable if the AN supports and uses the unlocked mode.

f. Start a packet data call.

   1. Ensure that the AN assigns one or more HRPD revision B capable carriers to the AT.

   2. Ensure that the only the pilots from the serving sector are in the Sub-Active set of the AT.

g. Start a bi-directional data transfer such that the AT and the AN always have data to transmit. This can be achieved by using UDP based data transfer.

h. Move the AT towards a location where the pilots from AN2 become strong enough to be added to the Sub-Active Set.

i. Verify that the AT sends a MC-RUP message to the AN 1 requesting addition of new pilots from AN 2.

j. Verify that the AN 1 sends a TCAM and assigns the carriers from AN 2 such that there are unequal number of pilots across the Sub-Active Sets or different carriers from AN 1 and AN 2 are assigned.

k. Move the AT across an AN 1 – AN 2 boundary at least 10 times.

l. Verify that

   1. the HRPD connection remains active across multiple handoffs and that the data transfer continues

   2. and there are no RLP resets in the 10 second interval following each instance of the handoff.

m. Repeat the test for the following configurations if they are present in the network deployment

   1. AN 1 and AN 2 enabling 3 and 2, 3 and 1, and 2 and 1 HRPD Revision B carriers respectively

   2. TCAM assigns different carriers on AN 1 and AN 2.

15.4.4 Minimum Standard

The AT shall comply with step i, and l.

The AN shall comply with step j, and l .

15.5 Inter Revision Handoffs - Active HRPD Rev A to HRPD Rev 0

15.5.1 Definition

This test verifies inter-technology handoff from active HRPD Rev A to HRPD Rev 0 using mobile IP.

15.5.2 Traceability

(See [13]):

(See [14]):

(See [8]):

Chapter 7	*Session Layer*
Chapter 8	*Connection Layer*
Chapter 10	*MAC Layer (See [12]):*

(See [10]):

Chapters 3	*HRPD IOS Call Flows*

15.5.3 Method of measurement

a. Power up the AT and place it in an area with Rev A coverage. Ensure that the neighboring cell has Rev 0 coverage.

b. Configure the hybrid AT for mobile IP mode with one personality defined for HRPD Rev A and one personality defined for HRPD Rev 0.

c. Cause the hybrid AT to acquire AN 1 configured as HRPD Rev A and negotiate 2 personalities during the HRPD session configuration.

d. Initiate a HRPD Rev A packet data call from the hybrid AT.

e. Record the IP address assigned to the hybrid AT.

f. Issue a continuous “ping” command from the remote host to the hybrid AT using the IP address assigned to the AT in step 5.

g. Verify AT is active for data on AN 1 configured as HRPD Rev A, and verify the remote host receives a “ping” response from the AT.

h. Move from HRPD Rev A coverage to HRPD Rev 0 coverage area, such that there is a handoff from AN 1 to AN 2.

i. Ensure that the AN 1 sends an AttributeUpdateRequest with the SessionConfigurationToken instructing the AT to switch to the personality for the HRPD Rev 0 network.

j. Verify that the AT sends an AttributeUpdateAccept to the AN 1.

k. Verify that the AN 1 transmits a ConnectionClose together with a TrafficChannelAssignment message.

l. Verify that the AT reestablishes the connection and starts using the HRPD Rev 0 personality.

m. Verify hybrid AT is active for data on AN 2 configured as HRPD Rev 0 and verify the remote host receives a “ping” response from the hybrid AT.

n. End the call.

15.5.4 Minimum Standard

The AT shall comply with the steps g, j, l and m.

The AN shall comply with steps g, k and m.

15.6 Inter Revision Handoffs - Active HRPD Rev 0 to HRPD Rev A

15.6.1 Definition

This test verifies inter-technology handoff from active HRPD Rev 0 to HRPD Rev A using mobile IP.

15.6.2 Traceability

Same as section 15.5.2.

15.6.3 Method of measurement

a. Power up the AT and place it in an area with Rev 0 coverage. Ensure that the neighboring cell has Rev A coverage.

b. Configure the hybrid AT for mobile IP mode with one personality defined for HRPD Rev A and one personality defined for HRPD Rev 0. Note, the session configuration with multiple personalities needs to be done with AN configured with HRPD Rev A.

c. Cause the hybrid AT to acquire AN 2 configured as HRPD Rev 0.

d. Initiate a HRPD Rev 0 packet data call from the hybrid AT.

e. Record the IP address assigned to the hybrid AT.

f. Issue a continuous “ping” command from the remote host to the hybrid AT using the IP address assigned to the AT in step 5.

g. Ensure that AT is active for data on AN 2 configured as HRPD Rev 0, and verify the remote host receives a “ping” response from the AT.

h. Move from HRPD Rev 0 coverage to HRPD Rev A coverage area, such that there is a handoff from AN 2 to AN 1.

i. Verify hybrid AT is active for data on AN 1 configured as HRPD Rev A and verify the remote host receives a “ping” response from the hybrid AT. (The AT will continue to use the HRPD Rev 0 session configuration).

j. Terminate the ping session and allow the AT to go dormant on AN 1.

k. After the device has gone dormant, initiate another ping from the remote host to the AT.

l. Verify the AT and AN negotiate the HRPD session using the HRPD Rev A personality and the call completes successfully. Ensure that the AN 2 sends an AttributeUpdateRequest with the SessionConfigurationToken instructing the AT to switch to the personality for the HRPD Rev A network

m. End the call.

15.6.4 Minimum Standard

The AT shall comply with the steps i and l.

The AN shall comply with step l.

15.7 Inter Revision Handoffs - Active hand down from HRPD Rev B

15.7.1 Definition

This test verifies inter-technology handoff from active HRPD Rev B to HRPD Rev A and Rev 0 using mobile IP.

15.7.2 Traceability

Same as section 15.5.2.

15.7.3 Method of measurement

a. End the call.

b. Power up the AT and place it in an area with HRPD Rev B coverage. Ensure that the neighboring cell has HRPD Rev A coverage.

c. Configure the hybrid AT for mobile IP mode with one personality defined for HRPD Rev B and one personality defined for HRPD Rev A.

d. Cause the hybrid AT to acquire AN 1 configured as HRPD Rev B and negotiate 2 personalities during the HRPD session configuration.

e. Initiate a packet data call from the hybrid AT and ensure that revision B based personality is in use.

f. Record the IP address assigned to the hybrid AT.

g. Issue a continuous “ping” command from the remote host to the hybrid AT using the IP address assigned to the AT in step e.

h. Verify AT is active for data on AN 1 configured as HRPD Rev B, and verify the remote host receives a “ping” response from the AT.

i. Move from HRPD Rev B coverage to HRPD Rev A coverage area, such that there is a handoff from AN 1 to AN 2. Note, in order to trigger the handoff AT will send a RUP message after the AN 2 pilot is greater than PilotAdd.

j. Verify that the AN 1 sends an AttributeUpdateRequest message with the SessionConfigurationToken instructing the AT to switch to the personality for the HRPD Rev A network.

k. Verify that the AT sends an AttributeUpdateAccept to the AN 1.

l. Verify that the AN 1 transmits a ConnectionClose together with a TrafficChannelAssignment message.

m. Verify that the AT reestablishes the connection and starts using the HRPD Rev A personality.

n. Verify hybrid AT is active for data on AN 2 configured as HRPD Rev A and verify the remote host receives a “ping” response from the hybrid AT.

o. End the call.

p. Repeat the test for AN 2 configured as HRPD Rev 0.

15.7.4 Minimum Standard

The AT shall comply with the steps g, j, l, and m.

The AN shall comply with step g, I, k, and m.

15.8 Inter Revision Handoffs - Active hand up to HRPD Rev B

15.8.1 Definition

This test verifies inter-technology handoff from active HRPD Rev A / Rev 0 (AN 1) to HRPD Rev B (AN 2) using mobile IP. The test assumes that the revision A network is capable of negotiating a HRPD revision B based personality, and send AttributeUpdateMessage to change the personality.

15.8.2 Traceability

Same as section 15.5.2.

15.8.3 Method of measurement

a. Power up the AT and place it in an area with HRPD Rev A coverage. Ensure that the neighboring cell has HRPD Rev B coverage.

b. Configure the hybrid AT for mobile IP mode with one personality defined for HRPD Rev A and one personality defined for HRPD Rev B.

c. Cause the hybrid AT to acquire AN 1 configured as HRPD Rev A and negotiate 2 personalities during the HRPD session configuration.

d. Initiate a packet data call from the hybrid AT and ensure that revision A based personality is in use.

e. Record the IP address assigned to the hybrid AT.

f. Issue a continuous “ping” command from the remote host to the hybrid AT using the IP address assigned to the AT in step e.

g. Verify AT is active for data on AN 1 configured as HRPD Rev A, and verify the remote host receives a “ping” response from the AT.

h. Move from HRPD Rev A coverage to HRPD Rev B coverage area, such that there is a handoff from AN 1 to AN 2. Note, in order to trigger the handoff AT will send a RUP message after the AN 2 pilot is greater than PilotAdd.

i. Ensure that the AN 1 sends an AttributeUpdateRequest message with the

SessionConfigurationToken instructing the AT to switch to the personality for the HRPD Rev B network.

j. Verify that the AT sends an AttributeUpdateAccept to the AN 1.

k. Verify that the AN 1 transmits a ConnectionClose together with a TrafficChannelAssignment message.

l. Verify that the AT reestablishes the connection and starts using the HRPD Rev B personality.

m. Verify hybrid AT is active for data on AN 2 configured as HRPD Rev B and verify the remote host receives a “ping” response from the hybrid AT.

n. End the call.

o. Repeat the test for AN 1 configured as HRPD Rev 0.

15.8.4 Minimum Standard

The AT shall comply with the steps g, j, l, and m.

The AN shall comply with step g, I, k, and m.

15.9 Inter Revision Handoffs - Dormant hand down from HRPD Rev B

15.9.1 Definition

This test verifies inter-technology handoff from dormant HRPD Rev B (AN 1) to HRPD Rev A / Rev 0 (AN 2) using mobile IP. The test assumes that the HRPD Rev B and HRPD Rev A / Rev 0 systems are in different subnets and session transfer is enabled.

15.9.2 Traceability

Same as section 15.5.2

15.9.3 Method of measurement

a. Power up the AT and place it in an area with Rev B coverage. Ensure that the neighboring cell has HRPD Rev A coverage and that the AN 1 advertizes the pilots from AN 2 in the Neighborlist message.

b. Configure the hybrid AT for mobile IP mode with one personality defined for HRPD Rev B and one personality defined for HRPD Rev A.

c. Cause the hybrid AT to acquire AN 1 configured as HRPD Rev B and negotiate 2 personalities during the HRPD session configuration.

d. Initiate a packet data call from the hybrid AT and ensure that revision B based personality is in use.

e. Record the IP address assigned to the hybrid AT.

f. Allow the air interface connection to become dormant.

g. Move from HRPD Rev B coverage to HRPD Rev A coverage area, such that the AT performs an idle handoff from AN 1 to AN 2.

h. Cause the AT to send a message on the access channel. Note the AT may send a RouteUpdateMessage with a UATIRequest message or UATIRequest message and ConnectionRequest message. The UATIRequest Message is sent if AN 1 and AN 2 are in different subnets.

i. Verify that the AT includes SessionConfigurationToken for the Rev B personality in the message transmitted on the access channel.

j. Verify that the AN 1 sends an AttributeUpdateRequest message with the SessionConfigurationToken instructing the AT to switch to the personality for the HRPD Rev A network.

k. Verify that the AT sends an AttributeUpdateAccept to the AN 1.

l. Send a ping message to the AT using the IP address recorded in step e.

m. Verify that the AT starts using the HRPD Rev A personality.

n. Verify hybrid AT is active for data on AN 2 configured as HRPD Rev A and verify the remote host receives a “ping” response from the hybrid AT.

o. End the call.

p. Repeat the test for AN 2 configured as HRPD Rev 0.

15.9.4 Minimum Standard

The AT shall comply with the steps i, k, m and n.

The AN shall comply with step j, and m.

15.10 Inter Revision Handoffs - Dormant hand up to HRPD Rev B

15.10.1 Definition

This test verifies inter-technology handoff from dormant HRPD Rev A / Rev 0 (AN 1) to HRPD Rev B (AN 2) using mobile IP. The test assumes that the HRPD Rev B and HRPD Rev A / Rev 0 systems are in different subnets and session transfer is enabled.

15.10.2 Traceability

Same as section 15.5.2.

15.10.3 Method of measurement

a. End the call.

b. Power up the AT and place it in an area with HRPD Rev A coverage. Ensure that the neighboring cell has Rev B coverage and that the AN 1 advertizes the pilots from AN 2 in the Neighborlist message.

c. Configure the hybrid AT for mobile IP mode with one personality defined for HRPD Rev A and one personality defined for HRPD Rev B.

d. Cause the hybrid AT to acquire AN 1 configured as HRPD Rev A and negotiate 2 personalities during the HRPD session configuration.

e. Initiate a packet data call from the hybrid AT and ensure that revision A based personality is in use.

f. Record the IP address assigned to the hybrid AT.

g. Allow the air interface connection to become dormant.

h. Move from HRPD Rev A coverage to HRPD Rev B coverage area, such that the AT performs an idle handoff from AN 1 to AN 2.

i. Cause the AT to send a message on the access channel. Note the AT may send a RouteUpdateMessage with a UATIRequest message or UATIRequest message and ConnectionRequest message. The UATIRequest Message is sent if AN 1 and AN 2 are in different subnets.

j. Verify that the AT includes SessionConfigurationToken for the Rev A personality in the message transmitted on the access channel.

k. Verify that the AN 1 sends an AttributeUpdateRequest message with the SessionConfigurationToken instructing the AT to switch to the personality for the HRPD Rev B network.

l. Verify that the AT sends an AttributeUpdateAccept to the AN 1.

m. Send a ping message to the AT using the IP address recorded in step e.

n. Verify that the AT starts using the HRPD Rev B personality.

o. Verify hybrid AT is active for data on AN 2 configured as HRPD Rev B and verify the remote host receives a “ping” response from the hybrid AT.

p. End the call.

q. Repeat the test for AN 1 configured as HRPD Rev 0.

15.10.4 Minimum Standard

The AT shall comply with the steps i, k, m and n.

The AN shall comply with step j, and m.

16 Inter Technology Switching

16.1 Inter Technology Switching – Dormant HRPD to cdma2000 1x

16.1.1 Definition

This test verifies inter-technology switching from dormant HRPD to cdma2000 1x using mobile IP. This test only applies to AT that are capable of switching between cdma2000 1x and HRPD. The algorithm for switching is AT dependent and should be known before test case execution. The test should be repeated using all supported revisions of [8] supported by the AT and AN.

16.1.2 Traceability

(See [13]):

(See [14]):

(See [8]):

Chapter 7	*Session Layer*
Chapter 8	*Connection Layer*
Chapter 10	*MAC Layer (See [12]):*

(See [10]):

Chapters 3	*HRPD IOS Call Flows*

(See [13]):

2.2.6.2.5	*Mobile Station Origination Operation*
2.6.3	*System Access State*
2.6.3.5	*Mobile Station Origination Attempt Substate*
2.6.4	*Mobile Station Control on the Traffic Channel State*
2.7.1.3.2.4	*Origination Message*
2.7.2.3.2.15	*Service Option Control Message*
2.7.3	*Orders*
3.6.3.5	*Response to Origination Message*
3.6.4	*Traffic Channel Processing*
3.7.2.3.2.21	*Extended Channel Assignment Message*
3.7.3.3.2.3	*Alert With Information Message*
3.7.3.3.2.20	*Service Connect Message*
3.7.4	*Orders*
3.7.5.5	*Signal*

16.1.3 Method of Measurement

a. Place the AT in a location with HRPD coverage.

b. Ensure that the AT has acquired the HRPD system and is in dormant state.

c. Initiate an HRPD packet data call from the hybrid AT.

d. Record the IP address assigned to the hybrid AT.

e. Wait for hybrid AT to go dormant.

f. Cause the AT terminal to switch from HRPD to cdma2000 1x. This could be achieved, for example, by moving to an area with significantly stronger pilots for cdma2000 1x than HRPD network.

g. Verify that the hybrid AT negotiates PPP on cdma2000 1x.

h. Issue a "ping" command from the remote host to the hybrid AT using the IP address assigned to the AT in step d.

i. Verify the hybrid AT is active for data on cdma2000 1x, and verify the remote host receives a "ping" response from the hybrid AT.

j. End the call.

k. Repeat steps a through j using all revisions of HRPD supported by the AT and AN.

16.1.4 Minimum Standard

The AT shall comply with steps g and i.

The AN shall comply with step i.

16.2 Technology Switching – Active HRPD to cdma2000 1x

16.2.1 Definition

This test verifies inter-technology switching from active HRPD to cdma2000 1x using mobile IP. This test only applies to AT that are capable of switching between cdma2000 1x and HRPD. The algorithm for switching is AT dependent and should be known before test case execution. The test should be repeated using all supported revisions of [8] supported by the AT and AN.

16.2.2 Traceability

Same as 16.1.2.

16.2.3 Method of Measurement

a. Place the AT in a location with HRPD coverage.

b. Ensure that the AT has acquired the HRPD system and is in dormant state.

c. Initiate an HRPD packet data call from the hybrid AT.

d. Record the IP address assigned to the hybrid AT.

e. Issue a continuous "ping" command from the remote host to the hybrid AT using the IP address assigned to the AT in step 4.

f. Ensure that AT is active for data on HRPD and verify the remote host receives a "ping" response from the AT.

g. Cause the AT terminal to switch from HRPD to cdma2000 1x. This could be achieved, for example, by moving to an area with significantly stronger pilots for cdma2000 1x than HRPD network.

h. Verify hybrid AT is active for data on cdma2000 1x and verify the remote host receives a “ping” response from the hybrid AT.

i. End the call.

j. Repeat steps a through i using all revisions of HRPD supported by the AT and AN.

16.2.4 Minimum Standard

The AT shall comply with step h.

The AN shall comply with step h.

16.3 Service configuration and negotiation Inter Technology Switching – Dormant cdma2000 1x to Idle HRPD

16.3.1 Definition

This test verifies inter-technology switching from cdma2000 1x to Idle HRPD using mobile IP. This test only applies to AT that are capable of switching between cdma2000 1x and HRPD. The algorithm for switching is AT dependent and should be known before test case execution. The test should be repeated using all supported revisions of [8] supported by the AT and AN.

16.3.2 Traceability

Same as 16.1.2.

16.3.3 Method of Measurement

a. Place the AT in a location with cdma2000 1x coverage.

b. Ensure that AT is dormant on cdma2000 1x.

c. Ensure that the AT has not acquired the HRPD system and does not have an open session with HRPD.

d. Record the IP address assigned to the hybrid AT.

e. Cause the AT terminal to switch from cdma2000 1x to HRPD. This could be achieved, for example, by moving to an area with significantly stronger pilots for HRPD than cdma2000 1x network.

f. Verify hybrid AT establishes a new session with the HRPD network.

g. Issue a “ping” command from the remote host to the hybrid AT using the IP address assigned to the AT in step d.

h. Verify the hybrid AT is active for data on HRPD, and verify the remote host receives a “ping” response from the hybrid AT.

i. End the call.

j. Repeat steps a-i using all revisions of HRPD supported by the AT and AN.

16.3.4 Minimum Standard

The AT shall comply with steps f and h.

The AN shall comply with step h.

16.4 Inter Technology Switching – Dormant cdma2000 1x to dormant HRPD

16.4.1 Definition

This test verifies inter-technology switching from cdma2000 1x to dormant HRPD using mobile IP. This test only applies to AT that are capable of switching between cdma2000 1x and HRPD. The algorithm for switching is AT dependent and should be known before test case execution. The test should be repeated using all supported revisions of [8] supported by the AT and AN.

16.4.2 Traceability

Same as 16.1.2.

16.4.3 Method of Measurement

a. Place the AT in a location with cdma2000 1x coverage.

b. Ensure that AT is dormant on cdma2000 1x.

c. Ensure that the AT has not acquired the HRPD system and has an open session with HRPD.

d. Record the IP address assigned to the hybrid AT.

e. Cause the AT terminal to switch from cdma2000 1x to HRPD. This could be achieved, for example, by moving to an area with significantly stronger pilots for HRPD than cdma2000 1x network.

f. Verify hybrid AT acquires the HRPD network and transmits a LocationNotification message to the HRPD network, if the RANHandoff attribte of the Packet Application was configured to 0x01.

g. Issue a “ping” command from the remote host to the hybrid AT using the IP address assigned to the AT in step d.

h. Verify the hybrid AT is active for data on HRPD, and verify the remote host receives a “ping” response from the hybrid AT.

i. End the call.

j. Repeat steps a through i using all revisions of HRPD supported by the AT and AN.

1 16.4.4 Minimum Standard

2 The AT shall comply with steps f and h.

3 The AN shall comply with step h.

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17 End to End Applications

17.1 Service configuration and negotiation AT Voice Origination and Termination in HRPD Idle and Dormant Mode

17.1.1 Definition

This test verifies that the AT can send a packet over the Access Channel to the AN. This test is applicable to all revisions of [8] supported by the AT and the AN.

17.1.2 Traceability

Same as 16.1.2.

17.1.3 Method of Measurement

a. Place the AT in a location with 1x and HRPD coverage.

b. Ensure that the AT has acquired 1x and HRPD and is idle on both systems. Note, AT should not have an open PPP session with the AN on the HRPD system.

c. Initiate a voice call from the hybrid AT.

d. Verify the call completes and verify CDMA user data in both directions.

e. End the call.

f. Verify that the AT returns to idle state on 1x as well as HRPD.

g. Initiate a voice call to the hybrid AT.

h. Verify the call completes and verify CDMA user data in both directions.

i. End the call.

j. Verify that the AT returns to idle state on 1x as well as HRPD.

k. Setup an HRPD AT originated connection. Allow the AT to become dormant on the HRPD system.

l. Initiate a voice call from the hybrid AT.

m. Verify the call completes and verify CDMA user data in both directions.

n. End the call.

o. Verify that the AT returns to idle state on 1x and dormant state on HRPD.

p. Initiate a voice call to the hybrid AT.

q. Verify the call completes and verify CDMA user data in both directions.

r. End the call.

s. Verify that the AT returns to idle state on 1x and dormant state on HRPD.

17.1.4 Minimum Standard

The AT shall comply with steps d, f, h, j, m, o, q and s.

The AN shall comply with steps d, h, m and q.

17.2 AT Voice Origination and Termination in HRPD Active Mode

17.2.1 Definition

This test verifies a voice call origination and termination when in active HRPD mode. This test is applicable to all revisions of [8] supported by the AT and the AN. This test is only applicable to AT that support hybrid mode of operation. For example, AT that support simultaneous voice and data transmission will follow a different procedure than verified here.

17.2.2 Traceability

Same as 16.1.2.

17.2.3 Method of Measurement

a. Power up the AT and place it in an area where receive power is greater than -75dBm.

b. Place the AT in a location with 1x and HRPD coverage.

c. Ensure that the AT has acquired 1x and HRPD and is idle on both systems.

d. Set up an HRPD AT originated connection. Issue a continuous “ping” command from the remote host to the AT.

e. Ensure that the remote host receives a response to the ping transmitted to the AT.

f. Initiate a voice call from the hybrid AT.

g. Verify the call completes and verify CDMA user data in both directions.

h. End the call.

i. Verify that the AT returns to idle state on 1x and active state on HRPD. Note, depending on the duration of the voice call, the AT may become dormant on HRPD and the AN may need to reestablish the connection. The active state on the HRPD can be verified by the resumption of response to the ping transmitted by the remote host.

j. Initiate a voice call to the hybrid AT.

k. Verify the call completes and verify CDMA user data in both directions.

l. End the call.

m. Verify that the AT returns to idle state on 1x and active state on HRPD. Note, depending on the duration of the voice call, the AT may become dormant on HRPD and the AN may need to reestablish the connection. The active state on the HRPD

can be verified by the resumption of response to the ping transmitted by the remote host.

17.2.4 Minimum Standard

The AT shall comply with steps f, h, j, and m.

The AN shall comply with steps f and j.

17.3 AT SMS Origination and Termination in HRPD Idle and Dormant Mode

17.3.1 Definition

This test verifies a SMS origination and termination when in idle and dormant HRPD mode. This test is applicable to all revisions of [8] supported by the AT and the AN.

17.3.2 Traceability

Same as 16.1.2.

17.3.3 Method of Measurement

a. Place the AT in a location with 1x and HRPD coverage.

b. Ensure that the AT has acquired 1x and HRPD and is idle on both systems. Note, AT should not have an open PPP session with the AN on the HRPD system.

c. Instruct the hybrid AT to send an SMS message to the network on the r-csch. Ensure that the AT transmits the SMS message correctly.

d. Verify SMS message is correctly sent to the SMS Message Center.

e. Verify that the AT returns to idle state on 1x as well as HRPD.

f. Instruct the hybrid AT to send an SMS message on the r-dsch. Ensure that the AT transmits the SMS message correctly.

g. Verify the SMS is correctly sent to the SMS Message Center.

h. Verify that the AT returns to idle state on 1x as well as HRPD.

i. Instruct the network to send an SMS message to the hybrid AT on the f-csch. Ensure that the AN transmits the SMS message correctly.

j. Verify SMS message is correctly received at the hybrid AT.

k. Verify that the AT returns to idle state on 1x as well as HRPD.

l. Instruct the network to send an SMS message to the hybrid AT on the f-dsch. Ensure that the AN transmits the SMS message correctly.

m. Verify SMS message is correctly received at the hybrid AT.

n. Verify that the AT returns to idle state on 1x as well as HRPD.

o. Setup an HRPD AT originated connection. Allow the AT to become dormant on the

HRPD system.

p. Instruct the hybrid AT to send an SMS message to the network on the r-csch. Ensure that the AT transmits the SMS message correctly.

q. Verify SMS message is correctly sent to the SMS Message Center.

r. Verify that the AT returns to idle state on 1x and dormant state on HRPD system.

s. Instruct the hybrid AT to send an SMS message on the r-dsch. Ensure that the AT transmits the SMS message correctly.

t. Verify the SMS is correctly sent to the SMS Message Center.

u. Verify that the AT returns to idle state on 1x and dormant state on HRPD system.

v. Instruct the network to send an SMS message to the hybrid AT on the f-csch. Ensure that the AN transmits the SMS message correctly.

w. Verify SMS message is correctly received at the hybrid AT.

x. Verify that the AT returns to idle state on 1x and dormant state on HRPD system.

y. Instruct the network to send an SMS message to the hybrid AT on the f-dsch. Ensure that the AN transmits the SMS message correctly.

z. Verify SMS message is correctly received at the hybrid AT.

aa. Verify that the AT returns to idle state on 1x and dormant state on HRPD system.

17.3.4 Minimum Standard

The AT shall comply with steps e, h, j, i, m, n, r, u, w, x, z and aa.

The AN shall comply with steps d, g, q and t.

17.4 Service configuration and negotiation AT SMS Origination and Termination in HRPD Active Mode

17.4.1 Definition

This test verifies a SMS call origination and termination when in active HRPD mode. This test is applicable to all revisions of [8] supported by the AT and the AN.

17.4.2 Traceability

Same as 16.1.2.

17.4.3 Method of Measurement

a. Place the AT in a location with 1x and HRPD coverage.

b. Ensure that the AT has acquired 1x and HRPD and is idle on both systems.

c. Set up an HRPD AT originated connection. Issue a continuous “ping” command from the remote host to the AT.

d. Ensure that the remote host receives a response to the ping that it transmitted.

e. Instruct the hybrid AT to send an SMS message to the network on the r-csch. Ensure that the AT transmits the SMS message correctly.

f. Verify SMS message is correctly sent to the SMS Message Center.

g. Verify that the AT returns to idle state on 1x and active state on HRPD. The active state on the HRPD can be verified by the resumption of response to the ping transmitted by the remote host.

h. Instruct the hybrid AT to send an SMS message on the r-dsch. Ensure that the AT transmits the SMS message correctly.

i. Verify the SMS is correctly sent to the SMS Message Center.

j. Verify that the AT returns to idle state on 1x and active state on HRPD. The active state on the HRPD can be verified by the resumption of response to the ping transmitted by the remote host

k. Instruct the network to send an SMS message to the hybrid AT on the f-csch. Ensure that the AN transmits the SMS message correctly.

l. Verify SMS message is correctly received at the hybrid AT.

m. Verify that the AT returns to idle state on 1x and active state on HRPD. The active state on the HRPD can be verified by the resumption of response to the ping transmitted by the remote host.

n. Instruct the network to send an SMS message to the hybrid AT on the f-dsch.

o. Verify SMS message is correctly received at the hybrid AT.

p. Verify that the AT returns to idle state on 1x and active state on HRPD. The active state on the HRPD can be verified by the resumption of response to the ping transmitted by the remote host.

17.4.4 Minimum Standard

The AT shall comply with steps g, j, l, m, o and p.

The AN shall comply with steps f and i.

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18 HRPD RAN Performance

18.1 RAN Latency For HRPD Rev 0

18.1.1 Definition

This test verifies the OTA latencies for HRPD Rev 0. The AN should support HRPD Rev 0 only.

18.1.2 Traceability

(See [8]):

Chapter 3 and 12

(See [15]):

Chapter 2 and 3

18.1.3 Method of Measurement

a. Place the AT in an area with single dominant pilot.

b. Ensure that there are no other users in the sector.

c. Cause the AT to acquire the AN and establish a session with the AN.

d. Cause the AT to establish a data call with the AN.

e. While the AT is active for data, from a remote host transmit 100 pings with 8 byte payload to the AT. Measure the ping response time.

f. Verify that the average ping response time for 8 byte ping payload packets is less than 130 ms.

g. While the AT is active for data, from a remote host transmit 100 pings with 32 byte payload to the AT. Measure the ping response time.

h. Verify that the average ping response time for 32 byte payload ping packets is less than 165 ms.

i. While the AT is active for data, from a remote host transmit 100 pings with 56 byte payload to the AT. Measure the ping response time.

j. Verify that the average ping response time for 56 byte payload ping packets is less than 200 ms.

18.1.4 Minimum Standard

The AT and the AN should comply with steps f, h, and j.

18.2 RAN Latency For HRPD Rev A or Rev B

18.2.1 Definition

This test verifies the OTA latencies for HRPD Rev A or HRPD Rev B. The AN and the AT should support either HRPD Rev A or HRPD Rev B. this test should be conducted with default revision of HRPD supported by AT and the AN.

18.2.2 Traceability

Same as 18.1.2.

18.2.3 Method of Measurement

a. Place the AT in an area with single dominant pilot.
b. Ensure that there are no other users in the sector.
c. Cause the AT to acquire the AN and establish a session.
d. Cause the AT to establish a data call with the AN. Ensure that the AT and the AN use Subtype 3 physical layer protocol.
e. While the AT is active for data, from a remote host transmit 100 pings with 56 byte payload to the AT. Measure the ping response time.
f. Verify that the average ping response time for 56 byte payload ping packets is less than 120 ms..

18.2.4 Minimum Standard

The AT and the AN should comply with step f.

18.3 Sector Load Test For HRPD Rev A

18.3.1 Definition

This test verifies the RAN performance and fairness across multiple users. This test is applicable to AN and AT supporting HRPD Rev A. This test does not account for backhaul capacity limitation.

It is recommended to use a TCP and UDP bandwidth performance tool. TCP receive window size at the AT should be configured to be 64 kbytes. The server for the bandwidth measurement tool running at the AT should also use 64 kbytes window.

18.3.2 Traceability

Same as 18.1.2.

18.3.3 Method of Measurement

a. Place 6 AT in an area with single dominant pilot where the AT are able to request highest DRC and maintain FER of less than 1.5%.
b. Ensure that there are no active users in the cell under test.

c. Cause the ATs to acquire the AN and establish a session with the AN.

d. Cause the ATs to establish a data call with the AN.

e. Start FTP download to all the AT. The download size should be greater than 10 MB. Note, all file transfers should occur start within a span of 1 second.

f. While all users are downloading data, note the transfer rate for all AT for 100 seconds.

g. Verify that the transfer rate for all users is greater than 350 kbps.

18.3.4 Minimum Standard

The AT and the AN should comply with steps g.

18.4 QoS Sector Load Test For HRPD Rev A and Rev B

18.4.1 Definition

This test verifies the RAN performance for supporting multiple QoS users. This test is applicable to AN and AT supporting HRPD Revision B and/or Revision A. This test is applicable to AT and AN supporting video telephony application.

18.4.2 Traceability

Same as 18.1.2.

18.4.3 Method of Measurement

a. Place 6 AT in an area with single dominant pilot where the AT are able to request highest DRC and maintain FER of less than 1.5%.

b. Ensure that there are no active users in the cell under test.

c. Cause the ATs to acquire the AN and establish a session with the AN.

d. Cause the ATs to establish a data call with the AN.

e. Start video telephony calls at all the AT. Ensure that the requested bit rate for the video is greater than or equal to 64 kbps.

f. Allow all the video calls to be active.

g. Verify that the 6 AT and the AN can maintain video telephony calls simultaneously for 100 seconds.

18.4.4 Minimum Standard

The AT and the AN should comply with steps g.