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Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces — Part 1 Overview

Revision 0 (3G IOSv4.2)

(SDO Ballot Version)

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1.0 Copyright Information

This standard contains significant portions of material copied from ETSI GSM 04.08 (Phase 1) and ETSI GSM 08.08 (Phase 1) which has been modified to comply with the domestic specifications of the U.S.A. The specific modifications are in the following areas:

Many of the messages, information elements, and timers contained in GSM 04.08 (Phase 1) and GSM 08.08 (Phase 1) have been copied and adapted.

The message procedural descriptions can be found in the Interface Documents of this specification. These message procedural descriptions have been copied and adapted.

The message definitions can be found in the Interface Documents. These message definitions have been copied and adapted.

The information element definitions can be found in the Interface Documents. These information element definitions have been copied and adapted.

The timer definitions can be found in the Interface Documents. These timer definitions have been copied and adapted.

2.0 Functional Overview

This standard describes the overall system functions, including services and features required for interfacing a Base Station (BS) with the Mobile Switching Center (MSC), with other Base Stations, and with the Packet Control Function (PCF); and for interfacing the PCF with the Packet Data Service Node (PDSN).

This standard is intended to provide sufficient specification of a set of interfaces in order to support the interoperability of one vendor's equipment with that of another. Which interface(s) a vendor chooses to implement is dependent on business decisions, and is up to each vendor. However conformance to any given interface specified within this standard requires all of the messages and procedures for supported features on that interface to be supported as specified within this standard. Establishing standard interfaces allows the BS, PCF, PDSN, and MSC equipment to evolve independently and to be provided by multiple vendors.

2.1 Purpose

The purpose is to provide the standard for:

- interfacing of an MSC with one or more BSs,
- interfacing a BS with one or more BSs,
- interfacing of a PCF with one or more BSs,
- interfacing PDSNs with PCFs.

This document defines the functional capabilities, including services and features, of the defined interfaces. These services and features are the defining characteristics that are the basis for the overall system standard.

The MSC-BS Interface is defined as the interface that provides telecommunications services access between a Base Station and a Mobile Switching Center. It specifically represents the demarcation point between the BS and the MSC which coincides with the Reference Point "A" as depicted in the Telecommunications Industry Association (TIA) TR45 Network Reference Model (NRM), see [26]. This point establishes the technical interface and designates the test points and operational division of responsibility between the BS and the MSC.

This standard fulfills the following criteria:

- supports future MSC and BS implementations;
- supports current TIA/EIA/IS-2000, TIA/EIA/IS-834 and TIA/EIA/IS-95 air interfaces;
- makes maximum use of existing standards from the Telecommunications Industry Association (TIA) and other sources;
- promotes reliability enhancement, technical innovation, network product availability, and economic competition;
- allows connection of various manufacturers' BSs to the same MSC;
- allows the separate evolution of MSC and BS technology.

The source BS - target BS interface is defined as the interface which provides for inter-BS soft/softer handoffs. It specifically represents the demarcation point between two

Base Stations which coincides with the Reference Point "A_{ter}". This point establishes the technical interface and designates the test points and operational division of responsibility between the source BS and target BS. The source BS and target BS interface is defined as the A3/A7 interface shown in Figure 3.2-1 "Reference Model for cdma2000 Access Network Interfaces."

The PCF-PDSN interface is defined as the interface that provides access between a Packet Control Function and a Packet Data Serving Node for high speed packet data services. It specifically represents the demarcation point between the PCF and the PDSN which coincides with the Reference Point "A_{quater}". This point establishes the technical interface and designates the test points and operational division of responsibility between the PCF and the PDSN. The PCF-PDSN interface is defined as the A10/A11 interface shown in Figure 3.2-1 "Reference Model for cdma2000 Access Network Interfaces".

The PCF-PDSN interface definition fulfills the following criteria:

- supports future PCF and PDSN implementations;
- allows connection of various manufacturers' PCFs to the same PDSN and vice versa;
- makes maximum use of existing standards from the Internet Engineering Task Force (IETF) and other sources;
- promotes quality of service and accounting information exchange between the PCFs and the PDSNs
- promotes reliability enhancement, technical innovation, network product availability, and economic competition;
- allows the separate evolution of PCF and PDSN technologies.

The BS-PCF interface is defined as the interface between the Base Station and the Packet Control Function for high speed packet data services. It specifically represents the demarcation point between the BS and the PCF which coincides with the Reference Point "$A_{quinter}$". This point establishes the technical interface and designates the test points and operational division of responsibility between the BS and the PCF. The BS-PCF interface is defined as the A8/A9 interface shown in Figure 3.2-1 "Reference Model for cdma2000 Access Network Interfaces".

2.2 Scope

This standard provides the specification for the Interfaces which coincides with the Reference Point "A", "A_{ter}", "A_{quater}", and "$A_{quinter}$" defined in the TR45 Network Reference Model shown in [26].

The scope of this standard includes the following topics:

- MSC-BS and BS-BS interfaces:
  - Descriptions of the specified functional capabilities that provide wireless telecommunications services across the MSC-BS and BS-BS Interface as defined in the TR45 Network Reference Model;
  - Descriptions of the division of responsibility of the functions provided between the BS and the MSC, and between the source BS and the target BS, without prescribing specific implementations;
  - Descriptions of the MSC-BS Interface and the BS-BS interface standards that support DS-41 and IS-2000 systems.

- PCF-PDSN interfaces:
  - Descriptions of the specified functional capabilities that provide packet data services across the PCF-PDSN interface;
  - Descriptions of the division of responsibility of the functions provided between the PCF and the PDSN without prescribing specific implementations.
- BS-PCF interfaces:
  - Descriptions of the specified functional capabilities that provide packet data services across the BS-PCF interface;
  - Descriptions of the division of responsibility of the functions provided between the BS and the PCF without prescribing specific implementations.

The interfaces defined in this standard are specified by a set of characteristics, including:

- Physical and electromagnetic parameters.
- Channel structures.
- Message types and contents.
- Network operating procedures.
- User data framing and transport.

2.3 Organization

This specification describes the protocol necessary to provide to wireless radio telephone subscribers certain services requiring interaction between the Mobile Switching Center (MSC), the Packet Control Function (PCF), the Packet Data Service Node (PDSN), and the Base Station (BS), and is based on:

- TIA/EIA/IS-2001-A, "Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces," June 2001.
- TIA/EIA/IS-835-A, "cdma2000 Wireless IP Network Standard," May 2001.

2.4 Document Layout

The Interoperability Specification is organized into seven parts, each published in a separate document:

Overview	general overview, published in [11]
Transport	protocol definitions and transport requirements, published in [12]
Features	descriptions of features, published in [13]
A1/A2/A5 Interfaces	definition of the A1/A2/A5 interfaces, published in [14]
A3/A7 Interfaces	definition of the A3/A7 interfaces, published in [15]
A8/A9 Interfaces	definition of the A8/A9 interfaces, published in [16]
A10/A11 Interfaces	definition of the A10/A11 interfaces, published in [17]

The interface documents define the individual interfaces – this includes message procedures, message bitmaps, information element definitions, and the definitions of timers that are related to the interface. Note that some information elements are used on

multiple interfaces; in this situation, the information element is defined in each of the associated interface documents. Changes to the definition of an information element in one interface document do not imply changes to its definition in other interface documents. However, insofar as possible, the same Information Element Identifier shall be used in all definitions of the same information element.

The Features document defines how features are implemented in the IOS - which interfaces are used, which messages are used, and how the feature is implemented using these messages (call flows).

2.5 Documentation Conventions

"Shall" and "shall not" identify requirements to be followed strictly to conform to the standard and from which no deviation is permitted. "Should" and "should not" indicate that one of several possibilities is recommended as particularly suitable, without mentioning or excluding others; that a certain course of action is preferred but not necessarily required; or (in the negative form) that a certain possibility or course of action is discouraged but not prohibited. "May" and "need not" indicate a course of action permissible within the limits of the standard. "Can" and "cannot" are used for statements of possibility and capability, whether material, physical, or causal.

The scenarios and examples in this specification are not meant to be exhaustive, but are only used to help explain some of the important procedures of the protocol.

Figure 2.5-1 is provided as an example of the conventions used in this specification.

Several points within the diagram are worthy of note. The circled numbers in the following figure correspond to the numbered items below.

1. Horizontal dotted lines are used to indicate messaging that is not part of defined interfaces specified in this specification. Not all air interface messages are shown, and names may be generic. For example, as the phrase "handoff direction message" is meant to include EHDM, GHDM, and UHDM.
2. Vertical dotted lines between messages are used to indicate the span of timers. The timer name is placed as close as possible to the line. Timer names begin with a capital "T" followed by digits or alphabetic characters. Timer expiration is notated with an 'x' at the end of the vertical dotted line.
3. Horizontal solid lines are used to indicate messaging that is part of the interfaces specified in this standard.
4. Lower case letters are associated with individual messaging instances in the diagram in alphabetical order arranged vertically. These letters correlate the text below the diagram with portions of the diagram.
5. Procedures that may involve the exchange of several messages are shown as an open block arrow with the name of the procedure inside.
6. Comments related to parts of the diagram are located in a comment column on the right side of the diagram.

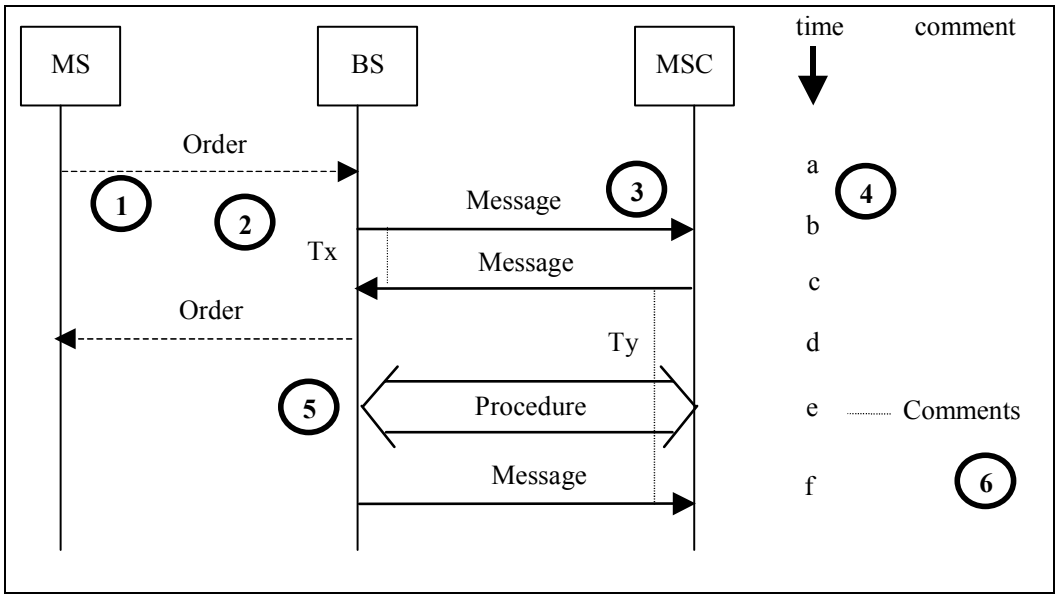

Figure 2.5-1 Document Convention Example: Call Clear Initiated by MS

a. The mobile station transmits an Order over the reverse link.

b. The BS sends a message to the MSC. Timer T_x is started by the BS.

c. The MSC sends a message to the BS and starts timer T_y. The BS stops timer T_x.

d. The BS acknowledges the MS message by returning an Order over the forward link.

e. The BS and MSC execute the procedure.

f. The BS then returns a message to the MSC. The MSC stops timer T_y.

2.5.1 Procedural Descriptions

The procedural descriptions are broken into sections where each section describes one of the messages in the procedure. The description for each procedure is written to flow through each section devoted to the messages that make up the procedure. Each of these sections has the following subsection breakdowns (as appropriate):

1. Successful Operation: this section is used to describe what the message is for, why the sender is sending it, and what the receiver is expected to do with the message. It may also provide a brief tutorial on the overall impact of this message regarding the particular procedure. It includes invocation of any pertinent timers or discussion of timing constraints. It may also provide subsections that describe the uses of the elements within the message, particularly if they are not obvious.

2. Failure Operation: if applicable, this section is used to describe the actions of the sender if the expected response is not received by the sender. This includes treatment of timer expiration or receipt of failure messages stemming from the message that was sent.

3. Abnormal Operation: if applicable, this section is used to describe out of sequence events that could possibly occur and the treatment by the receiver of the message.

2.6 References

[1] TIA/EIA/IS-2000.1-A, *Introduction to CDMA 2000 Standards for Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0001-0.

[2] TIA/EIA/IS-2000.2-A, *Physical Layer Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0002-0.

[3] TIA/EIA/IS-2000.3-A, *Medium Access Control (MAC) Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0003-0.

[4] TIA/EIA/IS-2000.4-A, *Signaling Link Access Control (LAC) Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0004-0.

[5] TIA/EIA/IS-2000.5-A, *Upper Layer (Layer 3) Signaling Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0005-0.

[6] TIA/EIA/IS-2000.6-A, *Analog Signaling Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0006-0.

[11] A.S0011-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 1 Overview*, October 2001. Refer also to TIA/EIA-2001.1-B.

[12] A.S0012-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 2 Transport*, October 2001. Refer also to TIA/EIA-2001.2-B.

[13] A.S0013-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 3 Features*, October 2001. Refer also to TIA/EIA-2001.3-B.

[14] A.S0014-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.4-B.

[15] A.S0015-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 5 (A3 and A7 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.5-B.

[16] A.S0016-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 6 (A8 and A9 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.6-B.

[17] A.S0017-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.7-B.

2.6.1 Telecommunications Industry Association (TIA) / Electronics Industry Association (EIA)

[18] TIA/EIA-2001.1-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 1 Overview*, October 2001. Refer also to A.S0011-0.

[19] TIA/EIA-2001.2-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 2 Transport*, October 2001. Refer also to A.S0012-0.

[20] TIA/EIA-2001.3-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 3 Features*, October 2001. Refer also to A.S0013-0.

[21] TIA/EIA-2001.4-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces)*, October 2001. Refer also to A.S0014-0.

[22] TIA/EIA-2001.5-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 5 (A3 and A7 Interfaces)*, October 2001. Refer also to A.S0015-0.

[23] TIA/EIA-2001.6-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 6 (A8 and A9 Interfaces)*, October 2001. Refer also to A.S0016-0.

[24] TIA/EIA-2001.7-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)*, October 2001. Refer also to A.S0017-0.
[25] TIA/EIA/IS-834, *G3G CDMA-DS to TIA/EIA-41*; March, 2000. Refer also to 3GPP2 C.S0007-0.
[26] TIA/EIA/TSB100, *TR-45 Wireless Network Reference Model (NRM)*, July, 1998. Refer also to 3GPP2 S.R0005-A.

2.6.2 3GPP2

[27] 3GPP2 C.S0001-0, *Introduction to CDMA 2000 Standards for Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/IS-2000.1-A.
[28] 3GPP2 C.S0002-0, *Physical Layer Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/IS-2000.2-A.
[29] 3GPP2 C.S0003-0, *Medium Access Control (MAC) Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/IS-2000.3-A.
[30] 3GPP2 C.S0004-0, *Signaling Link Access Control (LAC) Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/IS-2000.4-A.
[31] 3GPP2 C.S0005-0, *Upper Layer (Layer 3) Signaling Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/IS-2000.5-A.
[32] 3GPP2 C.S0006-0, *Analog Signaling Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/IS-2000.6-A.
[33] 3GPP2 C.S0007-0, *Direct Spread Specification for Spread Spectrum Systems on ANSI-41 (DS-41) Upper Layers Air Interface*; March, 2000. Refer also to TIA/EIA/IS-834
[34] 3GPP2 S.R0005-A, *Wireless Network Reference Model*; July 1998. Refer also to TIA/EIA/TSB100.

2.7 Terminology

2.7.1 Acronyms

Acronym	Meaning
3GPP	Third Generation Partnership Project
3GPP2	Third Generation Partnership Project 2
ANSI	American National Standards Institute
BS	Base Station
BSC	Base Station Controller
BTS	Base Transceiver System
CC	Call Control
CDMA	Code Division Multiple Access
DS-41	An operational mode in which the BS and MS operate with the direct spread (DS) radio layers of the UMTS system defined by 3GPP, and the upper layers defined in IS-2000 that conform to and interoperate with ANSI-41 based networks.
EIA	Electronics Industry Association
ETSI	European Telecommunications Standards Institute

Acronym	Meaning
FA	Foreign Agent
GSM	Global System for Mobile communications
HA	Home Agent
HLR	Home Location Register
IETF	Internet Engineering Task Force
IOS	Interoperability Specification
IP	Internet Protocol
IS	Interim Standard
ISDN	Integrated Services Digital Network
ISLP	Intersystem Link Protocol
ITU	International Telecommunications Union
IWF	Interworking Function
kb	kilo bits
MM	Mobility Management
MS	Mobile Station
MSC	Mobile Switching Center
NRM	Network Reference Model
PCF	Packet Control Function
PCM	Pulse Code Modulation
PDSN	Packet Data Serving Node
PSTN	Public Switched Telephone Network
SDU	Selection/Distribution Unit
TIA	Telecommunications Industry Association
TSB	Telecommunications Systems Bulletin
UDI	Unrestricted Digital Information
UMTS	Universal Mobile Telecommunication System

2.7.2 Definitions

Base Station

An entity in the public radio telecommunications system used for radio telecommunications with mobile stations.

Base Station Controller

The control portion of the base station that includes call control logic and interconnections to the MSC, the BTSs that are part of the BS, other BSCs, and BTSs of neighboring BSs for purposes of soft/softer handoff.

Base Transceiver Station

A component of a base station that includes radio equipment. A BTS is sometimes equated with the physical cell site of a wireless network.

Bearer Connection

A connection intended to provide a path for user traffic.

Call Association

The totality of the active communication between the mobile station and the network, including all signaling and transfer of user information.

Cell

The unit of a base station having the ability to radiate in a given geographic area. In this standard, a Cell ID refers to a particular cell and sector.

Handoff

Handoff is the process by which an air interface circuit between a mobile station and a base station is transferred from the current base station equipment and air interface channel to either a different base station equipment and air interface channel or a different air interface channel on the current base station. The following types of handoff are supported:

1. Hard Handoff: A handoff that requires the mobile station to tune its radio equipment or to reestablish synchronization.

2. Soft Handoff: A handoff that does not require the mobile station to tune its radio equipment or to reestablish synchronization and that uses the same frame selection function (and voice transcoding function, if this is a voice call) in the network for both the old and new air interface channels.

3. Soft Handoff with Pre-Selection: The configuration achieved when a BS internally splits a single forward flow of coded user information from the frame selector to send it to two or more cells controlled by that BS. In the reverse direction, the BS joins the flows of coded user information frames from those cells, selects the best quality frame (preselection), and forwards only that selected frame to the frame selector.

4. Softer Handoff: A handoff involving two or more traffic channels on a call such that in the forward direction the BS splits a single flow of traffic channel frames into two or more forward flows to be sent to the mobile station with the power control combined bit set to indicate that the same reverse power control information is to be used. In the reverse direction the BS combines the traffic channel frames that are received from two or more cells/sectors and forms a single reverse flow from this combination.

Interworking Function

The Interworking Function (IWF), used in the context of this standard, provides a translation of the user traffic on a circuit data call between the fixed network and the air interface.

Logical Channel

A logical path that can carry signaling, user traffic, or a combination of the two between two entities such as the network and the mobile station. A logical channel can be instantiated over one or more physical channels. Logical channels may also share physical channels.

Mobile Switching Center

The MSC switches MS-originated or MS-terminated traffic. An MSC is usually connected to at least one base station. It may connect to other public networks PSTN, ISDN, etc., other MSCs in the same network, or MSCs in different networks. (It has been referred to as Mobile Telephone Switching Office, MTSO.) It provides the interface for user traffic between the wireless network and other public switched networks, or other MSCs.

Packet Control Function

An entity in the radio access network that manages the relay of packets between the BS and the PDSN.

Packet Data Session

An instance of use of packet data service by a mobile user. A packet data session begins when the user invokes packet data service. A packet data session ends when the user or the network terminates packet data service. During a particular packet data session, the user may change locations but the same IP address is maintained.

Packet Data Serving Node

Routes MS originated or MS terminated packet data traffic. A PDSN establishes, maintains and terminates link layer sessions to mobile stations.

Physical Channel

A physical path between the SDU function and the mobile station that consists of any connecting A3 traffic channel(s) and radio channel(s). Depending on the radio technology in use, a physical channel may be in soft handoff between the mobile station and the SDU function.

SDU Function

The SDU function (Selection/Distribution Unit function) includes the following functions:

Traffic Handler: This function exchanges traffic bits with the associated vocoder or CDMA RLP function, or is directly connected to the A5 interface.

Signaling Layer 2: This function performs the layer 2 functionality of the air interface signaling protocol and is responsible for the reliable delivery of layer 3 signaling messages between the base station and the mobile station.

Multiplex Sublayer: This function multiplexes and demultiplexes user traffic and signaling traffic for the air interface.

Power Control: This function administrates the forward and reverse link power control in a CDMA system. This function and the channel element provide the power control function for the CDMA operation. As part of this function, it generates or utilizes relevant power control information that is exchanged over the air interface or with the channel element.

Frame Selection/Distribution: This function is responsible for selecting the “best” incoming air interface reverse link frame from the channel elements involved in the soft handoff. It also distributes forward air interface frames to all channel elements involved in a call.

Backhaul Frame Handler: This function demultiplexes the control information and the air interface reverse frame from the frame received

over the backhaul network. It also multiplexes the control information and the air interface frames in the forward direction.

External Frame Handler: This function exchanges backhaul frames with channel elements which are remote from the Selector.

Intra-BS Frame Handler: This function exchanges backhaul frames with channel elements involved in intra-BS soft handoff.

Control: This function provides control functions.

Sector

A face of a of physical radio equipment implementation

Signaling Connection

A connection intended to provide a path for signaling traffic.

Source Base Station

The BS that is in control of the call is designated the source BS and remains the source BS until it is removed from control of the call.

Target Base Station

Any BS that supports the call other than the source BS is designated

3.0 Interface Model

The logical reference model used for this standard is the Network Reference Model as shown in [26]. The 3GPP2 Network Reference Model is a logical reference model as shown in [26].

3.1 Reference Points A, A_{ter}, $A_{quinter}$, and A_{quater}

The TIA TR45 Network Reference Model contains reference points A, A_{ter}, $A_{quinter}$, and A_{quater} that are implemented by the protocols and interfaces of this standard.

- The A reference point is implemented by A1, A2, A5.
- The A_{ter} reference point is implemented by A3 and A7.
- The A_{quater} reference point is implemented by A10 and A11.
- The $A_{quinter}$ reference point is implemented by A8 and A9.

3.2 Interface Reference Model

The interfaces defined in this standard are described below.

A1 — The A1 interface carries signaling information between the Call Control (CC) and Mobility Management (MM) functions of the MSC and the call control component of the BS (BSC).

A2 — The A2 interface carries 64/56 kbps PCM information (voice/data) or 64 kbps Unrestricted Digital Information (UDI, for ISDN) between the Switch component of the MSC and one of the following:

- the channel element component of the BS (in the case of an analog air interface), or
- the Selection/Distribution Unit (SDU) function (in the case of a voice call over a digital air interface),

A3 — The A3 interface carries coded user information (voice/data) and signaling information between the SDU function and the channel element component of the BS (BTS). This is a logical description of the endpoints of the A3 interface. The physical endpoints are beyond the scope of this specification. The A3 interface is composed of two parts: signaling and user traffic. The signaling information is carried across a separate logical channel from the user traffic channel, and controls the allocation and use of channels for transporting user traffic.

A5 — The A5 interface carries a full duplex stream of bytes between the MSC and the SDU function.

A7 — The A7 interface carries signaling information between a source BS and a target BS.

A8 — The A8 interface carries user traffic between the BS and the PCF.

A9 — The A9 interface carries signaling information between the BS and the PCF.

A10 — The A10 interface carries user traffic between the PCF and the PDSN.

A11 — The A11 interface carries signaling information between the PCF and the PDSN.

This is a logical architecture that does not imply any particular physical implementation. Figure 3.2-1 shows the relationship among network components in support of mobile originations, mobile terminations, and direct BS-to-BS soft/softer handoff operations.

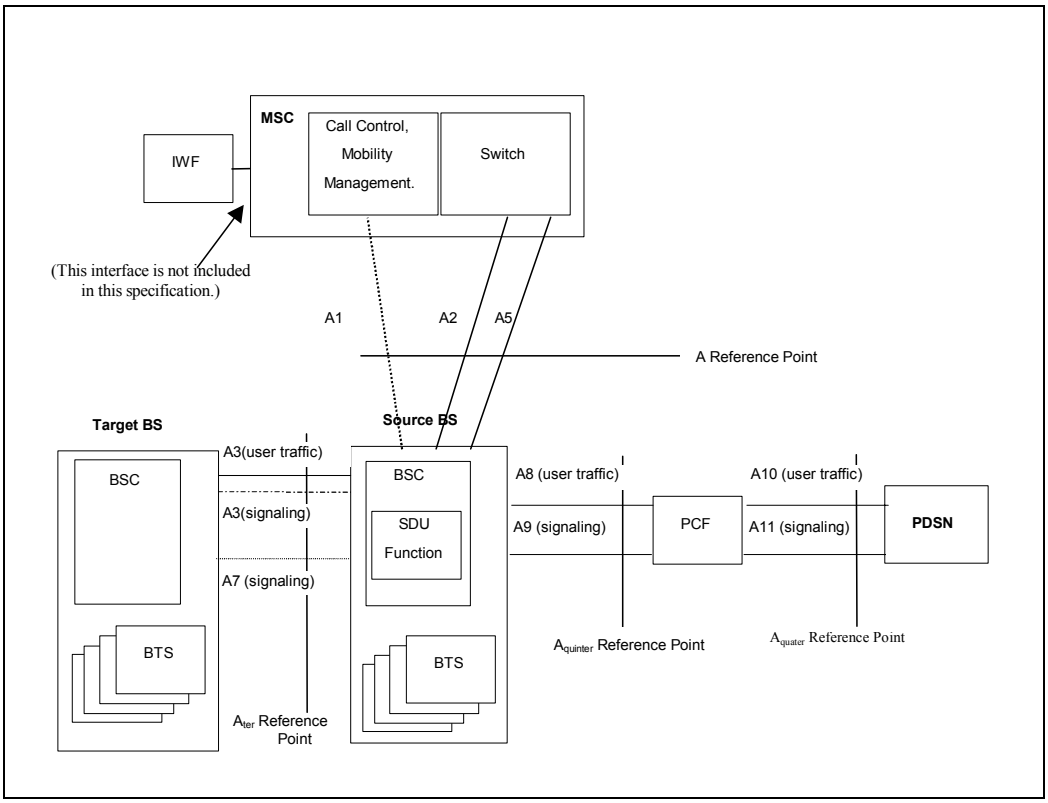

Figure 3.2-1 Reference Model for cdma2000 Access Network Interfaces

The A3 interface is used for inter-BS soft/softer handoff when a target BS is attached to the frame selection function within the source BS.

The A5 interface is used to provide a path for user traffic for circuit-oriented data calls between the source BS and the MSC.

The A7 interface is used between the source BS and the target BS for inter-BS soft/softer handoff.

The A8 interface is used to provide a path for user traffic between source BSC and PCF for packet data services.

The A9 interface is used to provide a signaling connection between source BSC and PCF for packet data services.

The A10 interface is used to provide a path for user traffic between a PCF and a PDSN for packet data services.

The A11 interface is used to provide a signaling connection between a PCF and a PDSN for packet data services.

For this standard, the circuit-oriented data IWF is considered to be located at the MSC.

For this standard the SDU function is considered to be co-located with source BSC.

4.0 Information Flows

The interfaces defined in this standard provide:

- bearer (user traffic) connections (A2, A3(traffic), A5, A8, and A10),
- a signaling connection between the channel element component of the BS and the SDU function (A3 signaling),
- a direct BS to BS signaling connection (A7),
- a signaling connection between the BS and the MSC (A1),
- a signaling connection between the BS and PCF (A9),
- a signaling connection between a PCF and PDSN pair (A11). A11 signaling messages are also used for passing accounting related and other information from the PCF to the PDSN.

In general, the functions specified on the interfaces are based on the premise that the interfaces carry signaling information that traverses the following logical paths:

- between the BS and MSC only (e.g., BS management information);
- between the MS and the MSC via the BS (e.g., the BS maps air interface messages to the MSC-BS Interface);
- between the BS and other network elements via the MSC (e.g., mobility management messages to the HLR);
- between the source BS and the target BS;
- between the BS and the PCF; and
- between the PCF and the PDSN.
- between the MS and the PDSN (e.g., Authorization information and MIP signaling).

These logical paths define all of the traffic that can exist on the defined interfaces. To support these logical paths, the interfaces of this standard can be described by the following characteristics:

- physical and electromagnetic parameters;
- channel structures; and
- message types and contents.

5.0 Packet Data Micro-Mobility and Macro-Mobility Concepts

The figure below provides a conceptual view of levels of packet data mobility.

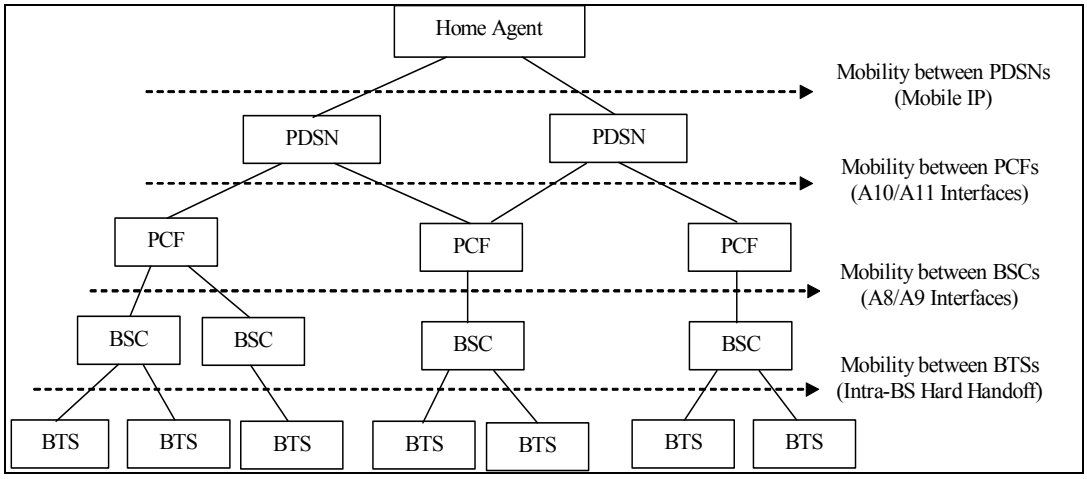

Figure 5.0-1 Levels of Packet Data Mobility

- The A8/A9 interfaces support mobility between BSCs under the same PCF.
- The A10/A11 interfaces support mobility between PCFs under the same PDSN.
- Mobile IP supports mobility between PDSN/FA under the same Home Agent.
- Hard handoff and soft handoff procedures realize the mobility between BTSs.