Technical Specification Group, Radio Access Network
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Source:	**TSG RAN Vice-Chairman**
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Document for:	**Information**
Agenda Item:	**6**

CONTRIBUTION to
3GPP2 Workshop on 3G Harmonization

AGENDA ITEM:	**5**
TITLE:	**Support of GSM-MAP Services utilizing MC CDMA-2000 Air Interface – rev 2**
SOURCE:	3GPP2 Hooks and Extensions Workshop: Services Support Ad Hoc
PLACE – DATE:	El Segundo, California – 9-10 September 1999

Abstract:
This contribution proposes a protocol function split for MC CDMA2000 to support GSP-MAP network services in a harmonized MC-MAP system

Recommendation:
Review and adopt.

1. Generic Procedures Supporting MAP Based CC/MM/GMM/SM Signaling

1.1 Network Origination

1.1.1 Procedure 1a – Network Originated – Iu-interface Set Up

1.1.1.1 Alternative 1 – Use of Existing Messaging (Possibly Extended) for Page/Page Response

1) Request from upper layers in network
2) Paging + information (non-access stratum information)
3) Page Response used to transfer the information from terminal on radio
4) Set up of Iu interface connection
5) Transfer of CC/MM/GMM/SM to MSC
6) Assignment Request from MSC
7) RRC connection setup via MC ECAM (Extended Channel Assignment Message)
   (Note: The BSC may choose to perform step (7) any time after step (3).
8) Encapsulation message used to transfer CC/MM/GMM/SM messages between terminal and MSC
9) RRC connection is released when Iu interface connection is released by MSC

Note 1*: 3GPP2/TSG-C will evaluate whether alternative 1 or alternative 2 is most optimized for each of the above procedures, or whether another alternative may be more efficient. 3GPP/TSG-RAN will provide the list of initial CC/MM/GMM/SM messages which need to be sent in these procedures and the maximum sizes of those messages.*

Note 2: *RRC Connection Setup involves the establishment and maintenance of a logical communication context between a mobile station and a BSC. Messaging between the two may be implemented across common and/or dedicated physical channels.*

1.1.1.2 Alternative 2 – Use of RRC Connection for Page Response

1) Request from upper layers in network
2) Paging + information (non-access stratum information)
3) RRC connection setup
4) Encapsulation message used to transfer the CC/MM/GMM/SM message to network on radio
5) Set up of Iu interface connection
6) Transfer of CC/MM/GMM/SM to MSC
7) RRC connection is released when Iu interface connection is released by MSC
   See note 1.

1.2 Mobile Origination

1.2.1 Procedure 2a – Mobile Originated –Iu-interface Set Up

1.2.1.1 Alternative 1 – Use of Existing Messaging

1) Request from upper layers in terminal
2) Origination message used to transfer the CC/MM/GMM/SM message from terminal on radio
3) Set up of Iu interface connection
4) Transfer of CC/MM/GMM/SM to MSC
5) Assignment Request from MSC
6) RRC connection setup via MC ECAM (Extended Channel Assignment Message)
   (Note: The BSC may choose to perform step (7) any time after step (3).
7) Encapsulation message used to transfer CC/MM/GMM/SM messages between terminal and MSC
8) RRC connection is released when Iu interface connection is released by MSC

1.2.1.2 Alternative 2 – Use of RRC Connection

1) Request from upper layers in terminal
2) RRC connection setup
3) Encapsulation message used to transfer the CC/MM/GMM/SM message from terminal on radio
4) Set up of A/Iu interface connection
5) Transfer of CC/MM/GMM/SM to MSC
6) Encapsulation message used to transfer CC/MM/GMM/SM messages between terminal and MSC
7) RRC connection is released when A/Iu interface connection is released by MSC

1.3 Broadcast

1.3.1 Procedure 4

1) RRC connection exists
2) Encapsulation message is sent from or towards the network to or from the terminal

1.3.2 Procedure 5

1) Cell Broadcast implemented via SMS Broadcast, where SMS Broadcast is managed via OA&M

1.4 Radio Mobility

1.4.1 Procedure 6

1) Information about the neighbor cells is provided to the terminal
2) Terminal performs measurements

3) Measurements are provided to the network
4) Network makes a handoff decision
5) Source RNC or BSC sends Relocation required message on A/Iu interface
6) Handoff request is sent from MSC to target BSC or RNC
7) Target BSC or RNC checks availability of resources
8) Handoff request acknowledgement is sent back to MSC with the committed resources
9) Handoff command is sent from MSC to source RNC or BSC
10) Handoff Direction is sent on the radio interface by source RNC or BSC. This may imply a change of the service provided to the terminal.
11) Handoff detect message is sent by target RNC or BSC to the MSC. Triggering point is L2 establishment.
12) Handoff complete is sent from terminal to target RNC or BSC
13) Target RNC or BSC relays Handoff complete to MSC
14) Clear command is sent from MSC to source RNC of BSC. That triggers the release of the radio resources under the old BSC or RNC.
15) Clear complete is sent to the MSC.

Note that the name of the messages on the radio interface are different on the 3GPP radio and 3GPP2 radio.

Additional study is necessary for the handoff of Packet Data connections. 3GPP will carry the initial analysis.

1. Protocol Requirements

1.1 Work Items and Issues

1) 3GPP must review all CC/MM/GMM/SM procedures and in particular timers based on the identified corresponding IS 2000 RRC procedure.
2) 3GPP2/TSG-C will provide information to 3GPP on parameters which can be configured and influence the timing of IS 2000 RRC procedures.
3) System overhead messaging will be extended to support MC MAP. Specifically, the MM and CC information of MAP-based systems must be supported. -- 3GPP2/TSG-C to investigate.
4) User plane needs to be reviewed i.e. that all GSM-MAP services can be mapped on IS 2000 layer 1 and layer 2. Action on 3GPP2/TSG-C with 3GPP to provide support.
5) Encapsulation of GSM layer 3 messages will be needed in IS 2000 for efficient transfer of CC/MM/GMM/SM messaging. A new encapsulation message may be needed. Alternatively, the Data Burst message might be extended for this purpose. 3GPP2/TSG-C will make this decision.
6) A new Channel Request message may need to be added to IS 2000. It may contain a protocol discriminator and the Reason for the Request based on alternatives selected in section 1.1. 3GPP2/TSG-C will need to determine whether extensions of existing common channel messages or creation of such a Channel Request message should be used, or possibly some combination of the two.
7) 3GPP2/TSG-C must examine the parameters available on the Iu interface for requesting radio bearer channels and map those into the capabilities of MC.
8) Unlike native mode MC-41 mobiles, the MC-MAP mobiles won't have ESN as the mobile identity. Instead the MC-MAP mobiles should support GSM-MAP identity types (IMEI, IMSI and TMSI). As a result, the MC Layer 1 specifications should permit use of GSM-MAP identity types in various hash functions. – 3GPP2/TSG-C must examine the various MC hash functions to determine impacts from the use of MC-MAP.
9) 3GPP2/TSG-C must also examine the support of various mobile identifier types (IMSI, TMSI, IMEI, …) in activities on the paging and access channels.
10) The MC MAC should support the QoS attributes defined in the evolved GSM-MAP, such as delay class, error rate, etc. Note: Since in the evolved GSM-MAP architecture the radio access network is isolated from all service aspects of the call, the radio access network is informed about QoS parameters of the Radio Access Bearer (RAB) by the core network. This is done on the Iu- interface in the radio access bearer establishment procedure. – 3GPP2/TSG-C needs to examine the UMTS QoS parameters, messages, and procedures and determine means to support them.
11) Since the Dormant State currently defined in the cdma2000 MAC is equivalent to URA-connected state, the decision of transition to/from the Dormant State may need to be taken out of the MC MAC responsibility for MC-MAP, and should be under responsibility of the upper layers. – 3GPP2/TSG-C to investigate.
12) 3GPP2/TSG-C must examine the need for and support for in-order delivery of higher layer PDUs.

13) 3GPP2/TSG-C must examine support for longer PDUs (> 254 bytes).
14) 3GPP2/TSG-C must examine support of priorities for upper layer signaling messages (e.g. lower priority for SMS messages).
15) It is anticipated that due to the extensive signaling implied by the GSM call model and support of concurrent services, the amount of upper layer signaling traffic on the dedicated channels will require prioritization of the radio resource management messages. – 3GPP2/TSG-C to investigate.
16) Definition of the MC RRC should align to the SAPs of DS-RRC. – 3GPP2/TSG-C to investigate.
17) Concurrent radio access bearers may exist simultaneously. Mechanisms must be investigated to assure proper coordination between MC and MAP upper layers to identify such instances. – This will involve discussions between 3GPP and 3GPP2/TSG-C experts to verify consistent and proper operation.
18) Idle mode selection/reselection procedures should be examined, including procedures for monitoring of other air interface modes (e.g. GSM, DS), and procedures and messages for broadcasting neighbor lists of other modes. – 3GPP2/TSG-C to investigate.
19) Existing cdma2000 procedures should be modified to reflect differences in access classes handling and cell barring. Some new procedures and possibly new parameters in the system information broadcast may need to be defined. – 3GPP2/TSG-C to investigate.
20) In order to make initial system acquisition fast enough, it is required to store MC channel information in the mobile station. New SIM files for storing information related to CDMA MC need to be defined. -- Both 3GPP/TSG-T3 and 3GPP2/TSG-C experts should examine this issue.
21) The MC-MAP specifications should permit assignment of the mobile station public long code mask by the Base Station. -- 3GPP2/TSG-C to investigate.
22) In the GSM call model, TMSI is assigned in the GSM upper layers and the radio access network is not aware of the TMSI assigned to a mobile. Because of that and similarly to DS, use of a Radio Network Temporary Identity (RNTI) should be considered in MC-MAP for addressing the mobile on the common channels within the radio access network.. -- 3GPP2/TSG-C to investigate.
23) New procedures and messages should be defined in the MC-MAP specification to support connected mode paging. -- 3GPP2/TSG-C to investigate.
24) Existing cdma2000 In-Traffic System Parameters procedure and message can be extended to support GSM-MAP specific MM information and may include neighbor lists of other air interface modes functionality. -- 3GPP2/TSG-C to investigate.
25) Extensions are required in the MC RAN to support vocoder location in the core network. Action required by 3GPP2/TSG-A. The possibility of vocoder location in the RAN must also be considered by both 3GPP and 3GPP2.
26) 3GPP2/TSG-C must examine Packet Zones vs. GPRS UMTS Registration Areas and Routing Areas in support of packet data service registration.
27) 3GPP is to check the content of the Page/Page response messages to identify and classify the information content as MM/CC/RRC. This is to facilitate the decision of 3GPP2/TSG-C on the choice of alternatives for procedures 1a and 2a.

28) 3GPP2/TSG-C must extend MC RRC to use GSM/UMTS cell (re)selection algorithms in MC-MAP networks.

1.2 Iu Interfaces

1) Iu Interface (3GPP 25.41x series)
2) MM, CC (3GPP 24.008)

1.5 Radio Interface

1) MC Layer 1 (IS-2000.2)
2) MC MAC (IS-2000.3)
3) MC LAC (IS-2000.4)
4) MC RRC (IS-2000.5)

1.3 Handoff

1.3.1 Work Items and Issues

1) Handoff between DS41 or GSM and MC is a hard handoff from the radio interface point of view. In the network, it corresponds to an inter-BSC hard handoff involving the support from the Core Network. This may not preclude optimizations for equipment having both RNC and BSC functions which could perform the hard handoff autonomously, but this needs further work. – This will require by experts from 3GPP/RAN2 and 3GPP2/TSG-C experts. 3GPP2/TSG-C will have first responsibility.
2) Extensions of MC are necessary in support of handoff. This includes neighbor lists, radio parameters, the control of the measurements and the measurement reporting, etc. . – 3GPP2/TSG-C to investigate
3) Extensions of DS are necessary in support of handoff. This includes neighbor lists, radio parameters, the control of the measurements and the measurement reporting, etc. . – 3GPP/RAN2 to investigate
4) Extensions of the A interface are necessary in support of handoff (i.e. GSM → MC-MAP hard handoff) . – 3GPP/RAN3 and SMG2 to investigate. SMG2 to have first responsibility.
5) Extensions of the Iu are necessary in support of handoff. This includes neighbor lists, radio parameters, the control of the measurements and the measurement reporting, etc. – 3GPP/RAN3 to investigate.
6) Extensions of MC radio interface signaling are necessary in support of handoff – 3GPP2/TSG-C to investigate.
7) Extensions of GSM MAP are necessary in support of inter-MSC handoff.
   a) The following handoff scenarios are considered:
   b) sync DS/MAP to sync MC/MAP handoff needs a means to convey neighbor cells information similar to cdma2000 in the DS-MAP cells. Extensions to DS are necessary. – 3GPP/RAN2 to investigate

c) sync MC-MAP to sync DS MAP handoff needs means to convey neighbor cells information in the MC cell. Extension in MC signaling is necessary. – 3GPP2/TSG-C to investigate

d) sync MC MAP to async DS-MAP handoff uses 3GPP async handoff mechanism. It requires a means to convey neighbor cell information in MC cell. Extension in MC signaling is necessary. – 3GPP2/TSG-C to investigate

e) async DS-MAP to sync MC-MAP handoff needs further analysis. Extensions to DS and/or MC are necessary depending on the technical solution. Preliminary work would be first in 3GPP RAN WG1.

8) The handling of terminal capabilities needs work. 3GPP/RAN2 and 3GPP2/TSG-C. 3GPP/RAN2 to have first responsibility.

9) Idle handoff requires analysis of 3GPP algorithms. The MC layers will be required to determine the strongest signals, procure information on those cells, and provide that information to the RRC layer for cell [re]selection reselection decisions based on SIM/UIM. – 3GPP2/TSG-C to investigate.

1.3.2 Active Mode Handoff Scenarios

Extensions to support the following handoff scenarios need to be supported.

1) MC/MAP → MC/MAP
2) MC/MAP → GSM 2G Systems
3) MC/MAP → DS/MAP
4) GSM 2G → MC/MAP
5) DS/MAP → MC/MAP

1.3.3 Idle Mode Handoff Scenarios

Extensions to support the following handoff scenarios need to be supported.

1. MC/MAP → MC/MAP
2. MC/MAP → GSM 2G Systems
3. MC/MAP → DS/MAP
4. GSM 2G → MC/MAP
5. DS/MAP → MC/MAP

These procedures include cell selection and re-selection, as well as dormant packet connection handoff.

2. GSM/UMTS Subscriber Services/Features

2.1 Bearer services

ID	Reference	Feature Name	Comments
1.	GSM 06 series	Speech Vocoding • Half Rate • Full Rate • Dual Rate • Enhanced-Full Rate • AMR	1a, 2a, 4, 6
2.		Low Speed Circuit Data High Speed Circuit Data to be supported over MC	1a, 2a, 4, 6
3.	3GPP-23.060 GSM 03.60	Packet Data Support	1a? 2a, 4, 6
4.		High Data Rate Support of rates up to 2.4 Mbps on forward link and Support of rates up to 307.2 Kbps on reverse link	1a, 2a, 4, 6
5.	ETSI GSM 02.02	Alternate Speech/Data [fax]	2a, 4 3GPP/S1 to check whether this is still needed
6.	ETSI GSM 02.02	Speech followed by Data.	2a, 4 3GPP/S1 to check whether this is still needed

1.6 Interworking Services

ID	Reference	Feature Name	Comment
7.		Tandem Vocoder Bypass	No impact on radio interface.

1.7 Tele Services

ID	Reference	Feature Name	Comment
8.	ETSI GSM 02.03	Telephony	1a, 2a, 4, 6
9.	ETSI GSM 02.03	Emergency Calls • Emergency call with IMSI if roaming allowed • Emergency call with IMSI even if roaming not allowed • Emergency call on IMEI, without SIM card	2a, 6
10.	ETSI GSM 02.03	Short Message MT/PP	1a, 4, 6
11.	ETSI GSM 02.03	Short Message MO/PP	2a, 4, 6
12.	ETSI GSM 02.03	Short Message Cell Broadcast	5
13.	ETSI GSM 02.03	Automatic Fax (GR.3)	1a, 2a, 4, 6
14.	ETSI GSM 02.03	Alternate Speech & Fax GR.3 - T & NT	2a 3GPP/S1 to check whether this is still necessary
15.	ETSI GSM 02.68	Voice Group Call Service	1a, 2a, 4, 6 Not in Release-99, Low Priority
16.	ETSI GSM 02.69	Voice Broadcast Service	1a, 2a, 4

1.8 Supplementary Services

ID	Reference	Feature Name	Comment
17.	ETSI GSM 02.67	enhanced MultiLevel Precedence and Pre-emption. (eMLPP)	4
18.	ETSI GSM 02.72	Call Deflection (CD)	4

ID	Reference	Feature Name	Comment
19.	ETSI GSM 02.81	Calling Line Identification Presentation (CLIP)	4
20.	ETSI GSM 02.81	Calling Line Identification Restriction (CLIR)	2a, 4
21.	ETSI GSM 02.81	Connected Line Identification Presentation (COLP)	4
22.	ETSI GSM 02.81	Connected Line Identification Restriction (COLR)	2a, 4
23.	ETSI GSM 02.82	Call Forwarding Unconditional (CFU)	2a, 4
24.	ETSI GSM 02.82	Call Forwarding on mobile subscriber busy (CFB)	2a, 4
25.	ETSI GSM 02.82	Call Forwarding on No Reply (CFNRy)	2a, 4
26.	ETSI GSM 02.82	Call Forwarding on mobile subscriber not reachable (CFNRc)	2a, 4
27.	ETSI GSM 02.83	Call Waiting (CW)	4
28.	ETSI GSM 02.83	Call Holding (HOLD)	4
29.	ETSI GSM 02.84	MultiParty (MPTY)	4
30.	ETSI GSM 02.86	Advice of Charge - Information (AoCI)	4
31.	ETSI GSM 02.86	Advice of Charge - Charging (AoCC)	4
32.	ETSI GSM 02.87	User-to-User Signaling (UUS)	1a, 2a, 4

ID	Reference	Feature Name	Comment
33.	ETSI GSM 02.88	Call Barring of all outgoing calls (BAOC)	2a, 4
34.	ETSI GSM 02.88	Call Barring of outgoing International calls (BOIC)	2a, 4
35.	ETSI GSM 02.88	Call Barring of outgoing International calls, except directed to home PLMN country (BOIC-exHC)	2a, 4
36.	ETSI GSM 02.88	Barring of all incoming calls (BAIC)	2a, 4
37.	ETSI GSM 02.88	Barring of incoming calls when roaming outside home PLMN country (BAIC-Roam)	2a, 4
38.	ETSI GSM 02.91	Explicit Call Transfer (ECT)	4
39.	ETSI GSM 02.93	Completion of Calls to Busy Subscriber (CCBS)	1a, 4
40.	ETSI GSM 02.42	Network Identity and Timezone (NITZ)	1a, 4
41.		Position Determination Service (Location Service)	1a, 2a, 4 3GPP/RAN2 + S2 to provide the report on location services. 3GPP2/TSG-C to verify support of measurements required by that report.
42.		SOLSA (Support of Localised Service Area)	MC RRC extensions are needed. This will affect cell (re)selection. -- 3GPP2/TSG-C

1.9 Network Features

ID	Reference	Feature Name	Comments
43.	3GPP 22.135	Multi-Call (Multiple simultaneous service instances)	1a, 2a, 4, 6
44.	ETSI GSM 02.85	Closed User Group (CUG)	Network service, no impact to the radio layers

ID	Reference	Feature Name	Comments
45.	ETSI GSM 02.95	Support of Private Numbering Plan (SPNP)	Network feature, transparent to the radio layers
46.	ETSI GSM 02.97	Multiple Subscriber Profile (MSP)	Network feature, transparent to the radio layers
47.	ETSI GSM 02.41	Operator Determined Barring (ODB) for home subscribers	Network feature, transparent to the radio layers
48.	ETSI GSM 02.41	Operator Determined Barring (ODB) for int'l roamers	Network feature, transparent to the radio layers
49.	ETSI GSM 02.40	Call Progress Indication	4
50.	ETSI GSM 02.33	Lawful intercept	Network feature, transparent to the radio layers
51.		Public Call Office & Subscriber Charge Meter	Network feature, transparent to the radio layers
52.		CAMEL	Network feature, transparent to the radio layers
53.		Pre-Paid Service	Network feature, transparent to the radio layers
54.		Billing Information	Network feature, transparent to the radio layers

1.10 Network Security

ID	Reference	Feature Name	Comment

ID	Reference	Feature Name	Comment
55.	ETSI GSM 02.09 ETSI GSM 03.20 3GPP-33-series	Subscriber Identity IMSI confidentiality	Required extensions will be based on the results of TIA TR-45decisions on Authentication, Signaling Message Encryption, Voice and Data ciphering procedures. No hooks are necessary for CDMA2000. Extensions of MC are needed to accommodate usage of GSM Upper Layer supplied ciphering keys. Examination of the vulnerability of the GSM keys when applied to the ciphering schemes of MC must be examined. Changes to the Core Network are not anticipated.
56.	ETSI GSM 02.09 ETSI GSM 03.20 **3GPP-33-series**	Subscriber Identity IMSI Authentication	Required extensions will be based on the results of TIA TR-45decisions on Authentication, Signaling Message Encryption, Voice and Data ciphering procedures. No hooks are necessary for CDMA2000. Extensions of MC are needed to accommodate usage of GSM Upper Layer supplied ciphering keys. Examination of the vulnerability of the GSM keys when applied to the ciphering schemes of MC must be examined. Changes to the Core Network are not anticipated.
57.	ETSI GSM 02.09 ETSI GSM 03.20 **3GPP-33-series**	Data confidentiality on physical channels	Required extensions will be based on the results of TIA TR-45decisions on Authentication, Signaling Message Encryption, Voice and Data ciphering procedures. No hooks are necessary for CDMA2000. Extensions of MC are needed to accommodate usage of GSM Upper Layer supplied ciphering keys. Examination of the vulnerability of the GSM keys when applied to the ciphering schemes of MC must be examined. Changes to the Core Network are not anticipated.
58.	ETSI GSM 02.09 ETSI GSM 03.20 **3GPP-33-series**	Connectionless user data confidentiality	Required extensions will be based on the results of TIA TR-45decisions on Authentication, Signaling Message Encryption, Voice and Data ciphering procedures. No hooks are necessary for CDMA2000. Extensions of MC are needed to accommodate usage of GSM Upper Layer supplied ciphering keys. Examination of the vulnerability of the GSM keys when applied to the ciphering schemes of MC must be examined. Changes to the Core Network are not anticipated.

ID	Reference	Feature Name	Comment
59.	ETSI GSM 02.09 ETSI GSM 03.20 **3GPP-33-series**	Signaling information element confidentiality	Required extensions will be based on the results of TIA TR-45decisions on Authentication, Signaling Message Encryption, Voice and Data ciphering procedures. No hooks are necessary for CDMA2000. Extensions of MC are needed to accommodate usage of GSM Upper Layer supplied ciphering keys. Examination of the vulnerability of the GSM keys when applied to the ciphering schemes of MC must be examined. Changes to the Core Network are not anticipated.

1.11 Registration, Roaming, Paging

ID	References	Feature Name	Comment
60.	ETSI GSM 03.12	Location Registration Procedures • location updating • location cancellation • periodic location updating • IMSI attach/detach	2a
61.		Classmark handling (detection of MS ciphering capability and MS RF capability, on request from the BSS and MSC or initiated by the MS)	Required extensions to MC will be needed to accommodate the various mobile version related information of an MC-MAP mobile station. 3GPP2/TSG-C and TSG-A to investigate, paying particular attention to the situation of multi-mode terminals.
62.		Slotted mode paging	1a RRC extensions. This is related to hashing on available identities. --3GPP2/TSG-C

1.12 Handoff

ID	Reference	Feature Name	Comment

ID	Reference	Feature Name	Comment
63.	**IS 2000.5** **3G IOS**	Soft/Softer	Existing functionality complete in RAN. No hooks, no extensions.
64.		Hard handoff MC MAP → MC MAP	Extensions required to the Iu interface. See section 1.3.
65.		Hard handoff MC MAP → 2G GSM	Extensions required to the MC RRC. See section 1.3.
66.		Hard handoff MC MAP → DS MAP	Extensions required to the MC RRC. See section 1.3
67.		Hard handoff 2G GSM → MC MAP	Extensions required to Iu and GSM A Interfaces. Extensions required to 2G measurement reporting. Extensions required to 2G GSM air interface handoff messaging. Extensions required to provide a time reference to the mobile while operating in GSM mode. See section 1.3.
68.		Hard handoff DS MAP → MC MAP	Extensions required to Iu Interface. Extensions required to DS measurement reporting. Extensions required to DS RRC air interface handoff messaging. Extensions required to provide a time reference to the mobile while operating in DS mode. See section 1.3.

3. MC-based Additional Features/Subscriber Services

1.13 Bearer services

ID	Reference	Feature Name	Comments
69.	IS-127	• Speech Vocoding EVRC	1a, 2a, 4, 6 3GPP/CN1 to investigate extensions to CC.

CONTRIBUTION to
3GPP2 Workshop on 3G Harmonization

AGENDA ITEM:	**2**
TITLE:	Requirements for Interoperability Between Multi-Carrier CDMA and GSM MAP
SOURCE:	3GPP2 Hooks and Extensions Workshop: Requirements and Architecture Ad Hoc Group
PLACE – DATE:	El Segundo, California – 9-10 September 1999

Abstract:
This contribution describes requirements for interoperability between a harmonized Global 3G (G3G) Multi-Carrier CDMA and GSM MAP.

Recommendation:
The requirements specified in this contribution should be used by both 3GPP and 3GPP2 for their joint definition and development of hooks and extensions to achieve interoperability between Multi-Carrier CDMA and GSM MAP.

Hooks:
No specific hooks are discussed in the document.

Extensions:
No specific extensions are discussed in the document.

Issues:
None

I. Introduction

The Operators Harmonization Group (OHG) has recently agreed to a harmonized Global 3G (G3G) CDMA technical framework. The harmonized G3G CDMA standard consists of three modes:

- Multi Carrier (MC), which includes 1X, 3X, etc.
- Direct Spread (DS),
- Time Division Duplex (TDD).

In the technical framework, specific recommendations have been made on Chip Rate, Pilot Structure and Synchronization Method for these three modes to ensure a harmonization of the two main CDMA based IMT-2000 Radio Transmission Technology (RTT) proposals: Wideband CDMA (WCDMA) and cdma2000.

ITU, SDOs and 3GPPs need to take appropriate actions to implement the OHG recommendation in the desired timeframe. Specifically, the hooks and extensions, as defined in the G3G CDMA framework, need to be specified in detail so that the three radio access modes (MC, DS and TDD) can be adapted to the two core networks (ANSI-41 and GSM MAP). Each combination of the radio access modes and the core networks shall allow customers to have access to the complete suite of services provided by each network type. Meanwhile, changes to ANSI-41 and GSM MAP should be minimized in development of the hooks and extensions.

This contribution describes requirements for interoperability between Multi-Carrier CDMA and GSM MAP. These requirements should be used by both 3GPP and 3GPP2 for their joint definition and development of the hooks and extensions so that the MC CDMA air interface can support all features and functions provided by the evolved GSM MAP core network. The requirements for interoperability between the Direct Spread CDMA and ANSI-41 have been specified by OHG in a contribution to the 3GPP workshop on UTRA L123 hooks and extensions held in Sophia Antipolis from 24 to 26 August, 1999.

II. Requirements

A combined MC/GSM MAP network should support the Basic, Extended, and Evolutionary Requirements as defined in sections below.

II.1 Basic Requirements

1. The MC radio access network shall be able to interface with GSM-MAP core network.

2. GSM MAP and evolved GSM MAP services (teleservices, bearer services, supplementary services, etc.)

3. GPRS services.

4. Mobile IP services, including WAP.

5. CAMEL services.

6. Technical capabilities for seamless national, regional and global roaming. "Seamless roaming" is defined as the capability for call origination and call delivery that is from the user's prospective no different than when in the home network. The roaming mobile shall be capable of autonomously registering on the visited network in accordance to the preferred roaming list contained in the UIM, and subsequent to successful completion of authentication procedures, have uninterrupted access to services that it is subscribed to, if offered by the visited network.

7. Seamless handoff from the MC mode to the DS mode and vice versa. "Seamless handoff" is defined as technical capability to perform inter-mode handoff with the success rate that is not appreciably lower than the hard handoff within the native radio interface mode.

8. Seamless handoff from MC/MAP to GSM/MAP systems. Please see the definition of "seamless handoff" in item 7.

9. Intra-network Tandem Free Operation (TFO) within the MC mode, between the MC and DS modes, and MC and TDD modes.

10. Simultaneous/non-simultaneous voice, text, image and video services with guaranteed QoS.

11. SIM/USIM functionality.

12. Existing/evolved security and authentication capability.

13. Evolved Value Added Services (VAS) including location services.

14. Band-independent operation.

II.2 Extended Requirements

"Extended Requirements" means that the best effort will be made to achieve in Release 1999, and is a firm requirement for Release 2000.

1. The seamless handoff from GSM/MAP to MC/MAP. Please see the definition of "seamless handoff" in item 7, section II.1

2. Inter-network Tandem Free Operation (TFO) within the MC mode, between the MC and DS modes, and MC and TDD modes.

3. Extensive voice and non-voice service options/service negotiation capability, including:
    - EVRC and AMR
    - Video Internet formats in most common use today for streaming and real-time video.
    - Music Internet format in most common use today.
    - Voice service option negotiation capability during call setup and while call is in progress.
    - Maximum vocoder data rate negotiation capability for the purpose of congestion control and QoS subscription (willingness to pay).
    - Packet data QoS (delay tolerance, loss rate) negotiation capability at call setup, independently for each link.
    - Packet data maximum rate negotiation capability at call set-up for each link independently. Data rate control capability at any time during packet session.

    Note : See Notes 1 and 2 under item 8 above for extending the concept of common video and music codecs to all G3G modes and unified wireline/wireless networks.

II.1 Evolutionary Requirements

1. Globally common vocoder for the G3G system. Common vocoder for G3G systems would support Tandem Free Operation (TFO) within the MC mode, between the MC and DS modes, and MC and TDD modes. It would also have a tendency to reduce the number of vocoders required to be supported by the mobile station for global roaming. This requirement translates into the requirement to embark upon the development of a common vocoder for the G3G system.

    Note 1: The requirement for commonality of vocoders, expressed here in the context of Multi-Carrier support on GSM MAP, by definition extends to all modes, including native modes and DS supported on ANSI-41.

    Note 2: TFO requirement should be also extended to interoperation with wireline networks, to the extent possible, with integrated VoIP based networks as a unifying factor.

2. Extensive voice and non-voice service options/service negotiation capability, including:
    - Yet-to-be-defined global CDMA vocoder with variable data rate and maximum data rate control capabilities.

- Future yet-to-be-defined CDMA specific format for video with pixel dimension control, color palette control, refresh rate control, variable data rate and maximum data rate control capability. It is a strong requirement to embark upon a common G3G video codec development.
- Future yet-to-be-defined CDMA specific format for music with variable rate and maximum data rate control capability.
- Video codec service option negotiation capability. For the CDMA specific video format, ability to negotiate pixel dimension, color palette, refresh rate and maximum data rate on each link (forward and reverse) independently.
- Music codec service option negotiation capability. For the CDMA specific audio format, ability to negotiate maximum data rate.

Note : See Notes 1 and 2 under item 1 above for extending the concept of common video and music codecs to all G3G modes and unified wireline/wireless networks.

III. Summary

The above should be considered as high level requirements for MC-MAP interoperability. We believe that MC/GSM MAP will be an important combination of radio access and core network, which will be deployed in various regions of the world. Contributors are willing to work with other services providers, manufacturers, SDOs, and 3GPPs to develop more detailed requirements so that the desired interoperability between MC CDMA and GSM MAP can be achieved.

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