



Service Domain Centralization (SeDoC) Use Case Analysis

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1 Introduction

1.1 Overview

The focus of this document is to evaluate the support of the CS (Circuit Switched) access use cases with the IMS (IP Multimedia Subsystem) service domain centralisation (SeDoC) architecture, studied by 3GPP in 3GPP TR 23.719 [6] and specified in Annex G/H of 3GPP TS 23.292[9]. Towards that goal, this document evaluates the 3GPP release 14 standard compliance to fulfil past and current CS market requirements. The study was initiated as a result of a discussion concerning the MSC (Mobile Switch Center) life-cycle and liaison statement proposal, both carried out under NG-GERI.

The analysis enables carriers looking to implement an IMS based control of CS access to have a better understanding of SeDoC capabilities.

For the reader, it should be clear which CS services can be immediately deployed according to 3GPP TS 23.292[9], and where an additional standardisation is needed. The document includes five (5) main sections and one (1) supporting Annex.

The general introduction in section 1 provides the background and a starting point of the technical analysis in section 1.3. It also describes the SeDoC CS access architecture with the default CS roaming configurations. Additionally, it describes the SeDoC support for inbound and outbound roaming from/to networks supporting legacy CS networks towards legacy roaming agreements.

Section 2 lists the official business requirements once the GSMA business groups would make them available. It was decided not to include any requirements unless they are originated.

Section 3 summarizes the key CS access use cases which need to be supported by 3GPP TS 23.292[9]

Section 4 outlines the current SeDoC functional and non-functional limitations, explaining their origin and showing why the full and formal standard compliance validation might not be possible. The same section also makes the summary conclusion with respect to CS. Full analysis of the CS service support is covered in Annex A.

Section 5 contains the conclusions and the proposed recommendations.

Annex A makes reference to 3GPP TS 23.292[9] standard and analyses specific clauses showing their completion status pointing where the functionality is defined and has normative or informative status. It also points out which CS functionality is partially standardized or not. The annex also states that 3GPP stage 3 work has not yet been completed.

1.2 Scope

The document focuses on the methods to address the CS service compliance by SeDoC both in the home and visited network scenarios given the existing consumer, regulatory and M2M (Machine to Machine) requirements. It provides the analysis of the required use cases, summarizes the standardisation which lead to SeDoC, and describes the deployment strategy. Where there are gaps in the standard, it will be pointed out with the respective

recommendations what specific procedure is missing, and what would be the most appropriate 3GPP standardisation approach given the market status.

This analysis will only look at the applicability of 3GPP TS 23.292[9] Annex G/H to CS access control and will not compare all the possible options for implementing such control. This question will be addressed in a future PRD (Permanence Reference Document)

1.3 High level description of SeDoC Architecture

This section provides a high level overview of the SeDoC architecture for non-roamers. It provides the full control of all CS services within the IMS. For details please refer to 3GPP TS 23.292 [9] annex G/H.

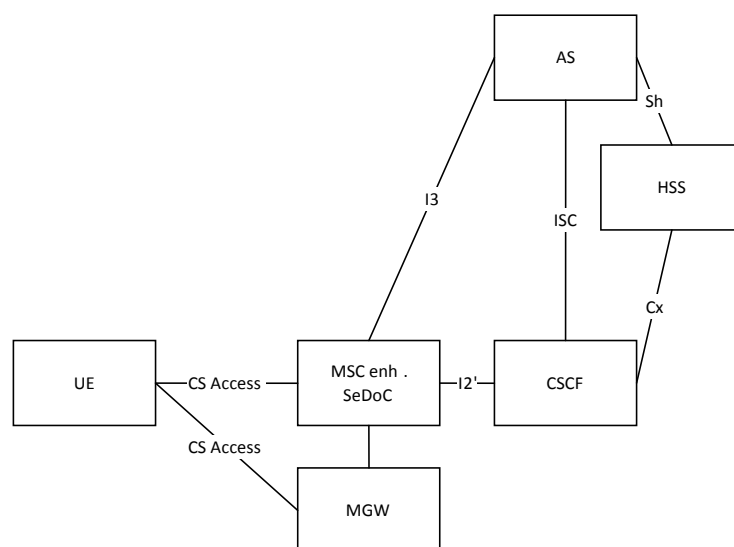


Figure 1– SeDoC Architecture

NOTE: The architecture only shows the principle architecture, i.e. it does not show all interfaces.

The MSC Server enhanced for SeDoC performs the following:

- terminates the CS Access and maps it to their respective IMS procedures.
- supports the Combined CS Access Authentication procedure to enables authentication and registration of all users accessing a network via CS access with the IMS domain as the only service domain.
- behaves as P-CSCF/ATCF from viewpoint of I/S/E-CSCF, SCC-AS.
- behaves as an MSC towards the UE (User Equipment) and other MSCs.as
- does not include VLR (Visitor Location Register) functionality, i.e. there is also no D-Interface to the HLR.

- User Service Profile data and user service profile (i.e. identity, supplementary services) are handled in the IMS domain only, i.e. in HSS (Home Subscriber Server), AS (Autonomous System), and for the roaming case in networks configured to use CS roaming interfaces in the ICS (IMS Centralized Services) Interworking function (therefore only depicted in figure 2).

1.4 SeDoC Architecture for CS inbound roamers

This section provides a high level overview of the SeDoC architecture for CS inbound roaming support. For details please refer to 3GPP TS 23.292 [9] annex G/H.

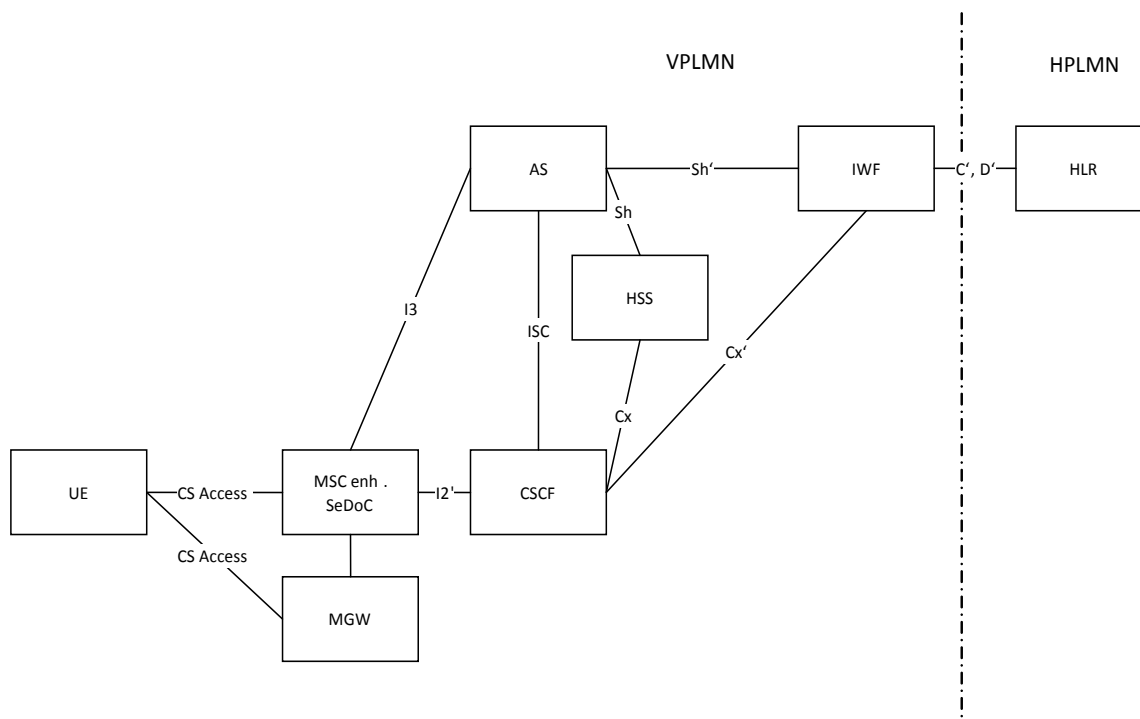


Figure 2 – SeDoC Architecture for inbound roaming support to networks configured to use CS roaming interfaces

In order to support roaming with networks that are configured to use CS roaming interfaces the SeDoC architecture requires the ICS interworking function which provides several roles:

- role as VLR towards HPLMN (Home Public Land Mobile Network) HLR (Home Location Register), i.e. in course of registration, the IWF (Interworking Function) retrieves the user profile from HPLMN and creates a temporary user profile.
- role as HSS towards the S-CSCF (Serving Call Session Control Function) (in VPLMN for local IMS registration.
- role as AS (Application Server) towards HSS (Home Subscriber Server) in VPLMN for 3rd party IMS registration to enable terminating session routing to the VPLMN (Visited Public Land Mobile Network)
- maps supplementary services management commands for inbound roamers to the respective CS MAP (Mobile Application Part) command to the HLR
- role as HLR towards VLR for outbound roamers in a legacy network.

NOTE 1: Figure 2 shows only the principle architecture, i.e. it does not show all interfaces.

NOTE 2: CS access related mobility procedures are supported and remain unchanged by SeDoC including 3GPP TS 29.002[15], 3GPP TS 23.272[8], 3GPP TS 23.216[5]

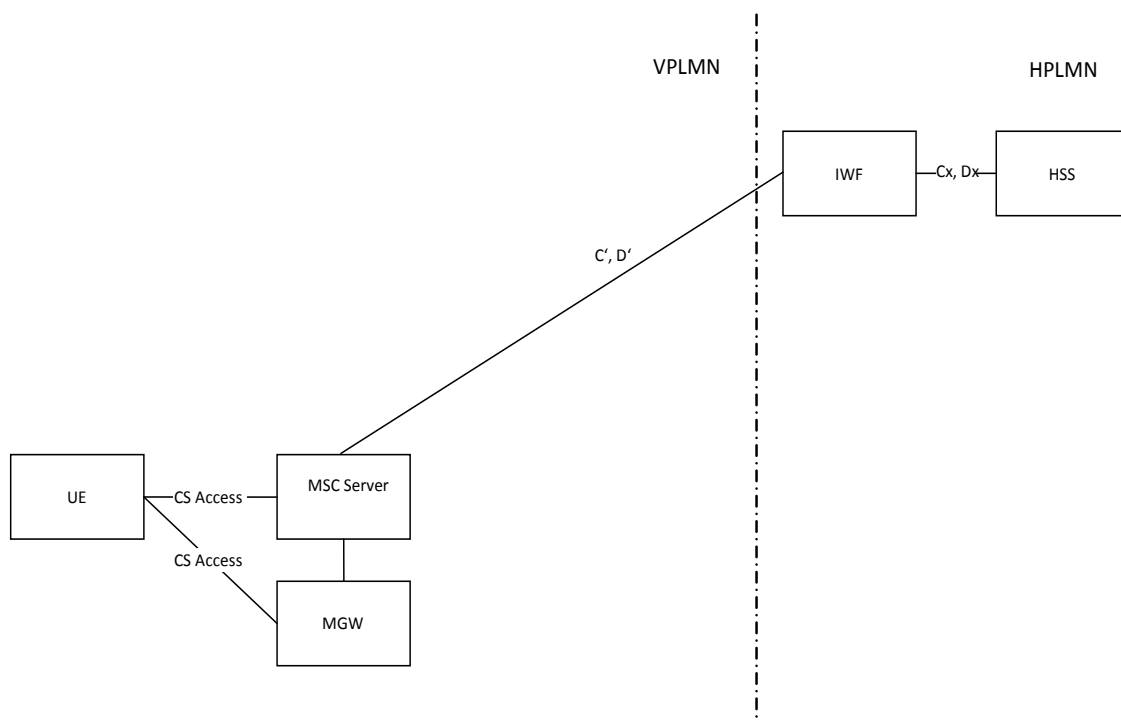


Figure 3 – SeDoC Architecture for SeDoC outbound roaming support to networks configured to use CS roaming interfaces

NOTE: Figure 3 depicts the inbound roamer from SeDoC network into legacy CS network. It does only show the principle architecture, i.e. it does not show all interfaces.

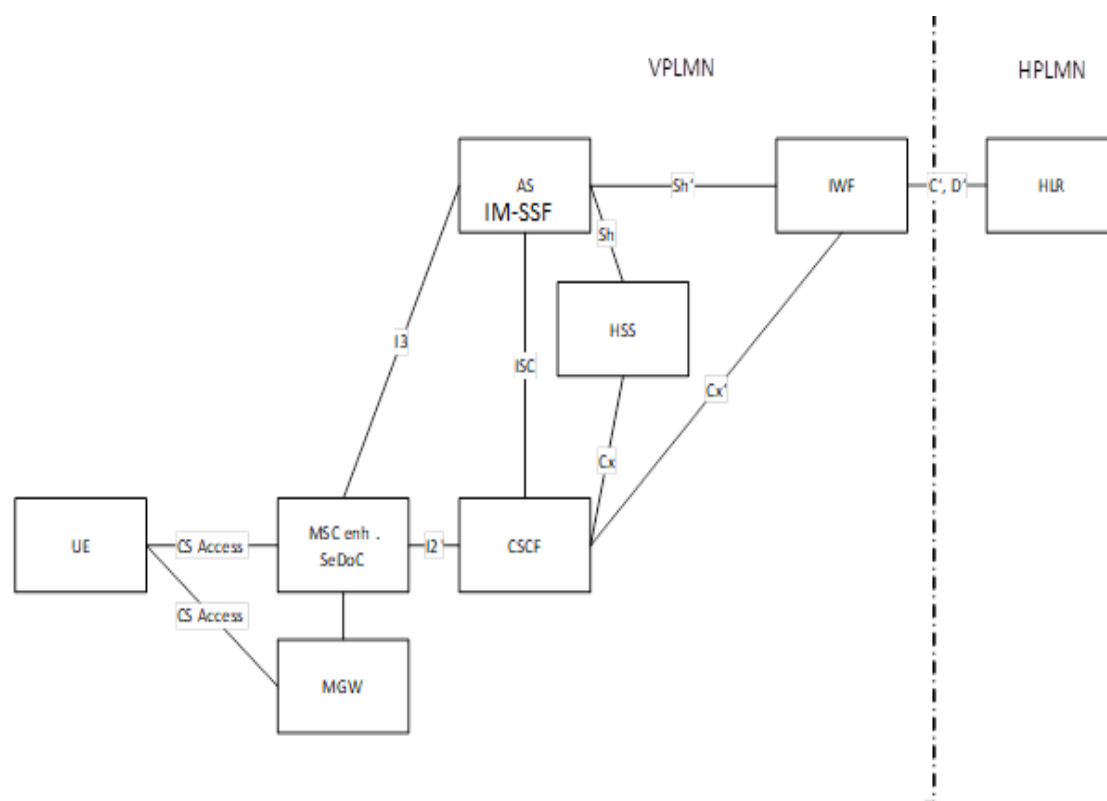


Figure 4- SeDoC Architecture for inbound CAMEL roaming support to networks configured to use CS roaming interfaces with IM-SSF collocated with AS specified in H.5.2.1

NOTE: Figure 4 shows only the principle architecture, i.e. it does not show all interfaces.

The procedure below is not fully described in 3GPP TS 23.292[9] Annex H, but is provided in this document to clarify how CAMEL (Mobile networks Enhanced Logic) is supported. In order to support CAMEL inbound roaming with networks that are configured to use CS roaming interfaces, the SeDoC architecture requires the IWF to support trigger activation therefore:

- IWF creates temporary IMS subscription in the VPLMN converting subscriber information including triggers
- IWF function interworks with IM SSF which can be collocated with any IMS AS via an implementation means. The IM SSF retrieves the CAMEL Subscription Information (CSI) from the ICS IWF at the time of the UE (User Equipment) Attach.
- The IM SSF (IMS Service Switch Function) performs the normal CAMEL requests to the gsmSCF (GSM Service Control Function) in the HPLMN as specified in 3GPP TS 23.278

In what follows the key call flows are included for the reference:

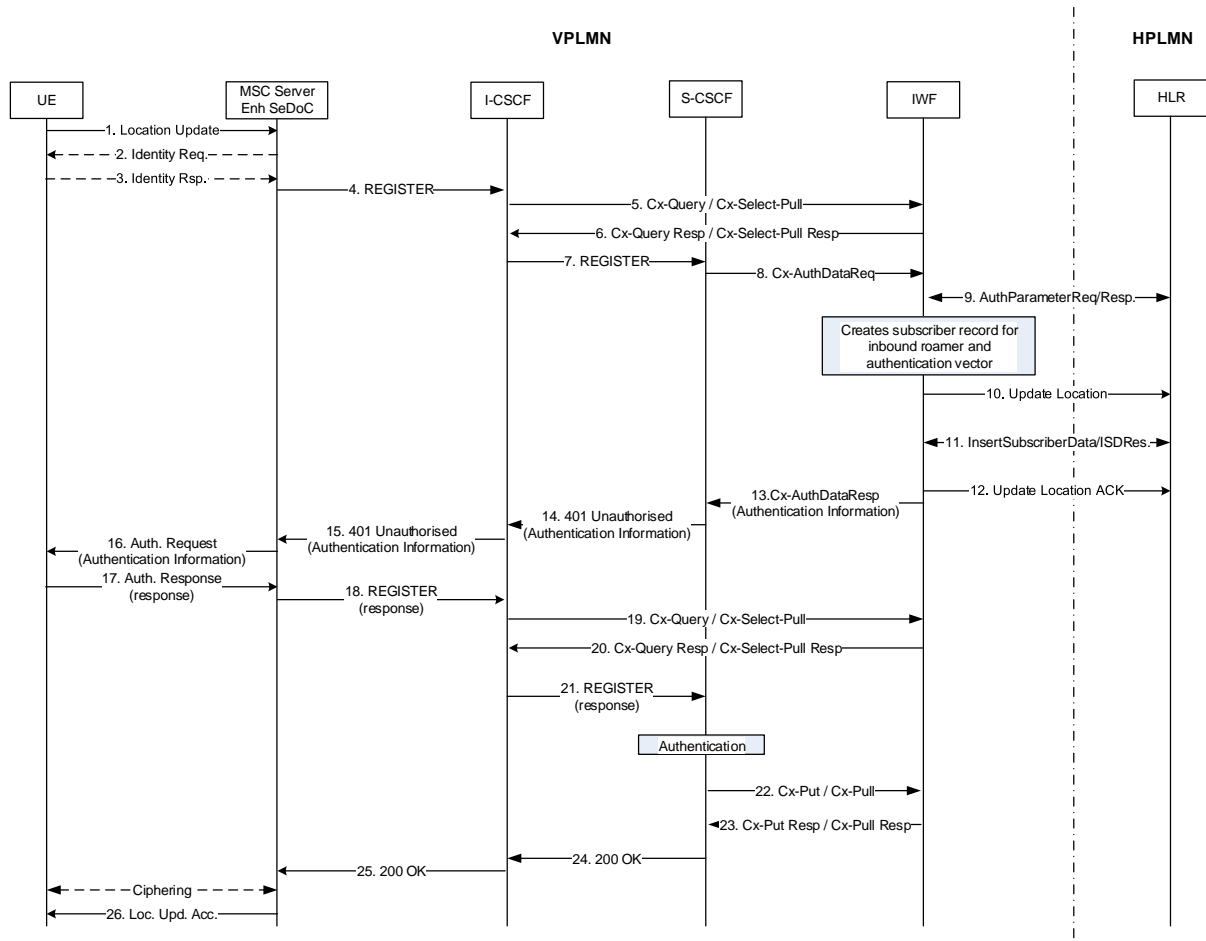


Figure 5 - Authentication/Registration procedure for inbound roamer

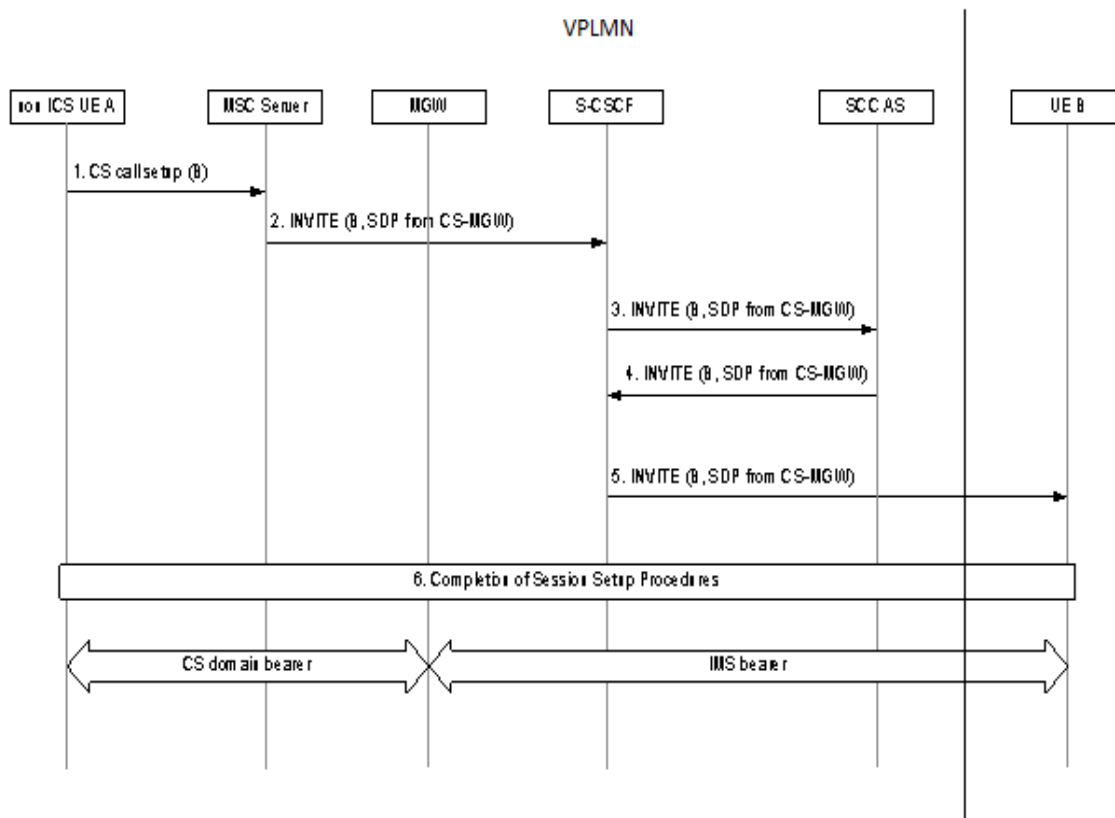


Figure 6 - Originating session for inbound roamer

NOTE: SeDoC Origination session for inbound roamers is the I2 origination procedure with the difference that the S-CSCF and AS are located in the VPLMN.

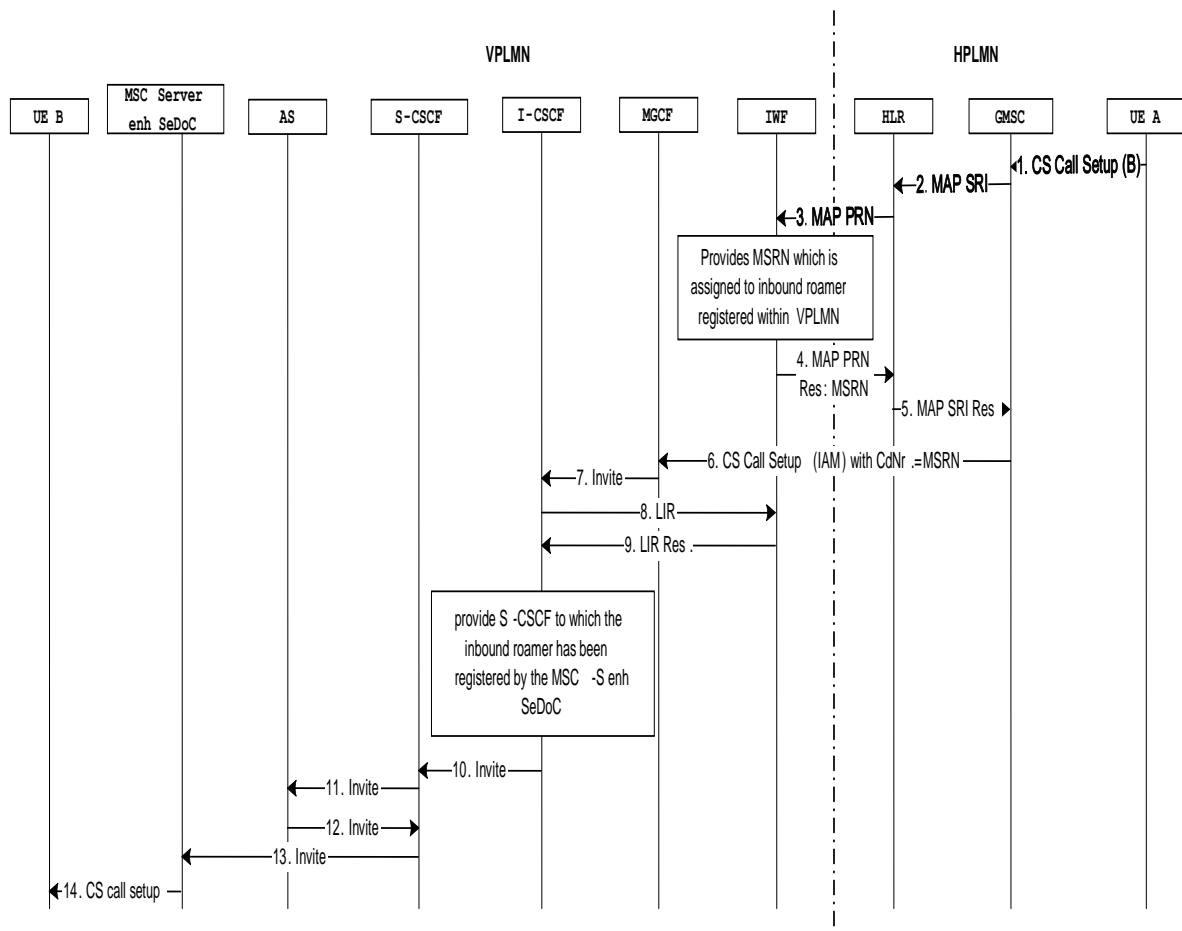


Figure 7 - Terminating session via CS Access for inbound roamer

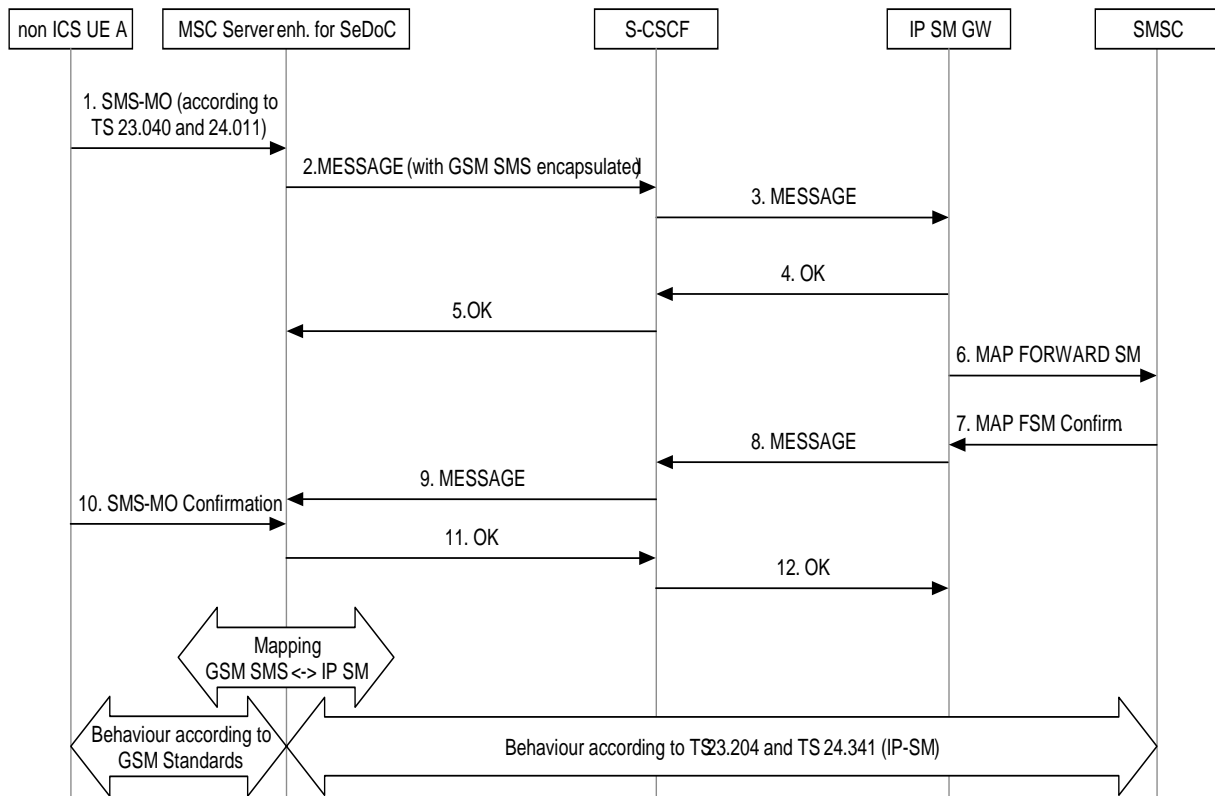


Figure 8- SMS-MO for own users not roaming

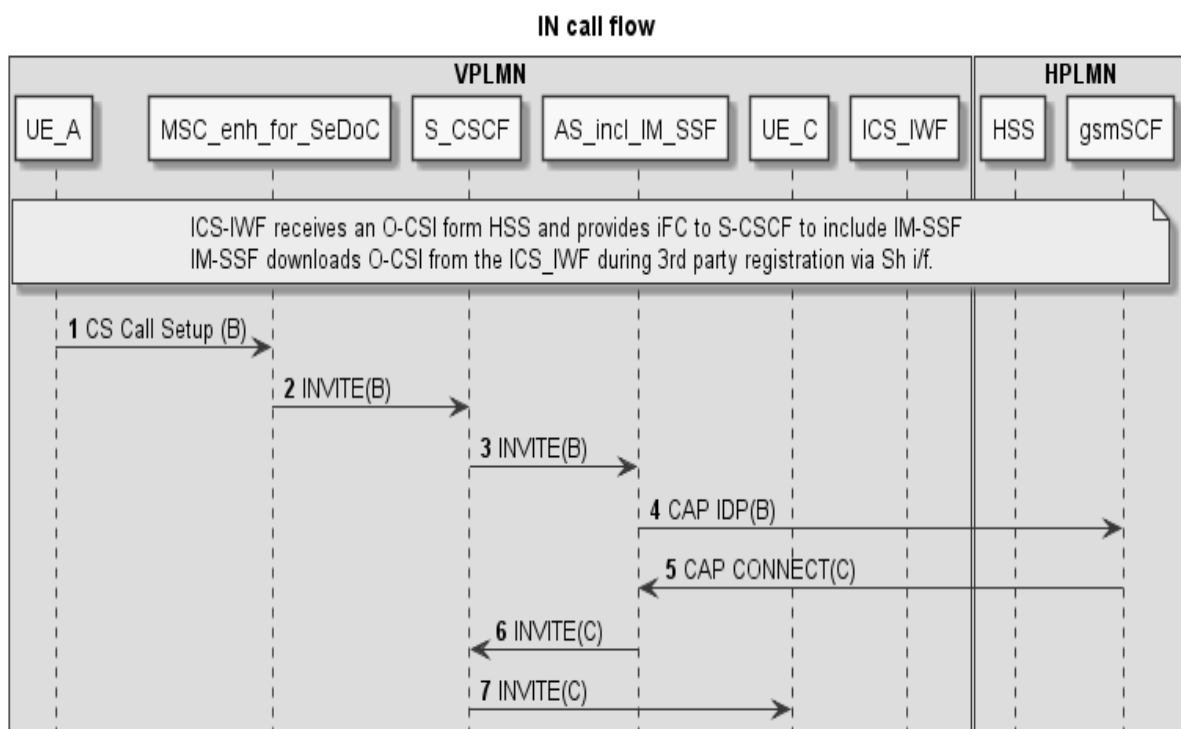


Figure 9 - Call flow including IN (source TR 23.719 [6])

NOTE 1: Figure 9 is not included in 3GPP TS 23.292[9] Annex H.

NOTE 2: In the above call flow and in accordance with 3GPP TS 23.292[9] section 5.3.3 MSC Enhanced for SeDoC does not perform any CAMEL/IN (Intelligent Network) triggering. All service logic execution is in IMS only

1.5 GSMA intelligence information

Please refer to coverage map <https://www.gsma.com/coverage/> to obtain information about 4G coverage.

Please refer to the network closure reports from GSMA WAS (Wholesales Agreement and Solutions Group) Homepage at <https://infocentre2.gsma.com/gp/wg/WA/Pages/Default.aspx> under News or contact Julia Gullstrand (JGullstrand@gsma.com)

1.6 Definition of Terms

Term	Description
3GPP	3rd Generation Partnership Project
APN	Access Point Name
ATI	Any Time Interrogation
AS	Application Server
CAMEL	Mobile networks Enhanced Logic
CN	Core Network
CS	Circuit Switched
CSD	Customer Service Division
CSCF	Call Session Control Function
CSFB	Circuit Switched FallBack
COTS	Commercial Off The Shelf
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
EIR	Equipment Identity Registe
GMSC	Gateway MSC
GMLC	Gateway Mobile Location Centre
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
gsmSCF	GSM Service Control Function
HLR	Home Location Register

HPLMN	Home Public Land Mobile Network
HSS	Home Subscriber Server
ICS	IMS Centralized Services
ICS-IWF	ICS Interworking Function
IMEI	International Mobile Equipment Identity
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IM SSF	IMS Service Switch Function
IN	Intelligent Network
IWF	Interworking Function
LB-SMS	Location-Based SMS
LTE	Long Term Evolution (Radio)
M2M	Machine to Machine
MAP	Mobile Application Part (protocol)
MME	Mobility Management Entity
MO	Mobile Originated
MS	Mobile Station
MSC	Mobile services Switching Centre
MT	Mobile Terminated
NE	Network Element
NNI	Network to Network Interface
PERS	Personal Emergency Response Systems
PLMN	Public Land Mobile Network
PRD	Permanent Reference Document
PRN	Periodic Ring Notification
PSI	Provide Subscriber Information
RAN	Radio Access Network
S-CSCF	Serving Call Session Control Function
SeDoC	IMS Service Domain Centralisation
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SMETS	Smart Meter Equipment Technical Specifications
SRI	Subscriber Remote Interface
UE	User Equipment
UMTS	Universal Mobile Telecommunications Service
VLR	Visitor Location Register
VMSC	Visited MSC

VoCS	Voice over Circuit Switched
VoLTE	Voice over LTE
VPLMN	Visited Public Mobile Network
WAS	Wholesales Agreemnts and Solutions Group

1.7 Document Cross-References

Ref	Document Number	Title
1	3GPP TS 23.002	Network architecture
2	3GPP TS 23.018	Basic call handling; Technical realization
3	3GPP TS 23.040	Technical realization of the Short Message Service (SMS)
4	3GPP TS 23.205	Bearer-independent circuit-switched core network
5	3GPP TS 23.216	Single Radio Voice Call Continuity (SRVCC)
6	3GPP TR 23.719	Feasibility Study on Service Domain Centralization
7	3GPP 23.271	Functional stage 2 description of Location Services (LCS)
8	3GPP TS 23.272	Circuit Switched (CS) fall back in Evolved Packet System
9	3GPP TS 23.292	IP Multimedia Subsystem (IMS) centralized services
10	3GPP TS 24.008	Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
11	3GPP TS 24.010	Mobile radio interface layer 3; Supplementary services specification; General aspects
12	3GPP TS 24.173	IMS Multimedia telephony communication service and supplementary services; Stage 3
13	3GPP TS 24.390	Unstructured Supplementary Service Data (USSD) using IP Multimedia (IM) Core Network (CN) subsystem IMS; Stage 3
14	3GPP TS 29.002	Mobile Application Part (MAP) specification
15	3GPP TS 29.205	Application of Q.1900 series to bearer independent Circuit Switched (CS) core network architecture
16	3GPP TS 33.203	3G security; Access security for IP-based services
17	GSMA NG.121	2G-3G Sunset Guidelines v0.1
18	3GPP TS 33.102	3G security; Security architecture
19	3GPP TS 23.078	Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 4
20	3GPP TS 32.240	Telecommunication management; Charging management; Charging architecture and principles

2 Requirement Summary

This section will be completed after receiving a formal requirement from the GSMA business group with the respect to CS life cycle duration or the time it will take to migrate the majority of CS traffic to 4G or any other technology.

3 Legacy CS Access Use Cases

The current section classifies the key CS use cases provided through legacy CS access networks, and that can be provided through SeDoC.

3.1 Consumer Services

- Voice for legacy CS and 4G CSFB (Circuit Switched FallBack) subscriber (smartphone, feature phone)
- SMS (Short Message Service)
- USSD (Unstructured Supplementary Service Data)
- Supplementary Services
- Location services
 - CS networks offer location information to the third parties. For instance, advertisement agencies interface to the GMLC (Gateway Mobile Location Centre) to obtain the location for targeted advertisements. In that case location information is using Lg interface as per 3GPP TS 23.271[7].
 - Home Zone using Provide Subscriber Information as per 3GPP TS 29.002[15] Provides Subscriber Information used as part of the CAMEL Any Time Interrogation (ATI) process and is sent from the HLR to the serving MSC in order to retrieve the subscriber state and location information.

3.2 Roaming Services

3.2.1 Legacy CS Roaming Model Support

- Voice roaming for CS subscribers
- SMS roaming for CS subscribers
- USSD roaming for CS subscribers
- CSFB for 4G subscribers roaming

SeDoC provides services for inbound CS roamers and whose HPLMN supports a CS only network as depicted in Figure 2 and using existing NNI interfaces for that matter.

Additionally, SeDoC provides support for the SeDoC inbound roaming into pure CS networks as depicted in Figure 3 and using existing NNI interfaces for that matter.

If a subscriber roams into a VPLMN and the HPLMN does not support SeDoC, the VPLMN does not offer services to the roaming subscriber based on SeDoC.

From an HPLMN perspective, the NNI (Network to Network Interface) with the VPLMN will not be effected from the current legacy CS roaming interfaces regardless of SeDoC deployment in the VPLMN.

3.2.2 Legacy CAMEL Roaming Model Support

SeDoC provides services for inbound CS CAMEL roamers from CS only networks as depicted in Figure 4 (see also call flow in Figure 9) and using existing NNI interfaces for that matter. VPLMN will not be effected from the current legacy CS roaming interfaces regardless of SeDoC deployment in the VPLMN.

3.3 Regulatory Services

- Emergency call
- eCall
- Public alert over SMS and specifically Location-Based SMS (LB-SMS)
 - LB-SMS identifies the actual list of mobile subscribers in the area and sends an individual SMS
 - In 2018, article 110 of the European Electronic Communications Code made it mandatory for all the Member States of the European Union to deploy a Public Warning system using telephone networks to alert everyone located in a specific area of an ongoing crisis or upcoming disaster, by June 2022.
- Check IMEI (International Mobile Equipment Identity) (related to different security provisions in different countries)
 - In some counties all mobile devices purchased outside the country using a local SIM (subscriber identity module) must be registered with the government after a period of grace. After this period, the phone will be blocked for all local SIM cards based on IMEI.

3.4 Enterprise Services

- M2M usually antiquated single mode devices that require connectivity service
 - Device type examples (i.e. SMETS 1 in UK)
 - GSM units which are not GPRS (General Packet Radio Service) -capable
 - Active 3G-only, active 2G-only

NOTE: it is expected that while, 1-2 years' notice is sufficient for the consumer market, the M2M market will require 3-5 years to migrate

- CSD (Customer Service Division)
 - Handheld Point of Sale using CSD
 - Other CSD modem

4 SeDoC CS Access Underspecified Features

This section summarizes the functional and non-functional features in the 3GPP SeDoC architecture that are considered underspecified. Underspecified refers to the state of 3GPP specification where a certain aspects leave room for interpretation for their implementation. It implies that there is no guarantee for multi-vendor interoperability. Annex A contains the detailed references to 3GPP TS 23.292 sections explaining the standardisation status for the end user, roaming and architecture.

4.1 Functional Aspects of CS Use Cases

All consumer, enterprise, wholesale and regulatory services and their various combinations are supported in a standardized manner with the following exceptions, and in certain scenarios some suggestions for work around are proposed:

- SMS MT cannot be used as per 3GPP TS 23.040[3]
 - Section H.2.2.1.5 of 3GPP TS 23.292[9] makes only a simple summary statement about MT SMS (Mobile Terminated SMS) while SMS MO (Mobile Originated SMS) call flow specification is given in H.4.4. It is possible to infer SMS MT from the SMS MO specification and an implementation is possible. However, for the formal validation and verification the full MT SMS call flow is needed, otherwise interpretation is open. A potential inferred MT SMS is shown below; however, it cannot be established as formally 3GPP TS 23.292 compliant.

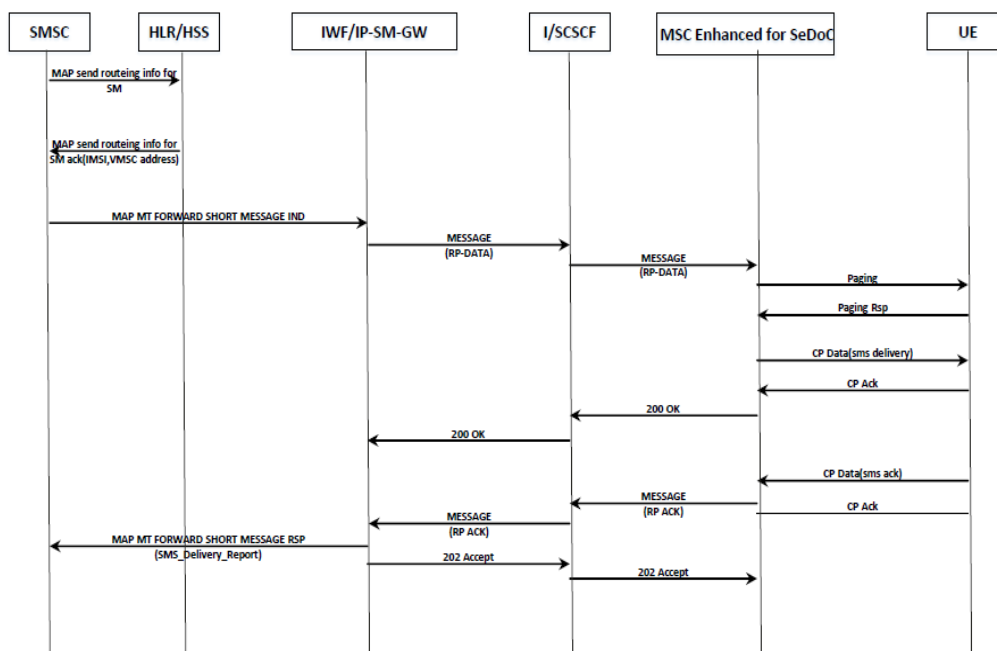


Figure 10 - Potential implementation of MT SMS

- MO USSD and MT USSD cannot be used as per 3GPP TS 24.390[13]
 - Section H.2.2.1.6 of 3GPP TS 23.292[9] describes the supplementary services management procedures but the standard does not specify USSD invocation procedures. The MO USSD and MT USSD procedures are not described. The disaggregation of VLR from MSC now requires to specify that the USSD Centre connects to the IMS therefore an A/Iu USSD to IP USSD mapping, should be provided for MSC Enhanced for the SeDoc. A possible implementation of MO USSD service is shown below but it is not been established formally in 3GPP TS 23.292.

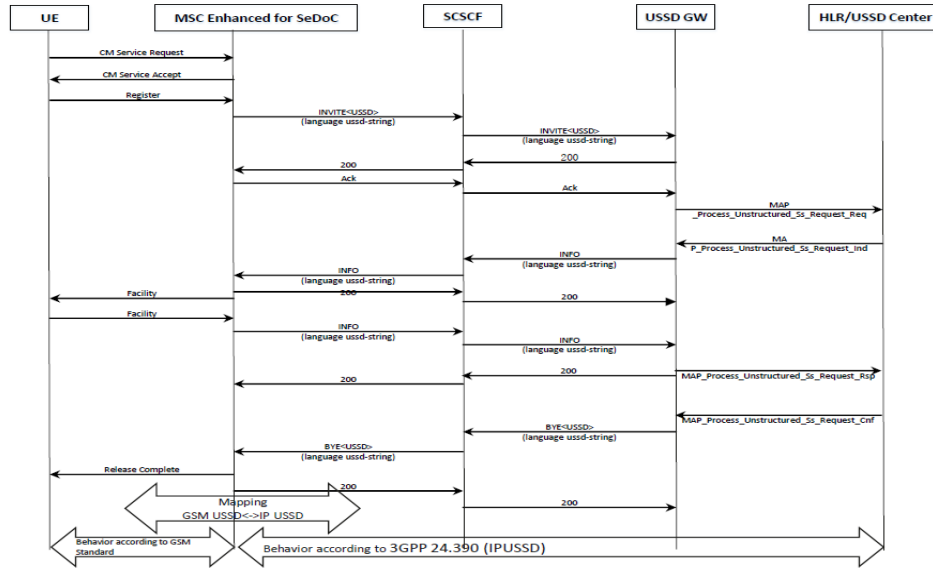


Figure 11 - Potential implementation of MO USSD

- No services that rely on IMEI check as per 3GPP TS 29.002[15] can be used. 3GPP TS 23.292[9] does not specify Check IMEI service, yet with the service centralisation check IMEI should be moved to IMS and this requires to change the MAP interface (MSC-Equipment Identity Register (EIR)) to Diameter (CSCF (Call Session Control Function) -EIR). 3GPP TS 23.292[9] clause 5.3.3 states to “Disregard any supplementary services or IN (e.g. CAMEL) triggers that may be present in the user profile”.

3GPP TS 23.292[9] section H1 states “service logic execution in IMS only”. The standard should be enhanced to support Check IMEI service by IMS and it should introduce the new interface. A possible implementation of Check IMEI service is shown below but it is not but it cannot be established as formally 3GPP TS 23.292 compliant.

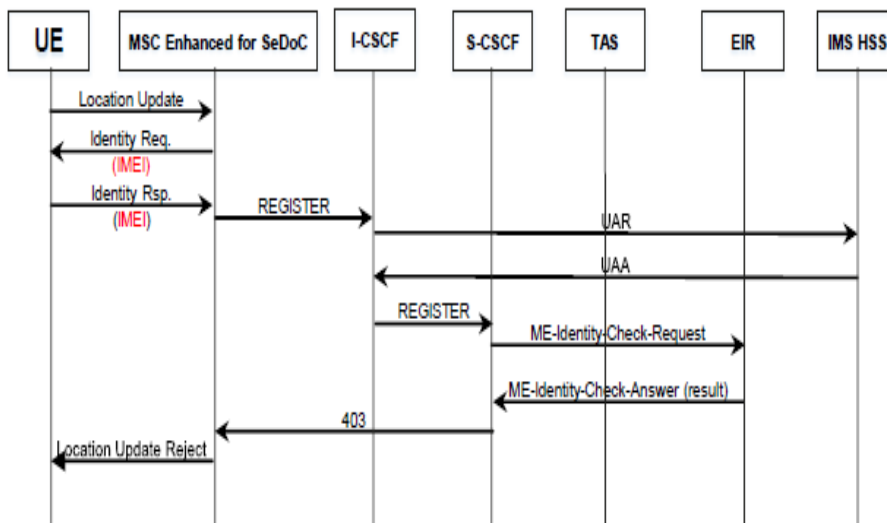


Figure 12 - Potential implementation of Check IMEI

- No services that rely on Provide Subscriber Information as per 3GPP TS 29.002[15] can be used
 - 3GPP TS 23.292[9] does not specify the call flow to manage the Provide Subscriber Information handling by the IMS system when communicating with MSC enhanced for SeDoC. With IWF now providing the VLR functionality, the legacy interaction HLR-VLR need to be mapped to SIP.
 A possible implementation of Provide Subscriber Information procedure is shown below but it cannot be established as formally 3GPP TS 23.292 compliant.

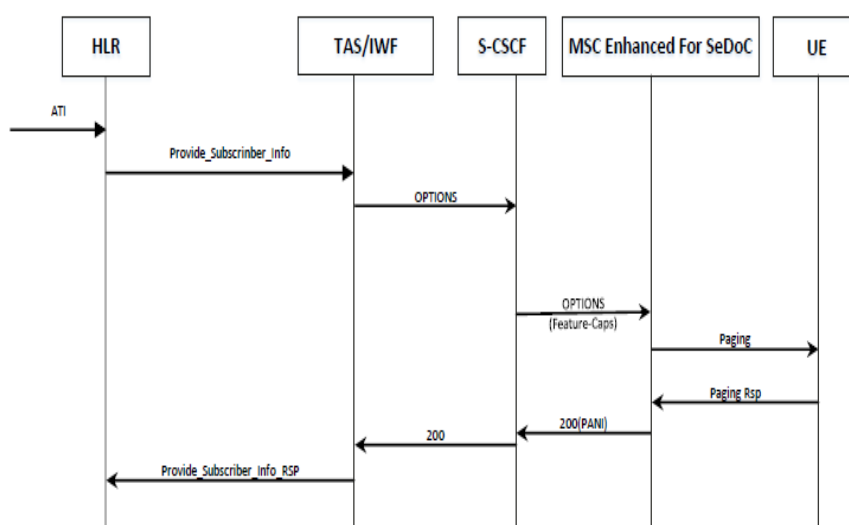


Figure 13 - Potential implementation of Provide Subscriber Information

- No services that rely on providing location information as per 3GPP TS 23.271[7] can be used
 - Section H.2.2.1.10 of 3GPP TS 23.292[9] describes the handling of location information but it is not clear in which SIP (Session Initiation Protocol) message to send the cell-id. In general, SIP message interaction between IMS and MSC enhanced for SeDoC is not defined for location services. Neither is the intent to move Lg interface to IMS clearly reflected. A possible implementation of location procedure is shown below but it cannot be established as formally 3GPP TS 23.292 compliant.

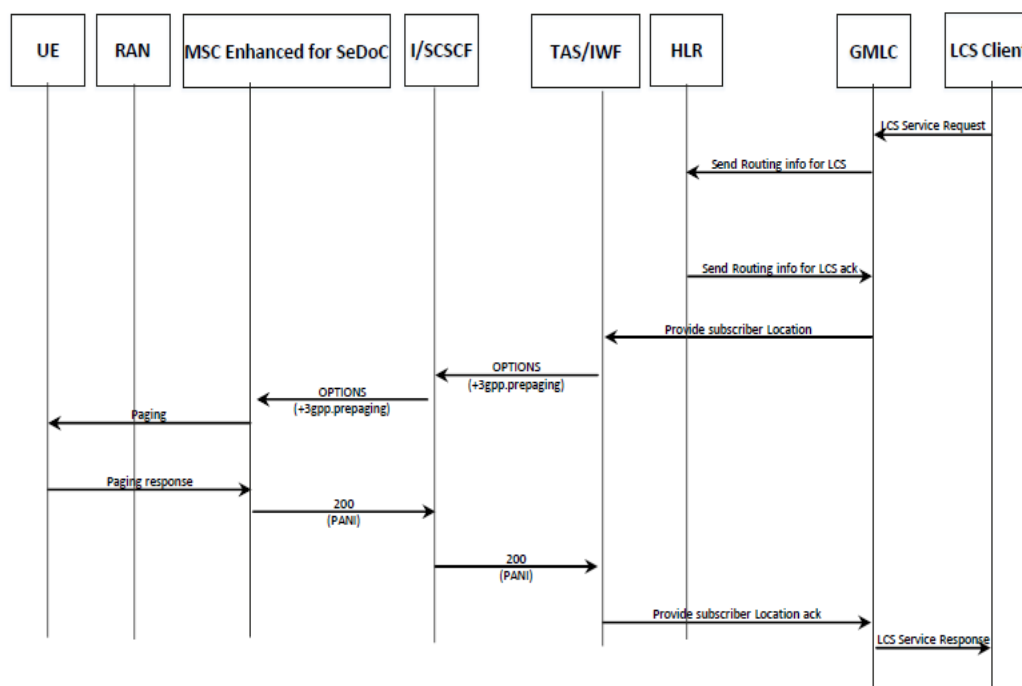


Figure 14 – Potential implementation of location service

4.2 Non-Functional Aspects of CS Use Cases

All CS services non-functional behaviours are supported in a standardized manner with the following exceptions:

- Pre-page is not supported use as per 3GPP TS 23.018[2]
 - Pre-page in GSM/UMTS (Global System for Mobile Communications/Universal Mobile Telecommunications Service) networks refers to the case in where the called UE is paged during a SRI/PRN (Subscriber Remote Interface/ Periodic Ring Notification) procedure, i.e. MSC/VLR returns PRN to GMSC after UE has responded to the paging message
 - CS networks use pre-paging as the means to optimize the resource utilisation. In this case the path through the network will be set even when it is not necessary because the MS (Mobile Station) might be out of coverage.
- Mobile Terminating Roaming Forwarding (MTRF) as per 3GPP TS 23.018[2] is not defined for MSC enhanced for SeDoC
 - MTRF is a technique used in CSFB to reduce the delay that may take place during the fall back
 - MTRF is not needed. CS retry defined in 3GPP TS 23.018[2] delivers the same functionality.

4.3 Unspecified CS Access Security Support

UMTS uses AKA-protocol as specified in 3GPP TS 33.102[19] and the same concepts/principles are reused for the IP Multimedia Core Network Subsystem. IMS AKA. SeDoC authentication mechanism fully complies with UMTS AKA as specified in 3GPP TS 33.102[19] and IMS AKA as specified in 3GPP TS 33.203[17], which converts UMTS authentication vector (RAND, XRES, CK, IK and AUTN) to an IMS authentication vector. Regardless of whether the UE accesses are via 2G or 3G, it fully complies with the Iu/A authentication mechanisms, and has no new requirements for UE and USIM. Combined CS Access Authentication and IMS Registration Procedure for non-roaming UEs is specified in Annex G of 3GPP TS 23.292[9]. Authentication/Registration for Inbound roaming support to networks configured to use CS roaming interfaces is specified in section H.5.3.2.1 of 3GPP TS 23.292[9]. There is no 3GPP stage 3 for the authentication procedure.

NOTE: As specified in section H.5.2.3.1 of 3GPP TS 23.292[9], SeDoC does not support 2G authentication

4.4 Conclusion on SeDoC CS Service Features

- All CS services can be supported using SeDoC, but not all can be supported in a fully standardized manner as described in section 4 of this document.
- Full support is possible for the following:
 - Legacy CS access services excluding USSD and home zone differentiated billing
 - eCall
 - Legacy CS Inbound and outbound roaming excluding USSD roaming
 - Emergency call
- All other non-functional aspects are supported with the exception of pre-paging

5 SeDoC Specific – Non CS Access Related Aspects

The previous section addressed legacy CS use cases. In this section other SeDoC related aspects are referred.

5.1 SeDoC Roaming Model Support

The SeDoC to SeDoC roaming model as described in 3GPP TS 23.292 Figure H.5.3.1.1-1 is considered deprecated from the GSMA point of view as it would require IMS roaming interfaces.

6 Conclusions

- All CS services can be supported using SeDoC, i.e. controlled by IMS, with the exceptions of the ones listed in section 4 of this document. The existing standard has left some gaps both due to omissions (i.e. pre-page) and through incompleteness (i.e. MT SMS call flow, location). This could bring uncertainty.
- For operators not deploying the underspecified services listed in section 4 of this document, SeDoC is an option for consideration.
- There is no 3GPP stage 3 for SeDoC authentication.

Annex A 3GPP SeDoC Standardisation Status

The current standardisation status of SeDoC is summarized in the tables below. First, the end user services are summarized, following with the roaming, architecture and the basic functions. Table 1 summarizes the standardisation status for the end user service,s and it shows that there are five (5) services that require further standardisation to enable the full validation of a standard compliance.

Function	3GPP Standard		
	Chapter	Description	Status
MO call	23.292[9] 7.3.2.1.2 Origination using I2 reference point	ICS	Normative
MT call	23.292[9] 7.4.2.1.2 Termination using I2 reference point	ICS	Normative
Emergency call	23.292[9] 5 Architecture model and reference points 23.292[9] 7.3.2.3 CS Emergency call interworking with IMS 23.167 6.2.11 MSC Server enhanced with ICS	SeDoc: renew 23.292[9] 、 23.167	Normative
MO SMS	23.292[9] H.4.4 SMS-MO for own users not roaming	SeDoc : move to IMS, IMS SMSoIP	Informative
MT SMS	23.292[9] H.2.2.1.5 Call Control procedures	SeDoC: not fully specified like MO SMS in section H.4.4. Only mention that Call Control procedures from should mapped towards IMS interface, for SMS-MT	Informative, supported but not complete to formally verify compliance because call flow is missing.
MT USSD	H.2.2.1.6 Supplementary Services Management	SeDoC: lack of supplementary service invocation for MT USSD	Not Defined. Requires further standardization.
MO USSD	H.2.2.1.6 Supplementary Services Management	SeDoC: lack of supplementary service invocation for MO USSD	Not Defined. Requires further standardization

Supplementary Service Configuration	29.292 5.7 Supplementary Service Configuration	ICS: move to IMS, use I3 interface	Normative
Call forward	29.292 5.6 Supplementary Services invocation	ICS: move to IMS	Normative
Number display	29.292 5.6 Supplementary Services invocation	ICS: move to IMS	Normative
Call Hold	29.292 5.6 Supplementary Services invocation	ICS: move to IMS	Normative
Call Wait	29.292 5.6 Supplementary Services invocation	ICS: move to IMS	Normative
Supplementary Services operation	29.292 5.6 Supplementary Services invocation	ICS: move to IMS	Normative
ECT	29.292 5.6 Supplementary Services invocation	ICS: move to IMS	Normative
Fax/Data	23.292[9] H.2.2.1.11 CS Data support	SeDoc: move to IMS	Informative
Location Services	H.2.2.1.10 Location	ICS: move to IMS . General handling of location information addressed but it is not clear in which SIP message to send the cell-id. Neither the interaction between IMS and MSC enhanced for SeDoC is not defined for location services. The intent is to move Lg interface to IMS but that is also not addressed.	Informative. Requires further standardization.

Check IMEI	Not defined	Not defined but check IMEI should be moved to IMS and this require to change MAP interface (MSC-EIR) to Diameter (CSCF-EIR).	Not defined. Requires further standardization
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Table 1– SeDoC Standardisation Status For The End User Services

Table 2 summarizes the standardisation status for the roaming functionality.

Function	3GPP Standard		
	Chapter	Description	Standardized?
Inbound-roaming support	23.292[9] H.5.2 Inbound-roaming support	SeDoc : ICS-IWF handles	Informative
Outbound-roaming support	23.292[9] H.5.3 Outbound-roaming support	SeDoc : support outbound roamer	Informative
CAMEL Roaming Support	23.292[9] H.5.2.1 Roaming Architecture with legacy home network	SeDoC : support for CAMEL roaming	Informative

Table 2 - SeDoC Standardisation Status Roaming Services

Table 3 summarizes the standardisation status for the overall architecture and the basic procedures. There are two (2) procedures that require further standardisation to enable the full validation of a standard compliance.

Function		3GPP Standard		
		Chapter	Description	Status
Network entity	New ICS-IWF entity	23.292[9] H.2.1 Reference architecture	SeDo : New entity to handle inbound roamer defined	Informative
	Remove VLR	23.292[9] H.2.1 Reference architecture	SeDoc : remove VLR, store in IMS-HSS	Informative
Basic Procedures	Authentication	23.292[9] G.2 Procedure for registration utilizing IMS Authorization	SeDoc : utilizing IMS Authorization	Normative*)

MTRF	Not defined	Not defined	Not needed.
Pre-paging	Not defined	Not defined	Not defined. Requires further standardization
Provide Subscriber Information	Not defined	Not defined	Not defined. Requires further standardization
CAMEL	23.292[9] 5.3.3 - MSC Server enhancements for ICS 23.292[9] H1 states "service logic execution in IMS only"	3GPP TS 22.078 Annex B applies. 3GPP TS 23.278 describes the architecture for IM CN interworking	Normative

Table 3 - Standardisation Status for SeDoC Standardisation Status for Architecture and Basic Procedures

NOTE: Only stage 2 of the Combined CS Access Authentication and IMS Registration Procedure has been specified.

Annex B Document Management

B.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
1.0	11 Nov 2020	Initial version	TG	Walter Zielinski (Huawei)

Other Information

Type	Description
Document Owner	Networks / Packet
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