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*Technical Report*

## **3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Study on IMS Centralized Services (ICS) requirements (Release 8)**



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Keywords

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# Contents

Foreword .....	4
1 Scope .....	5
2 References.....	5
3 Definitions, symbols and abbreviations .....	5
3.1 Definitions .....	5
3.3 Abbreviations .....	5
4 Background information .....	6
5 Basis for requirements .....	7
5.1 User perspective.....	7
5.2 Service provider perspective .....	7
5.3 Access network scenarios .....	7
6 Service requirements .....	8
6.1 General .....	8
6.2 UE support.....	9
6.3 Roaming support.....	9
6.4 Service consistency.....	9
6.5 Service continuity .....	10
6.6 Emergency call.....	10
6.7 Priority service .....	10
6.8 IMS services .....	10
6.9 Infrastructure impacts .....	10
7 Conclusions .....	10
<b>Annex A: Change history .....</b>	<b>12</b>

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## Foreword

This Technical Report has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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- z the third digit is incremented when editorial only changes have been incorporated in the document.

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# 1 Scope

The present document provides a study of the service experience and suggested service requirements for IP Multimedia System (IMS) Centralized Services (ICS). ICS enables the delivery of IMS based services to users regardless of the attached access network type; e.g. CS domain access or IP Based Access Networks. Service continuity between access networks is also considered. User and service provider perspectives are considered along with service scenarios as the basis for identifying service requirements. Based on the previous considerations, service requirements are identified and conclusions are drawn.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.101: "Service principles".
- [3] 3GPP TS 22.173: "IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services; Stage 1".
- [4] 3GPP TS 24.173: "IMS Multimedia telephony service and supplementary services; Stage 3".
- [5] 3GPP TS 22.030: "Man-Machine Interface (MMI) of the User Equipment (UE)".

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# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**IMS Centralized Services:** the provision of communication services wherein services and service control are based on IMS mechanisms and enablers, and support is provided for a diversity of access networks (including circuit switched and IP based, wireless and wireline), and for service continuity between access networks.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

ICS	IMS Centralized Services
VCC	Voice Call Continuity

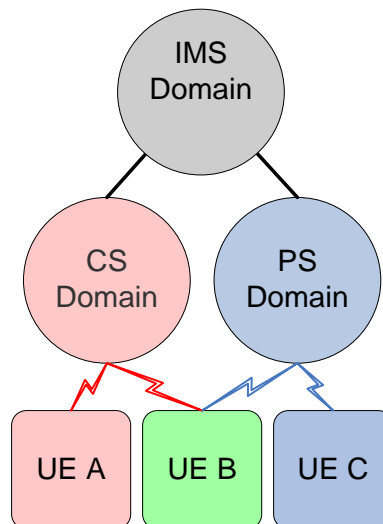
## 4 Background information

It has been recognized that the direction of the industry is towards IMS, and a need exists for the consistent provision of services across a diversity of access networks. Additionally, the ability to deploy all services from a single consolidated core network is attractive to service providers. Therefore to address these considerations, specification of IMS Centralized Services (ICS) is under consideration. With this approach services and service control are based on IMS mechanisms and enablers within the IMS.

IMS Centralized Services is an approach to the provision of communication services wherein services and service control are based on IMS mechanisms and enablers, and support is provided for a diversity of access networks (including circuit switched and IP based, wireless and wireline). Service continuity between domains (CS, PS) is also provided.

In this context service consistency means that the subscriber's service experience is the same regardless of the domain (CS, PS). Service continuity means that the subscriber's services are maintained seamlessly and transparently when transitioning across domains while in an active session. ICS enables service consistency and service continuity. Service continuity availability depends on the capability of the UE.

A high level conceptual overview of ICS is provided in the following figure.



**Figure 1. IMS Centralized Services Concept**

Key attractions for enabling IMS Centralized Services include the ability to provide a consistent user experience regardless of the domain (CS, PS), and consistency with the industry trend to shift to IP based services. Additionally, a major attraction for service providers is the possibility for reducing core network complexity, maintenance and operation by offering all services from a single consolidated core network.

The key issue for ICS is how IMS-based services are enabled over the CS infrastructure.

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## 5 Basis for requirements

While identifying requirements for IMS Centralized Services it is useful to consider the user's perspective, the service provider's perspective, and service scenarios.

### 5.1 User perspective

From the User's perspective, IMS Centralized Services provides an enhanced, more ubiquitous user experience from a single UE than otherwise provided. Connectivity is provided over a greater diversity of access networks than previously available, the service set available behaves consistently and can grow with the evolution of IMS. Services may be constrained due to the limitations of the differing access networks used however. Additionally, the provision of service continuity between networks is appealing to subscribers.

### 5.2 Service provider perspective

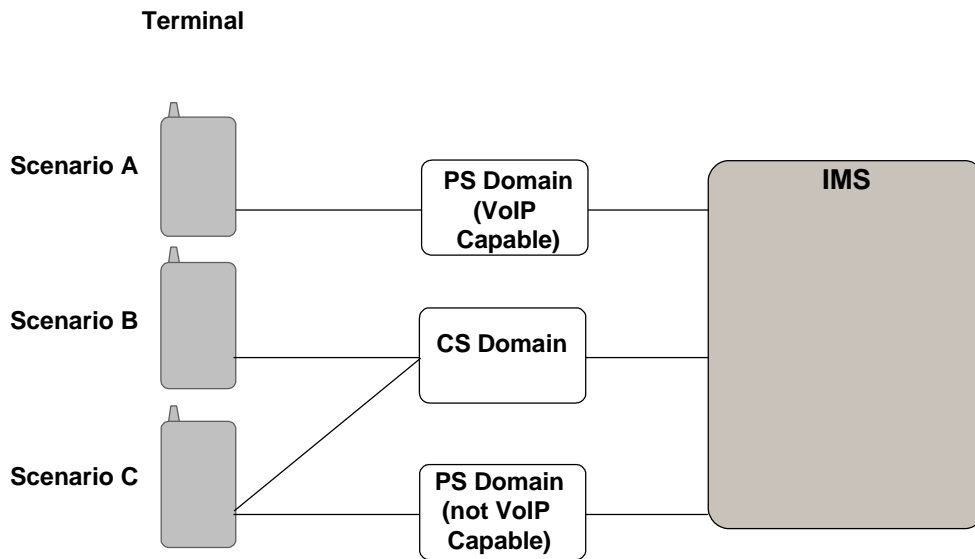
Service providers may find IMS Centralized Services attractive because this approach is consistent with the direction of the industry to move towards IP based services. Service providers deploying IMS Centralized Services may be viewed as IMS service providers. Their core networks are therefore IMS oriented (e.g. not CS oriented). With this focus, service providers would prioritize approaches that optimize IMS core network performance and common IMS service architecture consistency. From the perspective of Service Providers, ICS users are IMS subscribers. The services provided are therefore IMS services, and IMS Centralized Services is essentially viewed as enabling the provision of IMS services to subscribers in the CS domain.

Additionally, a key attraction of ICS for service providers is that it supports the development of a single consolidated core network with one service environment rather than several service environments. Requirements considerations from this perspective include consideration of infrastructure impacts (e.g. minimal impacts to the existing CS and IMS infrastructure).

### 5.3 Access network scenarios

IMS Centralized Services will be supported across different types of UEs attached through different types of access networks. UEs may or may not be VCC capable.

An overview of UE/ Access Network scenarios is provided in the following figure.



**Figure 2. Access Network Scenarios**

Scenario A: The network is an IP CAN capable of transporting bi-directional speech media. Here both media transport and session control signalling is carried over the IP CAN. In this scenario IP based services are being provided over a fully supportive IP capable network. For IMS centralized services there are no issues associated with enabling ICS under this scenario, and thus it is not further elaborated upon within the scope of this study.

Scenario B: The UE is served through the CS domain. In this scenario, both the media transport and session control signalling is carried through the CS domain.

Scenario C: Both CS domain and a non bi-directional speech media capable IP CAN are available in the network: Here media transport is carried through the CS domain and session and media control signalling is carried over CS domain or over the non bi-directional speech media capable IP CAN. Note that PS domain may be VoIP capable in this scenario as well.

In addition to considering the provision of IMS Centralized Services across different access networks, service continuity between domains is also considered.

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## 6 Service requirements

### 6.1 General

IMS Centralized Services brings value to service providers by providing a consolidated core network (reducing CAPEX and OPEX costs), and to subscribers by providing a consistent service experience.

To achieve these objectives, the core network enabling mechanisms for the provision of services should be consistently applied for subscribers regardless of domain type. Additionally, impacts to the core network should be minimal.

It is considered that:

- ICS users are IMS subscribers.



- The ICS user shall receive both registered and unregistered services in a consistent manner when the user is accessing IMS regardless of CS or PS domain.

- IMS mechanisms, including service enabling mechanisms and mechanisms for differentiating registered and unregistered services, shall be consistently applied regardless of CS or PS domain.

Note: the requirements for consistent usage of core network enabling mechanisms and minimal core network impacts may be at odds with one another. For example, if applying SIP IMS Registration methods for subscribers using CS domain is too complex, then it may be warranted to pursue alternative methods of providing similar or less functionality. Tradeoffs between complexity and functionality may need to be considered. The inclusion of these requirements in the requirements study should not be interpreted as constraints in studying possible architectural solutions.

The system shall be capable to provide ICS to the UE when it uses CS domain for both media transport and session signalling (i.e. scenario B).

The system shall be capable to provide ICS to the UE when it uses PS domain for session signalling and CS domain for media transport and session signalling (i.e. scenario C).

## 6.2 UE support

Support of UEs enhanced with ICS capability as well as UEs without ICS capability shall be possible. In the CS domain the UEs should be able to continue to use the minimum set of services in a consistent manner.

Note: The minimum set of services is ffs.

Example 1: A 2G UE which is within the coverage of a GSM network should be able to use voice telephony which is consistent to TS11 and to use supplementary service invocation codes [5] to administrate its supplementary services.

Example 2: A 3G UE with IMS client, UTRAN and GERAN CS and PS capabilities in CS domain will also only be able to use voice telephony and supplementary service invocation codes [5] for administration of supplementary services. It is not expected that this UE can use IMS features like HTTP administration of services in the absence of a PS access. This may result in the case that some IMS service settings which are not defined for CS can not be changed when attached to a CS only, but this has no impact on the user experience as these service features are not available in the CS. If GPRS is available some IMS features may be available.

## 6.3 Roaming support

An ICS user shall receive full ICS support from the HPLMN while roaming in the VPLMN, subject to the constraints of the VPLMN (e.g. roaming agreements, operator policies).

The home operator shall be able to control if the UE shall act as an UE enhanced with ICS capability or without ICS capability while roaming.

If the roaming partner does not or cannot support ICS (due to architectural or technical limitations or commercial reasons), then any ICS service offering may be limited or may not be possible to those roaming subscribers. The decision on services to be provided shall be made during the initial network attach to CS domain in the VPLMN, e.g. by exchanging network capability between VPLMN and HPLMN in a backward compatible manner. In such cases, either

- a) The subscriber does not receive IMS Centralized services. The roaming subscriber shall be able to originate and terminate basic services e.g. bi-directional speech calls.
- b) The subscriber receives a subset of IMS Centralized services.
- c) The subscriber is rejected from roaming in those networks.

## 6.4 Service consistency

ICS shall be available from any access network, domain and UE. A reduced set of services may be offered subject to constraints of the UE, access network and domain.

Emergency calls and priority services (if provided by the operator) shall be provided in a consistent manner regardless of domain

Subscribers shall have a consistent user experience regardless of the domain used, subject to the constraints of the UE and access network.

## 6.5 Service continuity

ICS shall support service continuity between different 3GPP access networks, subject to the constraints of the UE and access networks.

The service continuity shall include:

- Basic services
- Non mid call services
- Mid call services

## 6.6 Emergency call

IMS Centralized Services includes providing subscribers with seamless transparent bi-directional speech service across access networks. Subscriber's expectations for emergency call support will be the same as for bi-directional speech, so emergency call support needs to be provided under the same conditions as bi-directional speech. Therefore it is required that support for emergency call for ICS users is provided.

## 6.7 Priority service

Global wide disasters (e.g. hurricanes, tsunamis, earthquakes, floods, etc.) have heightened awareness of the importance of the need for availability of Priority communication services. Support for Priority Service for ICS users is required.

## 6.8 IMS services

ICS users receive IMS Services. IMS service control is always performed by the home IMS network except for emergency calls. However the services themselves may be provided by the home IMS network, the visited IMS network or a 3rd party provider.

The set of IMS services supported by ICS should include at least the following, subject to the constraints of the UE and access networks:

- IMS Multimedia Telephony services and supplementary services defined within [3] and [4].

Note: Other IMS hosted services supported by an operator or 3rd party may be supported.

## 6.9 Infrastructure impacts

IMS Centralized Services should have minimal impacts to the existing CS and IMS infrastructure.

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# 7 Conclusions

New requirements for the 3GPP system on IMS Centralised Services have been identified in Clause 6 of this Technical Report. It is therefore recommended that the content of this clause is used as a basis for introducing ICS requirements into the 3GPP Technical Specifications in Rel-8. Additionally, the content of other clauses may be considered within specification work for ICS as appropriate.

This report recommends that the ICS related requirements are captured in a single place. A new chapter in TS 22.101 entitled IMS Centralized Services can be one alternative.



## Annex A: Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2007-03					WID approved at SA#35 in SP-070239; this is the initial draft skeleton TR.	none	0.0.0
2007-04					SA1#36 Results: Version 0.1.0 produced from S1-070373, S1-070431, S1-070728, S1-070730, S1-070731, S1-070732	0.0.0	0.1.0
					The reference to 22.030 was added to chapter 3 and section 6 was renumbered on the header 2 level	0.1.0	0.1.1
					Agreed to be sent to SA#36 for information at SA1#36	0.1.1	1.0.0
2007-06					Additional agreements captured	1.0.0	1.1.0
2007-08					SA1#37bis: Changes agreed in S1-071161, S1-071199 and S1-071267 incorporated.	1.1.0	1.2.0
2008-01					SA1#39: Changes agreed in S1-080073 and incorporated.	1.2.0	1.3.0
					Agreed to be sent to SA#3 for approval at SA1#39	1.3.0	2.0.0
2008-03					Raised to v.8.0.0 by MCC following SA#39 approval	2.0.0	8.0.0