white paper

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Next-generation intelligent networks: migrating to IMS

Safeguarding investments in value-added services when moving from circuit-switched networks to all-IP and IMS. How operators can integrate existing value-added services in the evolving IMS network.

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TAKING YOU FORWARD

Introduction

Many telecommunication operators find themselves in a transition phase. They will migrate circuit-switched (CS) networks to the IP Multimedia Subsystem (IMS), a process that could span several years. Many of these operators have also invested large sums in developing (either in-house or in collaboration with third parties) and deploying value-added services (VAS) in circuit-switched networks.

A vital factor influencing the uptake of IMS as the preferred core network for voice and multimedia communications is the extent to which the migration process can safeguard past investments in VAS. This paper describes an approach and strategy for safeguarding these investments, and how operators can, over time, migrate VAS in the circuit-switched network to IMS.

The paper begins with a brief introduction to VAS and a description of the same in the IMS network. It then presents solutions for migrating VAS in CS networks to IMS.

Value-added services

The term value-added services describes a technique which encompasses a set of protocols and supporting architecture that telecommunication network operators employ to offer customized end-user services. In the context of CS networks, VAS are frequently referred to as the intelligent network (IN). To end-users, VAS represent a user experience that goes beyond standard network services.

VAS give operators a means of differentiating themselves from one another. A rich portfolio of VAS helps them to attract new subscribers and to reduce churn. In addition, the time that operators need to develop, test and deploy VAS is typically much shorter than for standardized network services.

The VAS concept started to take off around 1990. A strong driver of the concept was the standardization (in ITU, ETSI and 3GPP) of underlying architecture and protocols. Today, VAS are employed worldwide. Operators have invested large sums to deploy execution platforms and to develop the service logic that runs on them. They have also invested heavily in billing and (real-time) charging systems. In addition, they have invested in the development of business support systems. These are composed of customer administration systems, user self-care systems and enterprise data systems, which contain, among other things, private numbering plans and user policies (for example, outgoing call screening).

A question that operators pose as they prepare to migrate their networks to all-IP and IMS in order to offer multimedia communication is *how can I safeguard my past and future investments?*

Other factors that influence the migration of VAS include

- continuously improving support for telecom-grade characteristics by off-the-shelf IT industry platforms and middleware;
- the need for openness; and
- the need to reduce total cost of ownership (TCO).

Example of a value-added service

CALL DIVERSION ON BUSY is one example of a VAS. On FORWARD ON BUSY, a standard network service forwards incoming calls to a predefined (user-configured) number. But when CALL DIVERSION ON BUSY is offered as a VAS, FORWARD ON BUSY may adapt the number to which calls are forwarded according to time of the day, subscriber location, or both.

Another factor that influences the evolution of VAS is that the access, core and service networks (including associated platforms) evolve in different phases and at different rates. Accordingly, an operator's migration strategy is unique and dependent on the installed base as well as on plans for introducing IMS. In other words, there is no one uniform strategy.

VAS in IMS and the evolution of legacy value-added services toward all-IP and IMS are generally termed the next-generation intelligent network (NG-IN). NG-IN embodies the service environment in next-generation networks. It is this service environment that makes it possible to control

- calls in circuit-switched networks (such as GSM and PSTN/ISDN); and
- calls and sessions in packet-switched networks (such as IMS).

NG-IN also helps operators to safeguard investments made in legacy VAS.

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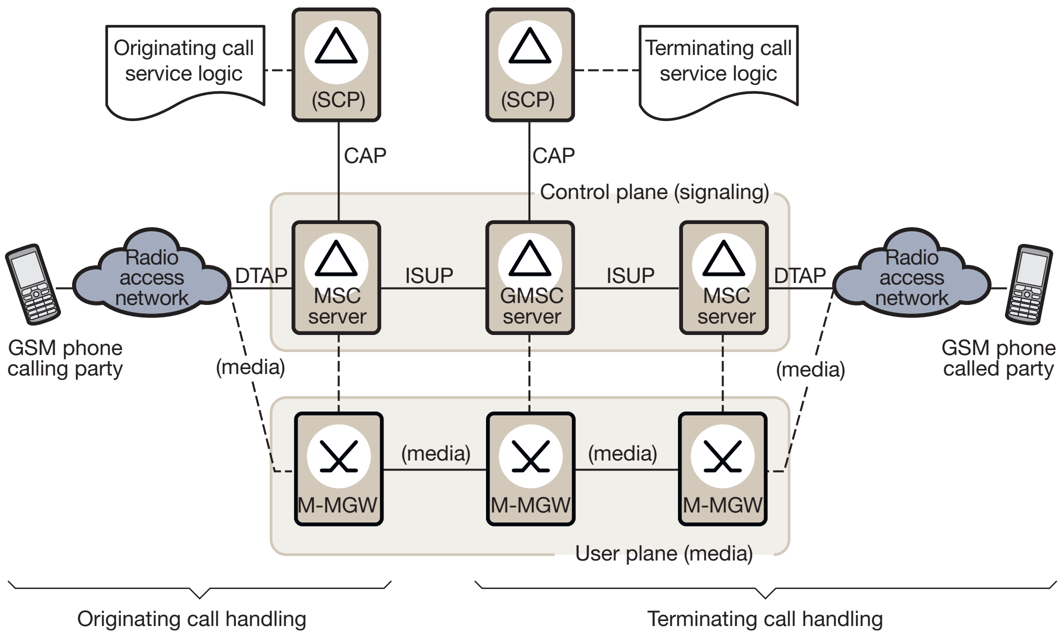
Value-added services in GSM/ UMTS networks

Operators realize VAS in GSM/UMTS networks by deploying service logic on a service execution platform (usually referred to as a service control point, SCP). The execution or function of VAS is similar in GSM and UMTS networks. Figure 1 shows the generic architecture for deploying VAS in a GSM network. The concept and principles for VAS apply in both wireline (PSTN) and mobile (GSM/ UMTS) networks. The primary focus of this white paper is on VAS in mobile networks.

Among other things, the SCP interacts with a mobile services switching center (MSC) or gateway MSC (GMSC) in the GSM core network. The interface between the MSC/ GMSC and SCP is formed by the CAP protocol.

> **CAP**
> CAP is short for CAMEL application part. Its predecessor was the IN application part capability set 1 (INAP CS1). CAMEL, which is short for Customized applications for mobile network-enhanced logic, is the IN standard for GSM networks.



Legend:

CAP	*CAMEL application part*
DTAP	*direct transfer application part*
GMSC	*Gateway MSC*
ISUP	*ISDN user part*
MGW	*Media Gateway*
M-MGW	*Mobile Media Gateway*
MSC	*mobile services switching center*

Figure 1: Generic architecture for value-added services in a GSM network

Value-added services in IMS networks

IMS uses the session initiation protocol (SIP) to control the establishment of voice and multimedia sessions. SIP runs end-to-end; that is, it originates from and terminates in end-users' terminals. Accordingly, it is carried over the access network (for IMS, this may be 3G or 4G, WLAN, or any type of fixed access). IMS realizes VAS using a SIP application server (SIP-AS), possibly augmented by logic on the terminal equipment. The ensuing discourse focuses primarily on the network side of VAS.

The role of the SIP-AS in IMS is similar to that of the SCP in the GSM domain. It is logically connected to the

- Serving CSCF (S-CSCF);
- Interrogating CSCF (I-CSCF);
- Multimedia resource control function (MRF); and
- Home subscriber system (HSS).

The SIP-AS is a service execution platform on which several services may be deployed. Its connection with the MRF is used to control user interaction, such as playing call progress announcements. Similarly, its connection with the HSS is used for storing and retrieving static or dynamic subscriber data. Figure 2 shows the generic architecture for value-added services in IMS. As standardized for the IMS network, individual entities are connected through reference points. Figure 2 also depicts an application server for basic telephony (multimedia telephony, MMTel) in IMS.

Session initiation protocol

The session initiation protocol (SIP) was defined by the Internet Engineering Task Force (IETF) and has been adopted by the Third Generation Partnership Project (3GPP) for IMS. It is a signaling protocol, widely used for setting up and tearing down multimedia communication sessions, such as voice and video calls over the internet. Other feasible examples of applications include video conferencing, streaming multimedia distribution, instant messaging, presence information, and online games.

The protocol can be used for creating, modifying and terminating two-party (unicast) or multiparty (multicast) sessions that consist of one or more media streams. The modification can, among other things, involve changing addresses or ports, inviting more participants, and adding or deleting media streams.

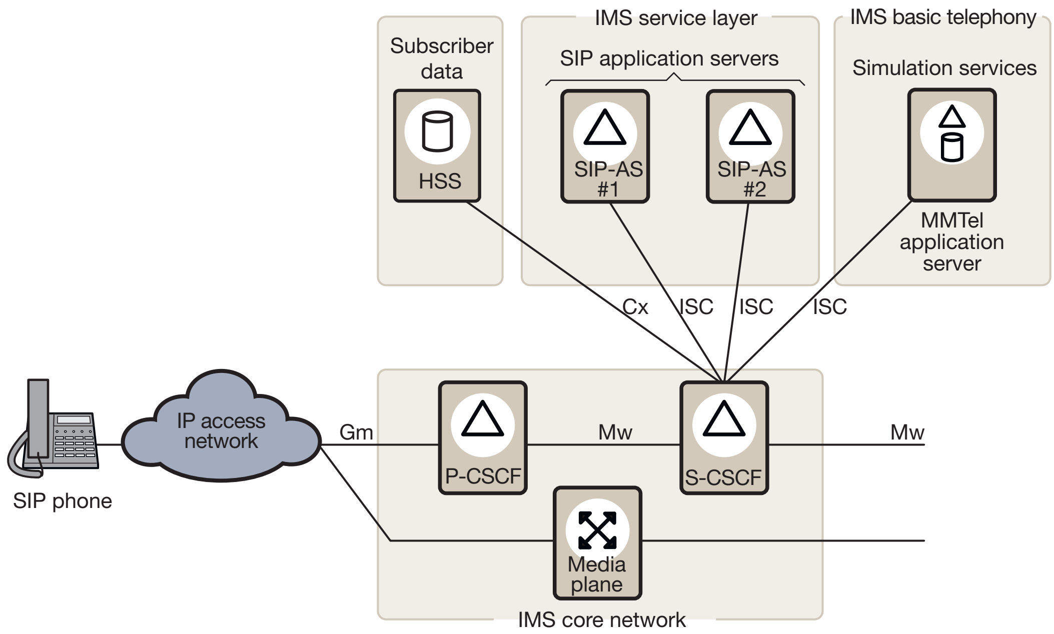
SIP is an IP-based application layer protocol. Within the OSI model, it is placed in the session layer (layer 5). SIP has been designed to be independent of the underlying transport layer; it can run on TCP, UDP, or SCTP.

IMS

The IP Multimedia Subsystem (IMS) is an architectural framework for delivering IP multimedia services. It was originally designed by the 3GPP as a part of the vision for evolving mobile networks beyond GSM. Its original formulation represented an approach to delivering internet services over GPRS. This vision was later updated by 3GPP, 3GPP2 and TISPAN.

To ease the integration with the internet, IMS uses IETF protocols wherever possible (for example, SIP). The 3GPP states that IMS is not intended to standardize applications but rather it helps wireless and wireline terminals to access multimedia and voice applications – that is, it creates a form of fixed mobile convergence (FMC) by means of a horizontal control layer that isolates the access network from the service layer. From a logical architecture perspective, services need not have their own control functions, because the control layer is a common horizontal layer.

For additional information about IMS, please also read *Introduction to IMS* (Ericsson white paper, March 2007), and *Services in the IMS Ecosystem* (Ericsson white paper, February 2007).



Legend

AS	*application server*
Cx	*reference point between CSCF and HSS*
Gm	*reference point between SIP User agent (terminal) and P-CSCF*
HSS	*Home Subscriber System*
ISC	*IMS service control interface*
Mw	*reference point between CSCF and CSCF*
SIP-AS	*SIP application server*

Figure 2: SIP-AS in the IMS network

When a subscriber registers with the network, the S-CSCF fetches persistent subscriber data from the HSS (Figure 2). One element of this data is called initial filter criteria (IFC). The S-CSCF uses IFC to invoke VAS. IFC specifies the conditions for invoking VAS for calls to or from a given subscriber. It also contains the address(es) or host names of SIP-AS(s) with VAS for said subscriber. The reference point between the S-CSCF and SIP AS is called the IMS service control interface (ISC). The ISC reference point carries the SIP signaling (as received over the Mw reference point) between S-CSCF and SIP-AS. The SIP signaling carried over this reference point is enhanced to ensure, for example, that SIP messages sent from S-CSCF to SIP-AS can be returned to the S-CSCF.

Call-related SIP signaling that is subject to control by a SIP-AS is routed through all the SIP-ASs that were invoked for a given session. The linking of the SIP-AS to the SIP session flow gives the SIP-AS full control over the SIP session. The session description protocol (SDP), which describes the media for a SIP session, is included in the transparent SIP signaling through the SIP AS.

This procedure differs from that used in GSM. In GSM, ISUP is not sent through the SCP (Figure 1). Therefore, the SCP can only control the circuit-switched call within the boundaries of the control that is exposed by the MSC/SSF through the CAP protocol.

VAS in IMS may control any type of session and non-session-related communication service in the IMS network, such as voice calls, video calls, messaging and chat sessions. A SIP-AS may thus influence how media is used and routed for a SIP communication session. VAS may be invoked for originating SIP sessions (initiated *by* a served IMS subscriber) and for terminating SIP sessions (destined *for* a served IMS subscriber).

Figure 2 indicates that multiple SIP-ASs may be invoked for a SIP session, depending on the contents of IFC. The IFC for a subscriber, for example, might stipulate that, for an originating call, the S-CSCF must first invoke a service in SIP AS #1, followed by a service in SIP AS #2. This method of sequentially invoking multiple SIP-ASs in a call is called IFC chaining. GSM employs a similar but restricted mechanism to invoke multiple services during a call.

In PSTN and GSM, the core network executes *basic services* (for example, voice calls) and *supplementary services* (such as CALL DIVERSION and CALL TRANSFER), which are separate from VAS.

GSM (as well as ISDN-based PSTN) has the following grouping of services: (1) basic services; (2) supplementary services; and (3) VAS. Basic services encompass *customer facing services* such as telephony. Examples of supplementary services include call forwarding and call transfer. Basic services and supplementary services are executed in the GSM/ISDN core network. VAS are executed by the service logic that resides in a service control point.

In IMS, multimedia telephony is a defined as an *IMS communication service*, which is comparable to a basic service in GSM. One has to deploy a SIP application server (SIP-AS) in order to augment the multimedia telephony communication service with supplementary services. This differs from the approach used in GSM, which executes standard supplementary services in the core network. In IMS, supplementary services are executed in an application server using standardized service logic.

VAS in IMS are also realized through an application server. The strict distinction between supplementary services and VAS does not exist in IMS. Instead, it is more meaningful to distinguish between standardized and non-standardized VAS.

Compared with GSM, the supplementary services in IMS give end-users richer control over how services are configured. This increased control is realized through a larger set of parameters that end-users may set to define the exact behavior of the service.

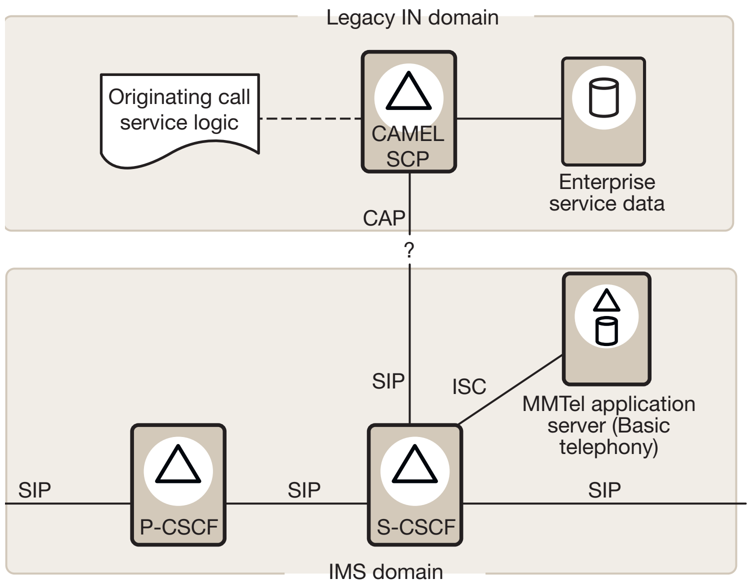
Value-added services in the evolving network

Over time, the core network will evolve to IMS and more and more subscribers will have IMS-capable terminals. Even so, the circuit-switched access network and circuit-switched terminals will remain operational for a long time. Against this background, one may ask *where should operators continue to use IN capabilities to control the circuit-switched network, and where should they use the IMS network and its integration with the service layer?*

Many operators who migrate from GSM to IMS will want to use legacy (GSM) VAS in the IMS network (these are often referred to as legacy IN). Figure 3 depicts some core questions; for example, *for which cases and how does one connect legacy IN services in the IMS network?*

As a follow-on to these questions, Figure 4 depicts how one gets legacy IN services to work in conjunction with a SIP-AS in the IMS network (for example, a SIP-AS that offers basic and supplementary telephony services).

The IMS core network uses SIP over the ISC reference point to SIP-AS, whereas legacy SCPs use CAP to the GSM core network. One should also bear in mind that legacy IN services might interact with other entities in the GSM network – for instance, a specialized resource function for playing announcements. Therefore, when operators migrate legacy value-added services to IMS, they must also apply this interaction in the IMS network.



Legend

CAP	*CAMEL application part*
CSCF	*Call Session Control Function*
IN	*intelligent networks*
P-CSCF	*proxy CSCF*
SCP	*service control point*
S-CSCF	*serving CSCF*
SIP	*Session Initiation Protocol*

Figure 3: Applying legacy IN in an IMS network

Multiservice invocation

One other issue to address is service interaction when multiple services are invoked. This will have a prominent role in IMS.

Introduction to service interaction and service adaptation

Multiservice invocation is a recurring requirement for VAS in GSM. The intelligent network standard mandates a single point of control to prevent different services from giving different and potentially conflicting instructions to the network. This means that not more than one IN service may, at any specific time, control a call in the GSM network. Put another way, the IN standard for GSM does not permit multiple IN services to control a call at the same time. Even so, operators do want to deploy multiple IN services in their networks (with multiple IN services working on one and the same call).

As a result, vendors often apply proprietary techniques for invoking multiple services. Usually, they create a “glue” service that combines the original services. In simple cases, they merely trigger the different services in a given sequence (service chaining). When using such glue logic, simple rules for assigning priority allow sufficient control. Some drawbacks of using proprietary methods is that they generally only work for one specific combination of services, they are vendor-specific, and they often require extensive system integration and testing.

The IMS network employs *IFC chaining* to distribute services via multiple SIP-ASs. However, IFC chaining does not offer a standardized way of coordinating the control of distributed service logic.

Operators who migrate from GSM to IMS and who want to deploy legacy IN in the IMS network must also address the issue of invoking multiple IN services. For instance, an operator might want to combine legacy IN service invocation with IMS VAS. Figure 4 shows an example architecture for multiservice invocation.

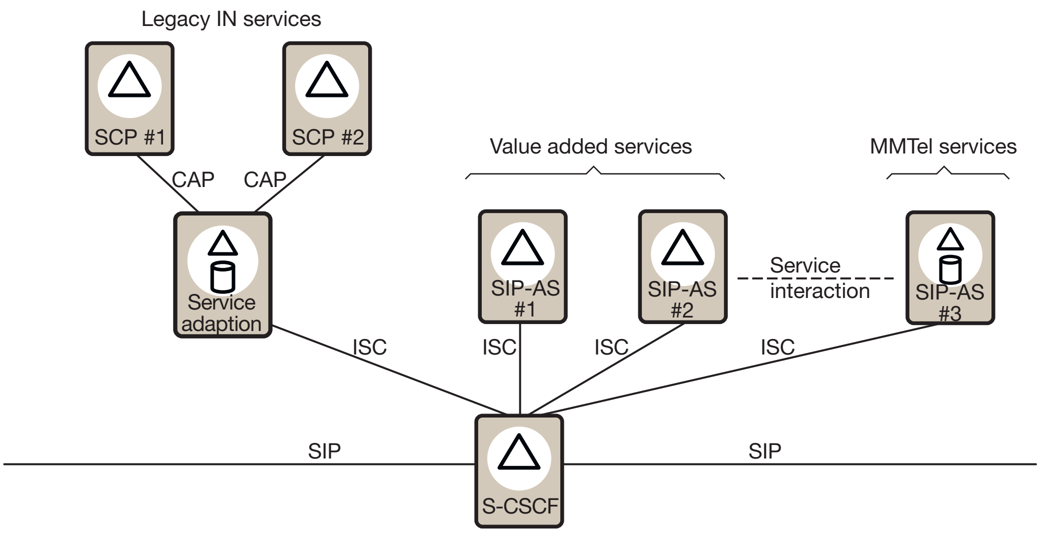


Figure 4: Multiservice invocation, combined GSM and IMS services

When an IMS service is composed of service logic that resides in multiple application servers (invoked for a single call or multimedia session), the *interaction* between the different sources of service logic can become crucial. This is because the service logic in different application servers might apply conflicting control to the session. Some kind of orchestration is thus needed to coordinate the service logic. In addition, operators must ensure that the IFC for a given subscriber is provided in the network to invoke the respective application servers in the correct order and under the correct conditions, depending on the type of call or multimedia session.

There are several reasons why multiservice invocation will have a prominent role in IMS. MMTel services and online charging, for example, are themselves invoked in much the same way as VAS (Figure 4). When a legacy IN service is applied in the IMS network, it will have to be combined with IMS services. There might even be some kind of mutual dependency between legacy IN services and the services in IMS. What is more, compared with IN, the total number of available services will be much higher in the IMS service environment. Also, the IMS environment might be more dynamic because available services can change more frequently.

In some situations, an interaction might arise when the basic MMTel functionality (that is, standardized supplementary telephony services) needs to be modified or extended with functionality in VAS. In some cases, when the VAS and the MMTel feature logic reside in different SIP-ASs, the interaction between the VAS and MMTel may be resolved by means of IFC chaining. In other cases, the MMTel functionality might query external VAS for instructions – for example, to obtain the destination of a call (depicted by a dashed line in Figure 4). This allows the VAS to supply MMTel service execution with subscriber-dependent parameters. One additional approach is to exchange service parameters embedded in the signaling that passes between VAS and standard MMTel.

Many initiatives have been proposed to help resolve the issues associated with multiservice invocation, service interaction, and protocol conversion. A common feature of the initiatives that address multiple triggering is that they use a service composition entity to limit the number of services invoked (triggers) from the core network. Two examples of service composition entities, TRIM and SCIM, follow.

TRIM

The trigger interaction manager (TRIM) is a logical entity that distributes a single trigger from the circuit-switched core network over multiple application servers. The functionality applied by TRIM is also referred to as *service brokering*. TRIM may be used, for instance, to combine a virtual private network (VPN) with a personal greeting service. Figure 5 shows the network architecture for TRIM deployment.

TRIM targets service distribution in circuit-switched networks. It contains the logic and potential subscriber data that identifies which IN services must be invoked for a given call. TRIM must be able to handle all kinds of service interactions: when invoked services give conflicting instructions, TRIM must either decide which instruction to forward to the GSM core network or take other action. TRIM is always solution-specific; knowledge about the services to be integrated is a prerequisite for implementing and configuring TRIM.

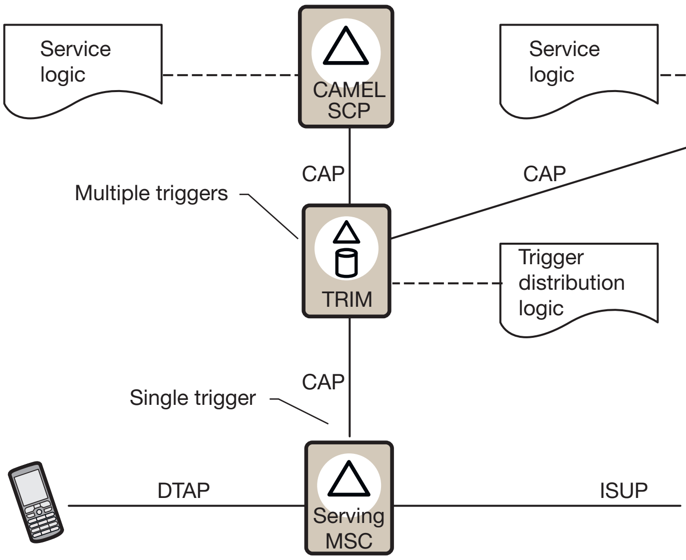


Figure 5: Trigger interaction manager

SCIM

The service capability interaction manager (SCIM) invokes multiple IMS services using a single trigger from the core network. Figure 6 shows how SCIM relates to the IMS network.

3GPP introduced SCIM as part of the Rel-5 version of the 3G network.[5] An entity in the IMS application layer, SCIM makes up an additional layer between the S-CSCF and application servers. One additional approach is to exchange service parameters embedded in the signaling that passes between VAS and standard MMTel via the ISC reference point. SCIM is sometimes also deployed as a stand-alone entity.

As mentioned above, it is anticipated that the IMS service environment will have a considerably larger number of available services compared with IN. It is also expected to be a much more dynamic environment because available services can change more frequently. In IMS, one can use IFC to coordinate rudimentary service interaction. But given the anticipated number of services and changes in services, this approach is complex, time-consuming, and expensive. A more flexible and less expensive approach is to employ a SCIM.

The 3GPP specification of the SCIM leaves the internal structure and details of implementation open. As a result, the range of solutions under this label is broad. Many commercial SCIM solutions include the ability to interact with legacy networks, implying that they go beyond the 3GPP definition of SCIM.

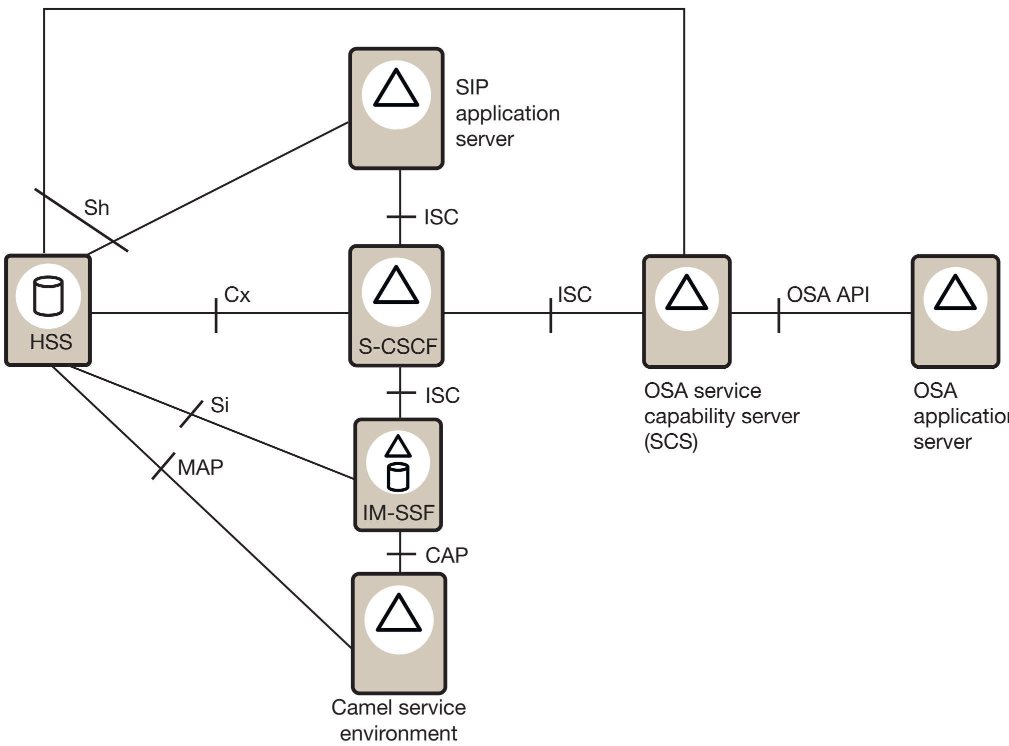


Figure 6: SCIM according to 3GPP (Source: 3GPP TS 23.002)

Applying legacy VAS in an IMS environment

The sections below describe how operators may apply legacy VAS in IMS. But first, a short introduction to IM-SSF.

IM-SSF

3GPP has specified the IMS service-switching function (IM-SSF) as part of Rel-5 of the 3G network. IM-SSF is a stand-alone adaptation entity between the IMS core network and legacy IN. Figure 7 shows its position in an IMS network.

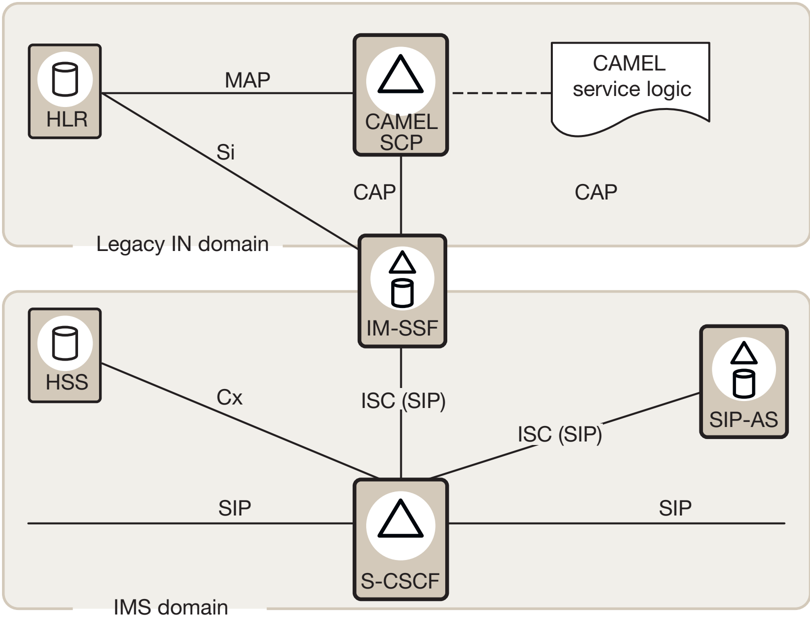
The IM-SSF serves as a SIP-AS to the IMS core network – that is, it uses IFC and ISC. Outgoing and incoming SIP sessions from an IMS subscriber who subscribes to legacy IN services are routed through IM-SSF using IFC. The subscriber profile in HSS contains the IFCs that relate to the IM-SSF; during registration these (IFCs) are sent to S-CSCF via the Cx reference point.

When an IMS subscriber registers with the S-CSCF, the IM-SSF obtains CAMEL subscription data from HLR. The IM-SSF is equipped with mobile application part (MAP) signaling capability; a designated reference point (Si) is used for obtaining the CAMEL trigger data from HLR. The IM-SSF translates SIP signaling from the S CSCF into CAP signaling to SCP. This way, SCP may run its regular IN service.

The IM-SSF handles all conversions between SIP and CAP, including protocol mapping and state model mapping (IMS MMTel state model <> ISUP basic call state model). Notwithstanding, a stand-alone IM-SSF built in compliance with the 3GPP specification is not a suitable solution for invoking legacy IN in an IMS network. This is because

- SIP and CAP differ too much, both in terms of signaling messages and state model. Consequently, the CAP between IM-SSF and SCP is rigorously restricted in functionality and much of the legacy IN service capability cannot be used through IM-SSF. The discrepancy between CAP and IMS relates specifically to user interaction, necessitating complex mapping logic in IM-SSF. Worse still, this mapping logic must be adapted to each existing VAS service.
- The CAP between IM-SSF and SCP is actually a subset of CAP to which new, IMS-specific parameters have been added. Deploying legacy IN in IMS through IM-SSF will thus require service logic adaptation, which defeats the purpose of IM-SSF.
- The service-triggering mechanism for IM-SSF requires that subscription data be obtained from HLR. However, IMS subscribers do not necessarily have subscription data in HLR. Operators must thus either apply a fake GSM subscription or some other non-standard method.
- IM-SSF does not allow services to evolve to use the IMS network and IMS terminal capabilities.

IM-SSF is formally defined as a stand-alone functional entity. This hampers interaction between the services that are invoked for IMS sessions. An IM-SSF may cater for (limited) protocol conversion, but it does not address service orchestration or service interaction. When invoking legacy IN in IMS network, the legacy IN must be combined with other (IMS) services. This is not supported by IM-SSF as formally specified. However, as is shown below, IM-SSF-like functionality may be applied for certain cases.



Legend

CAP	*CAMEL application part*
Cx	*Reference point between CSCF and HSS*
ISC	*IMS service control interface*
MAP	*Mobile application part*
Si	*Reference point between IM SSF and HLR*

Figure 7: IMS-SSF for deploying legacy IN in IMS network

An integrated solution for re-using existing VAS

Categorizing value-added services

VAS can be categorized according to the extent to which they are applicable in IMS.

In their existing form, Type I VAS do not apply in IMS – these are circuit-switched/GSM-specific. In general, Type I VAS handle routing in circuit-switched networks. For some IN services, a similar service requirement might exist in IMS, but the service will be built in a different manner without reusing the service logic or data from the existing service. Examples of Type I VAS include least-cost routing, carrier pre-select, and number portability.

Type II VAS have a use case that is applicable in IMS but they will not evolve into multimedia services. In general, they are voice-centric; for example, for charging purposes. In this case, there is potential to reuse data and existing VAS. Examples of Type II VAS include access screening and cashless calling.

Type III VAS are applicable in IMS and can be extended with multimedia functionality as well as other functionality offered by the IMS network. There is also some potential for reuse in IMS, although this potential is less pronounced than for Type II VAS because multimedia functionality is best developed in IMS. Examples of Type III VAS include freephone and premium rate, Centrex, and personalized ring-back tones.

Strategy for reusing VAS in IMS

As described above, only Type II and Type III VAS need to be considered for migration to IMS. In IMS, the logic that deals with the control of a circuit-switched session in an existing VAS is not applicable, but the data and business logic can be reused.

A suitable option for reusing Type II and Type III VAS in IMS is to create a front-end IMS session-logic application (Figure 8) that accesses VAS data, business logic, or both (instead of introducing a separate IM SSF node to connect legacy VAS to IMS via the call-control protocol). The SCP may be equipped with specific data-access interfaces that allow integration with business support systems (in Figure 8, this access is depicted by the arrow between the two service entities). The extent of reuse is dependent on the platform and technology in use. This strategy also applies and is easily implemented when the SCP and IMS-AS are implemented on the same platform and use the same technology. Scenarios that involve equipment from different vendors are considerably more challenging.

As described above, when the business logic and service data from IN services in the circuit-switched domain are reused in IMS, this reuse generally applies to comparable call cases. Accordingly, the business logic and service data may be extended to benefit from the rich call and session control capability that IMS offers.

As time progresses, more functionality (including both call/session control logic and business logic) can be added on the IMS side (in the front-end application and in the business logic respectively). However, if the business logic is reused in an IMS context, it might have to be updated, adapted, extended for, and exposed to, IMS. Therefore, one should also consider the option to redesign the service completely on IMS. The choice to reuse or redesign is a matter of cost and should take into consideration future costs and the benefits of working on a platform/environment that is adapted to IMS.

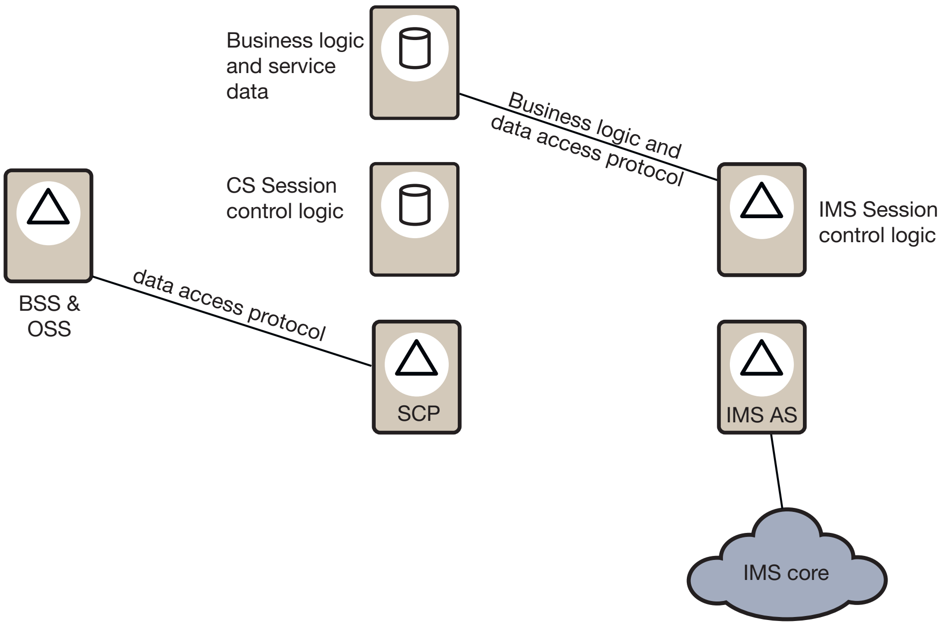


Figure 8: Reusing Type II and Type III VAS in IMS

A prerequisite for using front-end service logic in IMS to access the existing VAS enterprise data or business logic, is that the existing VAS has an interface to the business logic or (enterprise) data. One cannot always access and reuse business logic and service data – for example, when existing VAS do not offer direct access to service data. In such situations, the IMS session control logic might need to include IM-SSF functionality. The IM SSF functionality invokes the CAMEL control logic of the existing VAS using CAP in accordance with GSM methods. It then uses the response from the existing VAS for further processing.

Given the limitations of stand-alone IM-SSF as specified by 3GPP, and the fact that the most valuable components of a VAS are the business logic and service data, which are accessed indirectly via IN protocols, this approach is limited to simple VAS that assert minor control over a call (for example, VAS that provide number translation or outgoing call screening). These Type II VAS often consist of a single query and response. The use of (internal) IM-SSF for Type III VAS can require large investments in both the service (service adaptation) and the IM-SSF (protocol adaptation). Moreover, these investments are not future-proof. Therefore, it is highly probable that Type III VAS will have to be redeveloped for the IMS network and tailored to IMS network architecture and protocols.

In addition, operators should be aware that apart from the IN control protocol (CAP, CS1) some VAS in GSM have other dependencies on, or interfaces with, the core network. Examples include a MAP interface between

- the service execution platform and the HLR – to obtain subscriber location; and
- the service execution platform and the number portability (NP) database – to check the porting status of a subscriber.

This implies that when service logic is ported to, and deployed in, the IMS network, the service platform (NG-IN platform) may need to support these other network interfaces.

In summary, a recipe for determining *whether* as well as *how* one should migrate or evolve existing VAS to IMS begins with a type assessment of the service. For Type II and Type III services, the next step is to evaluate reusability versus redesign, taking into consideration the potential for further evolution and platform strategy. One reuse strategy is to employ an IMS front-end application that interfaces directly with the data or business logic of existing services. An alternative, and limited, strategy is to employ a front-end application that interfaces via IN (CAP, INAP CS1).

A key tool for migrating and evolving existing VAS is a service platform (NG-IN platform) that

- enables IMS applications to interface legacy SCPs via data access protocols;
- supports basic (internal or integrated) IM-SSF functions (to get around limitations in data access interfaces);
- supports service brokering techniques like TRIM, SCIM or service composition; and
- supports interfacing with the CS network via IN and MAP protocols.

Such a platform supports both SIP and IN protocols and thus further facilitates the offering of services to subscribers who have circuit-switched terminals (for example, GSM phones), SIP terminals, or both. A converged application running on NG-IN can use the IN call control capability (CS, CAP) to control a call in the GSM network or the SIP session control capability to control a session in the IMS network. Likewise, it can, in turn, use the aforementioned techniques to access legacy IN service logic or service data.

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Glossary

AS	application server
CAMEL	customized applications for mobile network-enhanced logic
CAP	CAMEL application part
Centrex	A PBX-like service that provides switching at the central office instead of at the customer's premises.
CS	capability set, circuit-switched
CSCF	Call Session Control Function
Cx	reference point between CSCF and HSS
DTAP	direct transfer application part
Gm	reference point between SIP user agent (UA) and P-CSCF
GMSC	Gateway MSC
HLR	Home Location Register
HSS	Home Subscriber System
ICS	IMS communication service
I-CSCF	Interrogating CSCF
IETF	Internet Engineering Task Force
IFC	initial filter criteria
IMS	IP Multimedia Subsystem
IM-SSF	IMS service switching function
IN	intelligent network
INAP	IN application part
ISC	IMS service control interface
ISDN	Integrated Services Digital Network
ISUP	ISDN user part
MAP	mobile application part
MGW	Media Gateway
M-MGW	Mobile Media Gateway
MSC	mobile services switching center
MMTel	Multimedia Telephony
MRFC	multimedia resource function controller
Mw	reference point between CSCF and CSCF
NG-IN	next-generation intelligent network
P-CSCF	proxy CSCF
PLMN	public land mobile network
PSTN	public switched telephony network
SCIM	Service Capability Interaction Manager
SCP	service control point
S-CSCF	serving CSCF
SDP	Session Description Protocol
Sh	reference point between AS and HSS
Si	reference point between IM-SSF and HLR
SIP	Session Initiation Protocol
SIP-AS	SIP application server
SRF	specialized resource function
SSF	service switching function
TISPAN	Telecommunications and Internet-converged Services and Protocols for Advanced Networking
TRIM	Trigger Interaction Manager
UA	user agent
VAS	value-added service
VPN	virtual private network

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