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Services in the IMS ecosystem

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White Paper

Different services have different demands and require different approaches

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Contents

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1 Executive summary

Two – basically contradicting – forces are shaping the IMS architecture. The first is the need to provide services for a true mass market that have the same global reach and impact as telephony. The second is the desire to tap into the extraordinary creativity and dynamics of the IP community, so operators can provide attractive and compelling service offerings to end users. This gives rise to two categories of services:

- Mass-market, standardized services, supported by a wide range of terminals and interoperable within the global operator community. These are characterized by scalability, availability and performance, and where functional growth is defined by standardization.

- Non-standardized services for individual operators to offer locally, within an operator group, or even globally. These services are characterized by flexibility and fast time-to-market.

The emerging IMS ecosystem supports not only development of new services but a rich business landscape. Building on carefully selected interfaces, it allows the operator, or any third party, to launch new or expanded services. These interfaces provide the architectural foundation for how to address the two categories of services stated above. The interfaces give access to standardized mass-market capabilities through downloadable clients and end-point or mid-point servers, in order to facilitate the development of creative new services that incorporate the standard capabilities as components. The other part of the solution is having powerful development environments that place all these components at any developer's fingertips, ready to be incorporated into innovative new combinations.

This paper discusses this broad spectrum of requirements on service creation, specifically in terms of the most appropriate way to develop non-standardized services. The key characteristics of each service are the main guiding factors in this process.

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2 Introduction

The telecom industry is about to launch new and compelling applications enabled by the introduction of IP Multimedia Subsystem (IMS). IMS is also the basis for evolution of standardized person-to-person communication services from voice only into multimedia; an evolution that places IMS in everyone's hand, desktop and home.

The IMS standard specifies mechanisms for interconnect and roaming, as well as bearer control, charging and security. Hence IMS is the communication platform for any service that needs more from the network than just IP transport.

These values and capabilities inherent in IMS – essential for the telecom industry and its customers – allow operators to be part of the value chain of new services, by leveraging network assets and providing customer benefits through new business models as well as existing telco models.

At the same time, a new communication culture has emerged. Communication today is about so much more than pure information exchange. It now revolves around the sharing of everyday life experiences and personal values and emotions. Further, communities of shared values or interest are demanding new communication solutions, such as support for real-time voice during a multi-player gaming session.

This would dictate that IMS must be both:

- The next-generation communication network – a multi-vendor, multi-operator network for mass market communication that is:
  ➔ a standardized, well-defined, performance-optimized global service domain;
  ➔ focused on service delivery across operators.

- An infrastructure supporting innovation and new applications where:
  ➔ service development/creation is easy, fast and does not require coordination;
  ➔ a flexible, dynamic innovation environment is available to a wide community of developers, with the potential to deliver their creations over the entire global operator community

These two purposes have different requirements and challenges, and therefore require focus on different key system properties.

In the standardized area – and in the communication part of non-standardized services – the focus is very network oriented. In order to deliver quality, security and service assurance it is important to maintain network and basic service integrity, control resource usage and prevent network overload. Put briefly, traffic management is in focus.

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In the flexible, dynamic innovation domain focus is more on the user experience: it is important to provide what a specific target group of users wants by supporting rapid service innovation and flexibility. This way, the cost and time needed to trial a new offering is minimized, making it feasible to develop a varied, dynamic and attractive service portfolio.

So let's look at some examples of how all this can be achieved in the emerging IMS architecture.

3 The architecture exemplified

A long-lived standardized service: multimedia telephony

This service is intended to replace existing telecom services, both fixed and mobile, and extend them with multimedia capabilities. All operators will have to offer the same service, since it must work with a wide range of affordable terminals, between operators and at all times (carrier grade). A very simplified view of the architecture is shown below.

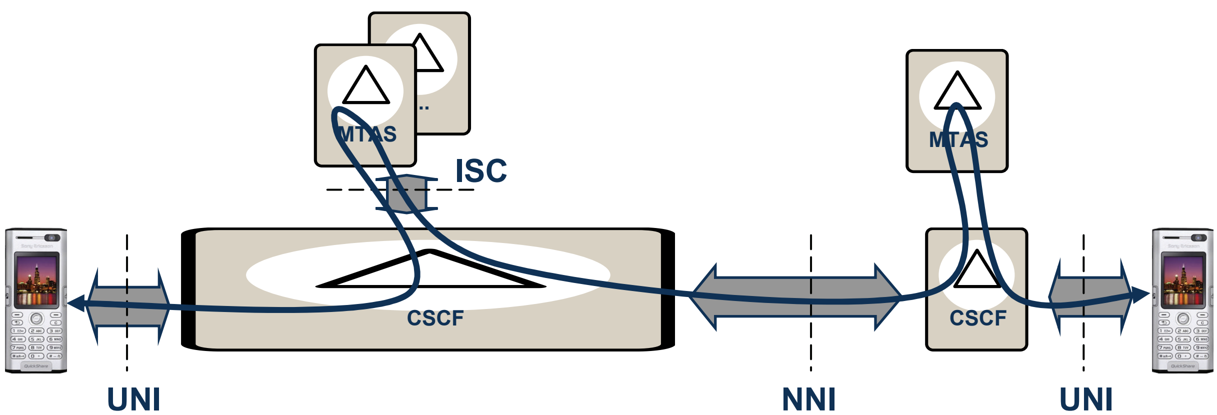

Figure 1: An example of a multimedia session

The session is initiated by one party from a standard application in the terminal. It accesses the network over the standardized User-to-Network Interface (UNI). The Call/Session Control Function (CSCF, essentially the key signal router and terminal registrar in the IMS architecture) inspects the signaling and concludes that this particular session is to be managed by the Multimedia Telephony Application Server (MTAS). Since the address given indicates that the intended B party is not served by this operator, the session is forwarded over the standardized Network-to-Network Interface (NNI). After a similar process in the terminating network, the session finally reaches the B party over the UNI. Of course the media plane (transfer of voice, pictures, video etc.) needs to be handled and controlled by IMS (security, quality assurance). This step has been omitted in this paper to avoid descriptions becoming unnecessarily complicated.

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For a service like this – mass-market volumes, long lived (decades) – it is easy to make the business case for the extra effort required to create an efficient, scalable and robust implementation; doing so minimizes the amount of equipment needed to deploy the service and therefore improves the bottom line for the high-volume services. Extra care must also be taken to make the service upgradeable without causing downtime as users demand that it is always available. This focus on optimization is feasible for this kind of service, since most of its aspects must be based on stable, global standards. Additionally, in order to ensure interoperability in the future, such standards must contain mechanisms to manage the evolution of interworking standards.

A short-lived non-standardized service: sales campaign

In this case, the word “service” is used in a slightly different way, indicating a business offering from an operator towards the end user, based on existing service components. In this sense, it is more a part of the operator’s marketing and sales process than a classic run-time application providing logic and/or media manipulation. Typically, this kind of service offering is triggered by a market opportunity and so the most important consideration is time to market. Very often it also requires a self-service user interface via the internet to minimize the impact on customer care. An example could look like this:

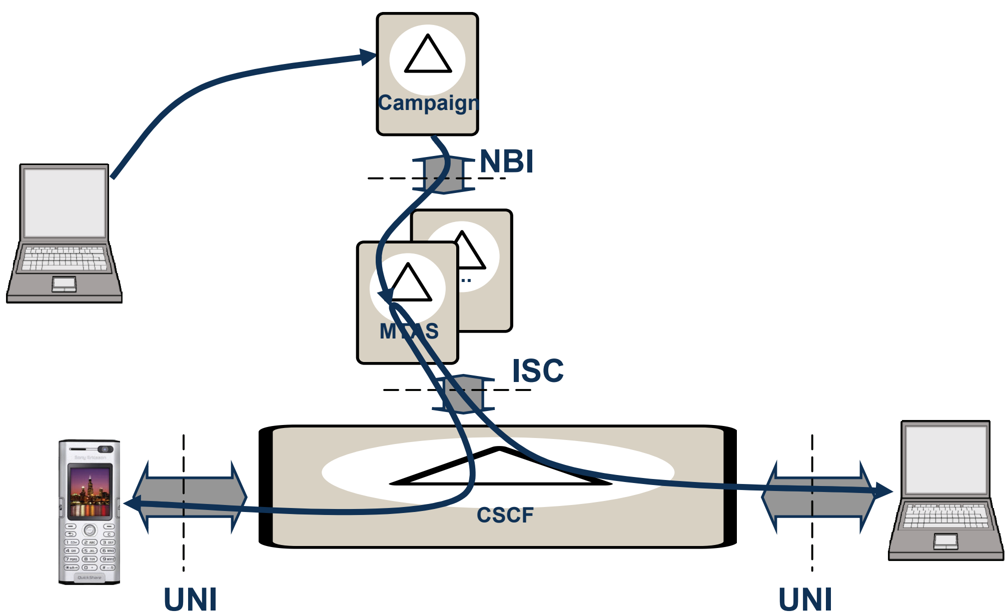

Figure 2: An example of a non-standardized service

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A user finds an interesting offer from his operator while surfing the net from a PC. After filling in his subscriber number, he clicks the “accept” button. The campaign server then collects information about the user and provisions the service. While doing this it notices that the user is qualified for a VIP customer group. This triggers the server to offer the user the chance to talk to a sales representative via a pop-up window. If the user presses “accept” the server will, via the North Bound Interface (NBI) to the MTAS, set up a voice and video session to one of the operator’s sales staff, who can then extend the offer.

This is quite different from the previous example. Since the service will only be used once per user (as part of the signing-up process), and not by all users, it is not economically feasible to build new infrastructure for this service. There is probably no need to optimize the implementation for run-time efficiency, instead, it is more important to use the same infrastructure that has previously been used for similar services, as this will allow reuse of existing equipment, components and developer skills. Additionally, a large part of the effort will be spent on orchestrating resources outside the IMS architecture, such as charging, policy control, client downloading and so on. The recommended strategy in this scenario, therefore, is to base the design on generic Service Delivery Platform capabilities.

A short-lived non-standardized service: networked Tamagotchi

Let us assume that the Tamagotchi, an electronic pet for children implemented in a small handheld computer device, enjoys a resurgence in popularity. Instead of buying such a device, an operator can offer it through a combination of a network-based, possibly third-party server, communicating with a client in the mobile phone, as shown below.

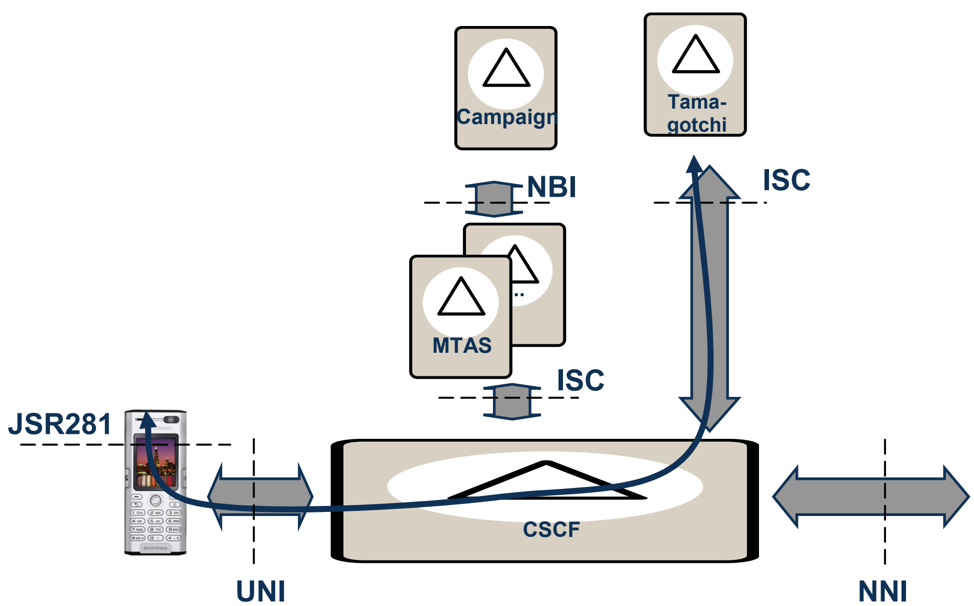

Figure 3: An example of a non-standardized service

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In order to provide an attractive interface, an add-on client is loaded into the phone over the air when the service is provisioned. This is a Java client that uses JSR281 (a standardized Java API to IMS functionality) to communicate with its Tamagotchi server. Sound, images and video can be supplied to the terminal using the application's own protocol. This protocol, however, is not defined in the NNI, so usage is limited to those users residing inside the network. Another, and probably better, way to implement this service is to use an extension of the multimedia telephony service that allows locating an application server as an end point. Then the Service Provider Interface (SPI) is used, and the multimedia telephony protocol can be used to transport the application-specific protocol. The same service would then look like this:

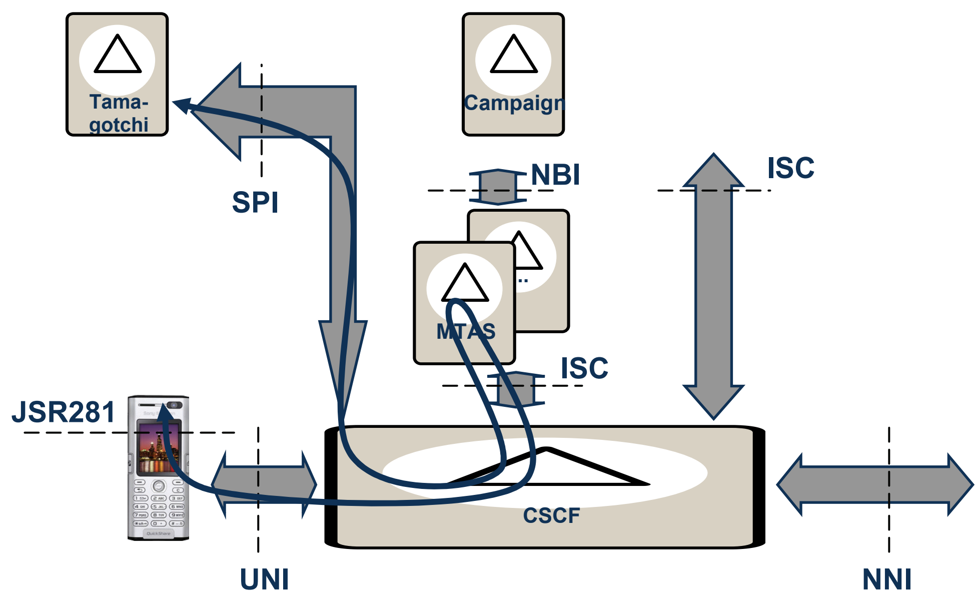

Figure 4: An example of a non-standardized service reusing a standardized communication service

This would then make it possible to offer the service to all users globally since the protocol can be carried over the NNI defined by the standardized multimedia telephony service.

This would also be a service where time to market is the most important consideration. The likelihood that such a service would have a long life is also fairly limited, so optimizing for performance and capacity is much less relevant than being able to deploy it quickly on an existing platform.

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A long-lived non-standardized service: Quaze

This is an example of a service that has not – yet – been developed. It is a quiz game in which members of opposing teams are faced with questions while – conceptually – running around a maze to search for clues and partial answers. The team that comes up with the correct answer first wins points from the other team. The game is based on good communication between the team members: anyone must be able to communicate with their entire team, or parts of it, irrespective of where the player is. Different teams may use different communication clients, optimizing communications. But since the teams are distributed over different operators, countries and possibly continents, the clients must use standardized ways of communicating over the network.

Success of a service such as this, once it is created, is not guaranteed, so initially the basics are the same as in the previous example (networked Tamagotchi). As the game gains popularity, clients working for users within different operators will be developed. To make these interwork they will use standardized communication services offered by the network over the SPI. This will be easy to achieve as it will be supported in standardized service development environments.

As the game continues to gain popularity, capacity in different servers will need to be enhanced. The initial architecture did not consider large-scale usage, with players competing for large sums of money. At this time some parts of the application are being optimized for execution speed, and some others for improved availability.

This example shows how a non-standardized IMS-based service has gradually evolved to only use standardized IMS-based communication services as a result of increased popularity and demand for being globally usable. In the IMS architecture the service could look something like this:

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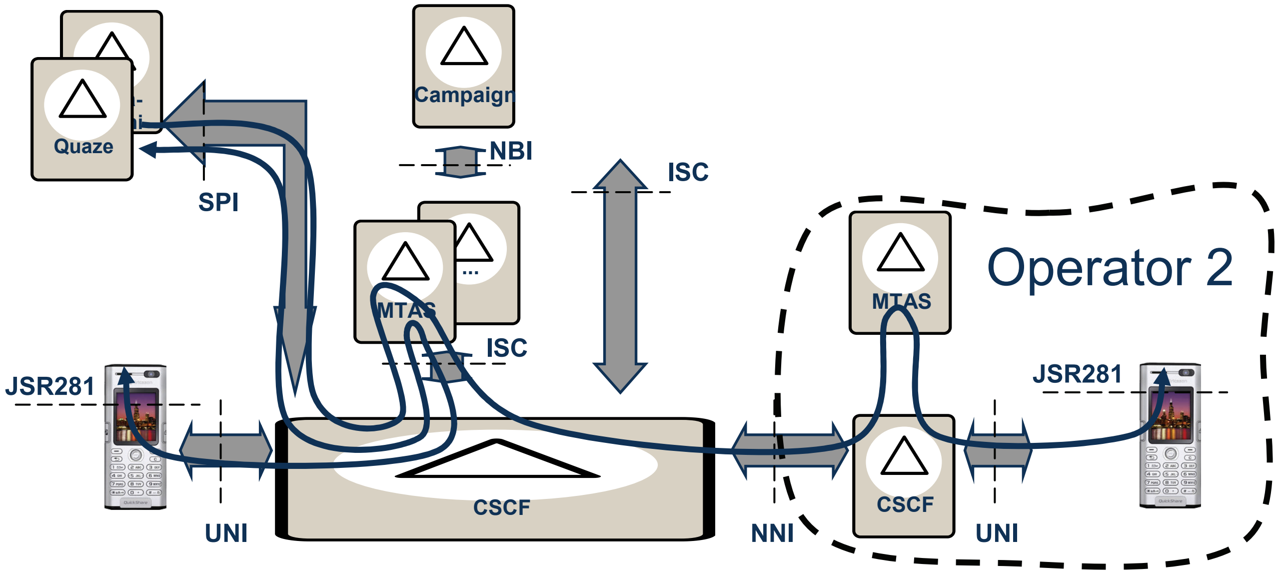

Figure 5: An example of a non-standardized service reusing a standardized communication service

When moving around in the maze, a session is established between the Quaze client in the terminal and the Quaze server in the network. When the player needs to communicate with another team member, they use the contact list to find the preferred way of communication for each player. The server knows the dynamic status of each team member from the active phonebook, and sets up sessions to each one, based on stored preference, over the SPI, allowing each member to be reached by their preferred communication method in all connected networks. Sessions passing operator boundaries are carried over the NNI since the Quaze server uses a standardized communication services for communication.

Even the initiating user can be a subscriber in another operator's network, as indicated in Figure 5. The user can then also use a downloaded client from the Quaze provider. Operator2 does not even have to be aware of the Quaze service, since charging is handled according to the communication service used by Quaze.

4 The IMS ecosystem architecture

As the above examples have shown, there are several interfaces in the IMS architecture that can be used to create service offerings for end users. An operator normally has access to everything in the figure below, and can choose to expose selected parts of the network capabilities to third-party providers.

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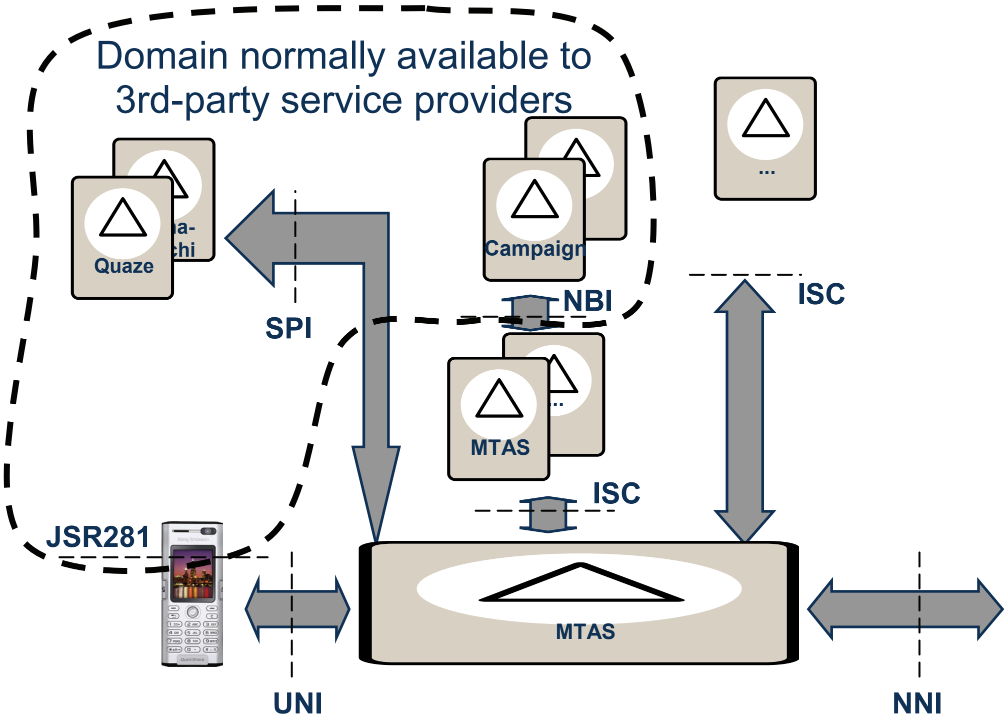

Figure 6: Parts of these interfaces are expected to be available for third-party service providers

The operator will use the SPI as the interface toward third-party service providers. The third-party services can also be offered to users in other operator's networks over the standardized NNI and its supported communication services.

Today we see three communication services emerging: real time user-to-user multimedia communication (MMTel); floor-control half-duplex (walkie-talkie) voice communication (Push-to-talk over Cellular); and instant messaging with support for message storing and forwarding (IMS messaging). If a new service offers a downloadable client that uses the standardized Java interface in the terminal (JSR281 and its evolution), then these services can also become mass-market services. The Java interface can, of course, also be used in a terminal-to-terminal session, such as extending a terminal game to a two-party game.

The standard for SPI is essentially signaling and media wise the same as for the UNI, but with another business setup. The communication services required for such services are being developed within the Third Generation Partnership Project (3GPP) and Open Mobile Alliance (OMA). The Java interface in the application servers is part of the normal Java community process. There is work ongoing to extend the current standardized Java environment (defined in JSR116) to include more flexibility when building SIP-based services (JSR289). This will result in even more possibilities for rapid development of services in a generic development environment.

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If new services are using the standardized services as a communication service, they can be used as a differentiating service to an operator's own subscribers as well as a service offered to all subscribers globally.

The North Bound Interface (NBI) on the IMS Application Servers is used to extend the standardized services with further application logic, as well as being used by other service execution entities. Examples of this are ring-back tone services and free phone services.

5 Conclusions

Different services have different business contexts and different requirements, leading to different optimization targets (run-time efficiency versus development efficiency). Consequently, all wishes can probably not be fulfilled with the same tools. In this paper we have looked at two main ways of structuring the service domain: “standardized versus non-standardized services” and “generic tools versus performance optimized implementation.”

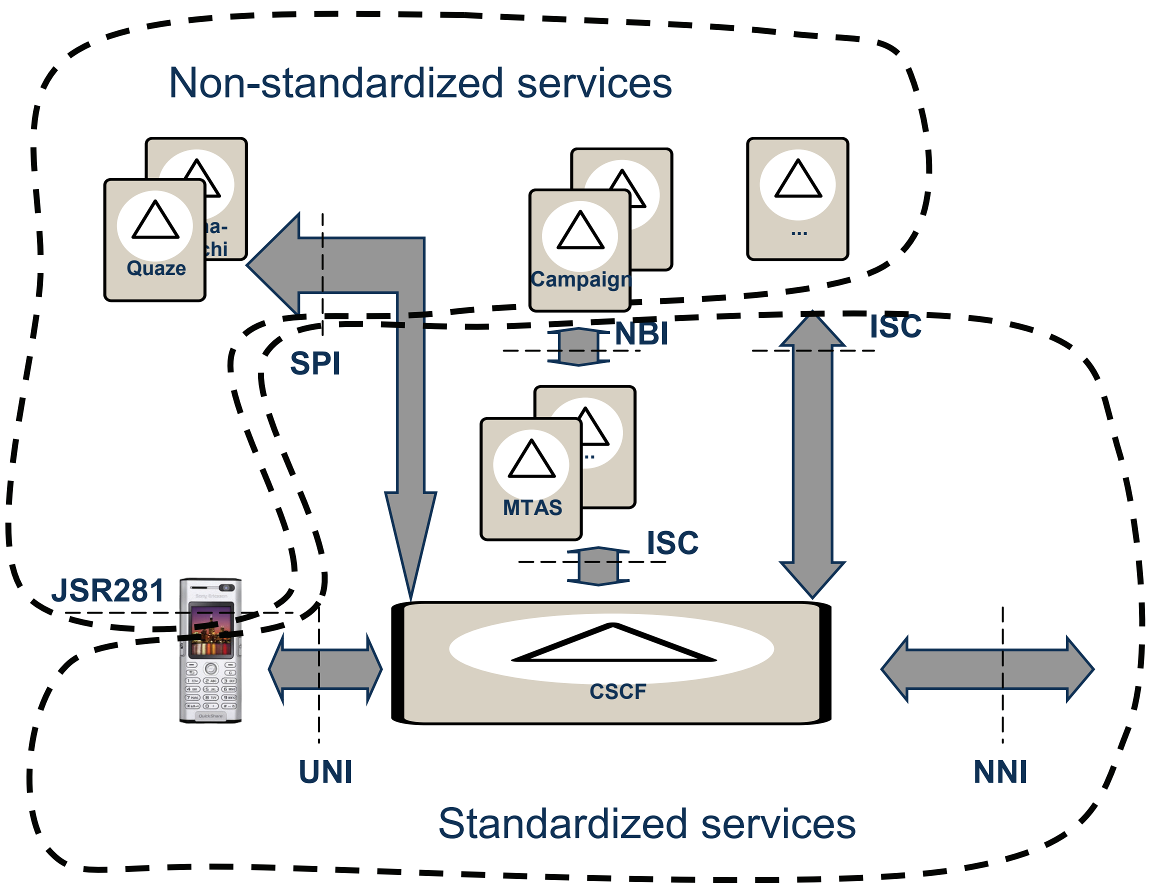

Figure 7: The complete (simplified) IMS service architecture

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Ericsson believes that for services that are expected to have a long life and work in a multi-operator, multi-vendor environment, such as services meant to replace existing large-scale communication services, it is important that the telecom community ensures powerful and flexible standards as well as stable implementations to make sure the service fulfills market expectations. This will be required of the standardized services from day one. For non-standardized services it is more important to have short time to market to bring innovative service ideas to end users quickly. When a service becomes a success, it will gradually face the same requirements as the standardized services. If it has reused the communication services from the standardized services as its base, it can easily grow and be offered to all users in the IMS world.

There are several tools (interfaces to the network, development environments, business setups and so on) that are needed to be successful at launching services in an IMS-based world. And as usual, whoever has the skills to choose the right tool for the right problem will have the most success in this new world.

6 Glossary

API: Application Program Interface

Campaign: An application server example

Carrier-grade: A quality level expression used to express a very high quality

Communication service: A service that can be used directly by the end user as well as used by other services to enable communication across several operators

CSCF: Call and Session Control Function, a 3GPP-specified entity central to IMS architecture

Floor control: Control mechanism that makes sure that only one user transmits information at a time in a multi-user session

IMS: IP Multimedia Subsystem

IMS ecosystem: The possibilities for many different actors to create added value and build sustainable business within the IMS architecture

ISC: IMS Service Control, API used to connect an application server to IMS

JSR116, JSR281, JSR289: Java standard descriptions

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MMTel:	Multimedia telephony
MTAS:	Multimedia Telephony Application Server
NBI:	North Bound Interface, normally exported from a standardized service used to enhance the base service, or to reuse it to create a new service
NNI:	Network to Network Interface, used to interconnect network nodes. In IMS it is based on SIP signaling
Quaze:	An application server example
SPI:	Service Provider Interface, used by a third-party service provider to connect to the network and be able to reuse the standardized communication services supported by all operators
UNI:	User to Network Interface, used by end-user terminals to access the network. In IMS it is based on SIP signaling.

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