

Teligent Converged Service Broker

“Taking network convergence to another level”

Abstract

The economic climate is changing – fact. With industry looking to ride out the storm, planned investments and approved budgets are under deeper and deeper scrutiny as purse strings tighten and non-mission critical programmes tend to be categorised under “AOB”. Operators are being challenged to increase ARPU whilst minimising the churn as subscribers continue to list *cost* as one of the most important factors when selecting their service provider.

Instead, operators often return from budget meetings with the challenge of promoting the legacy service platforms that continue to generate the majority of their revenue whilst the world watches the transition to IMS and VoIP edging slowly forward, some way behind the timeframe predictions of yesteryear.

This paper presents a brief overview of the IMS transition, focussing on the associated problems and challenges and how these can be overcome using the Teligent Converged Service Broker by answering the following key questions:

1. How can network operators safeguard the investments in legacy circuit-switched VAS platforms whilst continuing along the IMS transition path?
2. What methods are available to ensure rapid deployment of personalised, hybrid applications?
3. With the majority of IMS investment being in Application Servers as opposed to core IP-based networks, how can network operators maximise ROI of these NGN services with a TDM-heavy subscriber base?

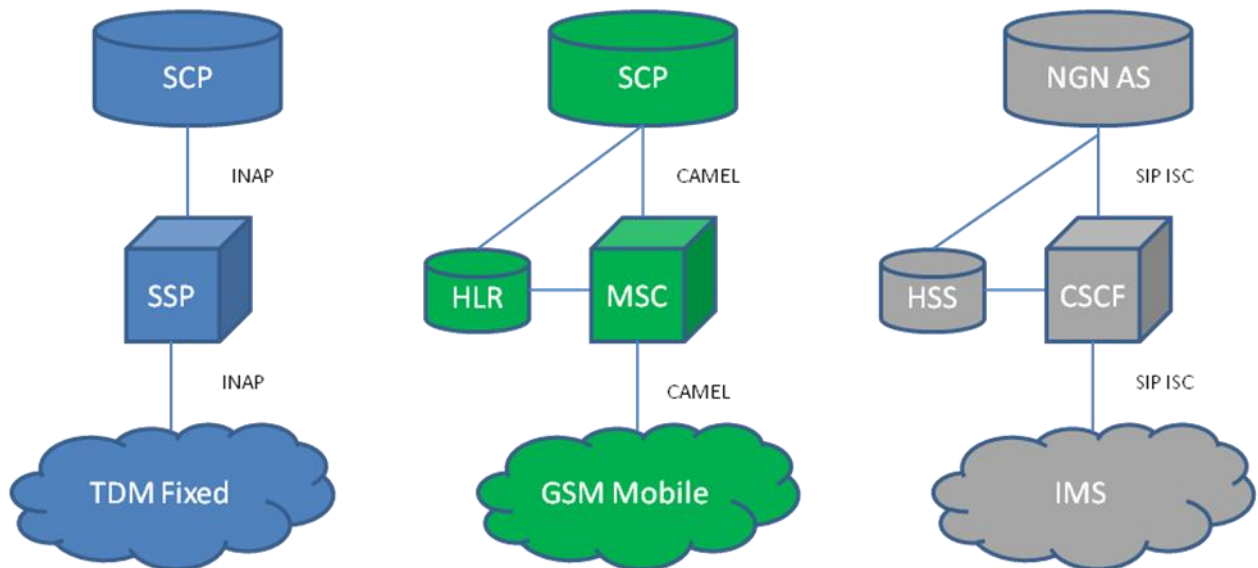
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The IMS Transition

IMS is a well-documented, globally-recognised service architecture for both mobile and fixed services. Combining voice and data into a single packet-switched network, the benefits for both operators and subscribers will be quick to repay the investment as and when IMS deployments become widespread. What remains unclear is when the transition to IMS will reach levels whereby the word “legacy” can be used in its true sense when referring to TDM networks. For now, the situation represented by the following diagram remains the reality – single networks connected to single VAS platforms from single vendors.



Whilst some propose, and indeed succeed, in IP-enabling their TDM SCP service platforms the benefits of this move are somewhat limited – the range of available services is the same and network operators continue to “feel the pinch” as the costs associated with this IP-enablement are applied to each and every VAS platform in their network. Full migration to IMS will negate this issue, and indeed many others, with network operators clear on the potential benefits that can be reaped as they move along the IMS transition path.

Research* suggests the following five bullets as the top reasons for operators choosing to invest in IMS deployments:

1. To provide new applications that increase the ARPU of the network operator;
2. To enable more rapid deployment of new services;
3. To allow independent access to services;
4. To reduce OPEX;
5. To provide hybrid, feature-blending services.

**Source: Heavy Reading vol.5 no.12, July 2007: “IMS Deployment Update: Promises and Challenges”*

Until now, and perhaps for some time to come, IMS is somewhat of a pipedream – a world where network architectures are fully converged with documented standards, whereas the realisation of

this vision is prevented by a combination of technical and commercial challenges. The reality is, therefore, that the IMS transition will continue to move forward but at a slow and steady pace.

When the reality of IMS does arrive, it will bring with it a plethora of benefits for consumers and carriers alike. Market expectations for high-quality wireless multimedia and seamless communication whether in the house, on the road or moving between the two will no doubt be satisfied, if not surpassed, with the rollout of IMS services. From the carrier's perspective, the implementation of these advanced services will be streamlined with IMS, resulting in increased revenue and reduced subscriber churn. But the transition will not be as smooth or as rapid as some might suggest.

Problems and Challenges

Nobody likes change. Whilst subscribers are constantly on the search for better value from their service providers, research continues to suggest that a significant financial saving is needed to outweigh the pain of learning how a new service works. Reprogramming your mind to use a new IVR menu structure after three years of using the same number combinations is easier said than done.

As subscribers move from TDM to IP, the benefits of the *new and improved service* often cause more pain as subscribers trawl through user manuals and interactive self-learning sessions, all the time cursing as they endeavour to simply make a call, pick up a voicemail or recharge their pre-paid account. The combinations of networks, protocols, switch types and application interfaces are vast and the challenge of retaining an identical end user experience may appear insurmountable. A small item on the risk register for sure, but seamless continuity of service for the end user is a major factor when aiming to reduce churn during service migration.

The challenges do not reside solely with customer satisfaction, however. As any service provider or network operator will surely testify, the deployment of new services presents a major challenge with regard to interconnectivity and interoperability. The theoretical task of simply hooking up a handful of E1's to a switch is taxing at the best of times; but with the additional complexity of unknown networks, untested vendor platforms and undiscovered protocol deviations, the result is often that Time to Market is greatly increased as the technical issues are ironed out before commercial launch. The consequential passing of a market opportunity is a bitter pill to swallow.

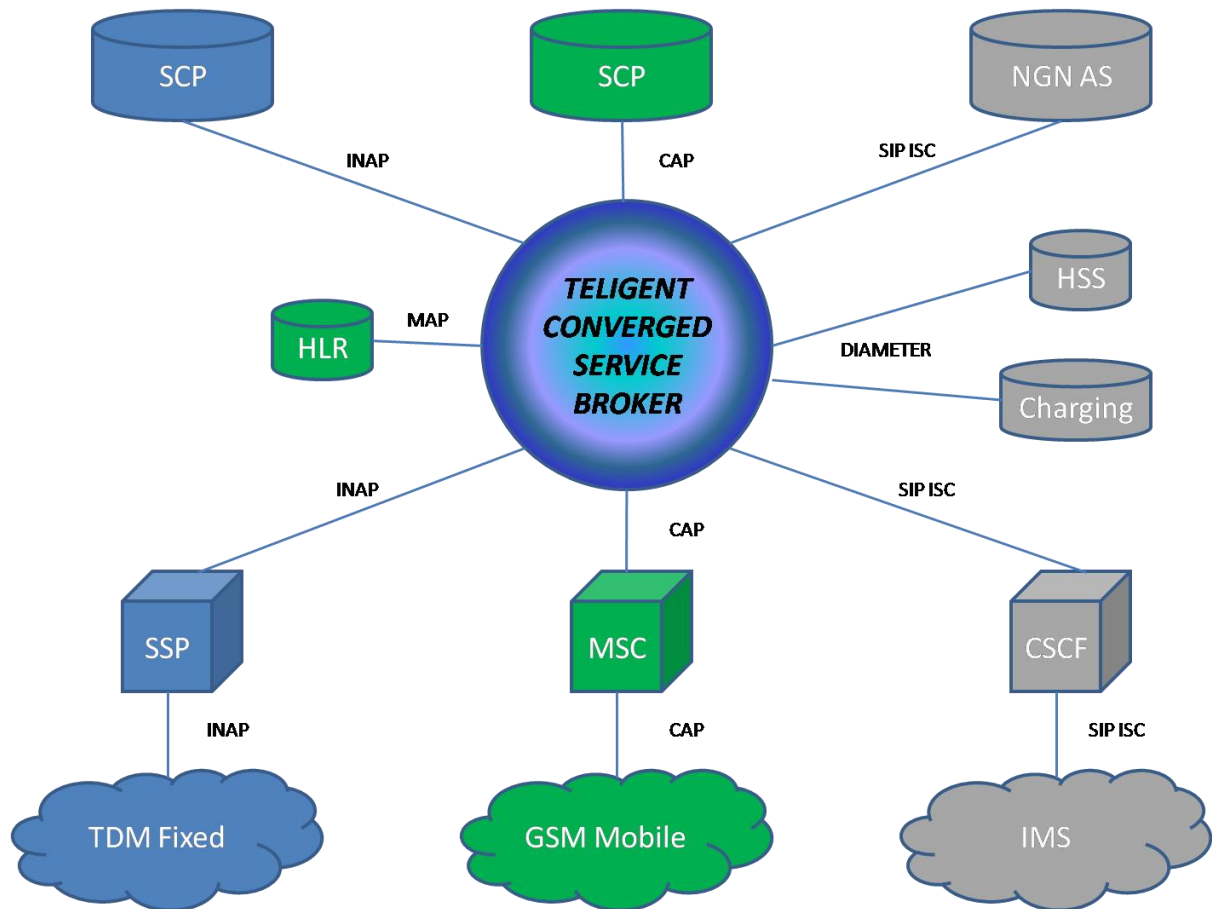
Inherent technical problems such as single-trigger limitations further lead to a situation where, after a new service platform is finally installed, connected and commercially launched, subscribers are still restricted to accessing a single application with their revenue-generating call. The potential to make use of several applications delivered by multiple vendors in a single call flow is guaranteed to excite the most mundane of agendas. Consider three separate platforms running Call Screening, Number Translation Services and Pre-Paid Calling, plus connections to external billing and charging systems all from different vendors, and the potential increase in subscriber numbers from offering new combined services opens up a door to a new world where the technical and commercial boundaries are stretched beyond the horizon.

Another common issue encountered during migration is that of handling Messaging services. Those issues include VMS (Voice Mail systems) which are not able to provide Notification or MWI (Message

Waiting Indication) to end-users in the NGN/IMS network. Conversely, SIP-based devices are unable to send SMS or MMS.

Teligent's Converged Service Broker

Responding to all the challenges raised above (and more) is the Converged Service Broker (CSB) from Teligent. Residing between the access layer and the service layer, the IMS-compliant, protocol-agnostic CSB abstracts the networks from the services and applications, opening up the possibility of connecting multiple switch types (both TDM and IP-based) to multiple service platforms (legacy SCP and IMS AS).



The Teligent CSB provides the following key technical and commercial benefits:

- Supports core network migration whilst allowing the network intelligence migration to be decoupled;
- Provides the ability for rapid deployment of new, hybrid applications;
- Permits service interaction between legacy SCPs and NGN Application Servers;
- Integrates with a range of networks and protocols;
- Abstracts the core networks from the service platforms, even when user-interaction is involved.

Supports core network migration

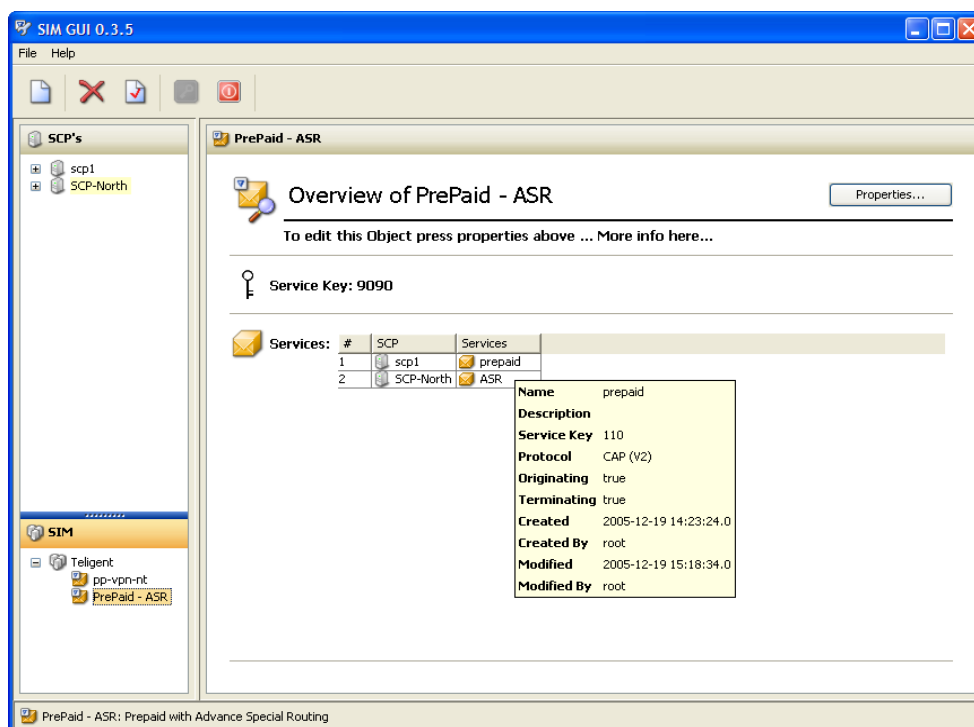
With connectivity to and from both TDM and IP-based core networks, plus interfaces to external network elements such as HLR and HSS, the Teligent CSB is fully supportive of the network migration trend from TDM to IP-based networks. The key benefit of the CSB in this respect is that the equally-important migration of intelligence from legacy SCP platforms to NGN Application Servers is decoupled from the IMS network transition, allowing operators to safeguard the investments in their legacy VAS platforms whilst continuing along the IMS migration path at a core network level. Commercially this allows the network operator to continue utilising the revenue-generating legacy SCPs ensuring feature-transparency to the end users.

Moving forward, the versatility of the CSB ensures that as Application Server environments become available, subscribers on any network (fixed, mobile or IP) are able to utilise both the old (SCP) and the new (NGN AS) services to their full extent.

Rapid Service Deployment

In addition to providing access to any service from any network, the Teligent CSB allows *new* services to be created and deployed from *existing* applications. With connections to multiple SCPs, each potentially running standalone applications with their own roadmap, the CSB opens the door to service blending – triggering multiple services from a single inbound call in a simple, rule-based configuration.

Teligent's unique and intuitive SIM GUI provides the operator with the ability to generate hybrid applications for mass market deployment and also on a case-by-case basis. No additional application development is necessary and no direct interaction between multi-vendor SCPs is required. Instead, composing user-applications based on a number of rule types ensures that the only work required is within the CSB, and all via a graphical interface. This reduces the time to market for new service offerings, allowing the operator to move quickly when an opportunity is identified.



Service Interaction

The architecture of the CSB provides a pseudo-mesh between networks and service platforms, allowing traffic from a variety of sources to benefit from the services offered by numerous service platforms.

By utilising the IM-SSF functionality within the CSB, it is possible for a call originating from an IP-based network to trigger an application running on a legacy TDM SCP.

The reverse scenario whereby a TDM-based caller wishes to benefit from a service running on an NGN Application Server, is just as easily achieved via the rIM-SSF (reverse IM-SSF) function.

Combined with the Service Interaction Manager (SIM) which allows multiple SCPs and NGN Application Servers to be involved in a single call flow, the potential of the Teligent CSB is both vast and versatile, allowing subscribers from any core network to access any application residing on any service platform.

Protocol and Network Agnostic

Teligent have a long and successful history supporting a wide range of signalling protocols. Clients regularly enquire into Teligent's ability to support bespoke combinations of, for example, DPNSS and VoIP accessing the same value-added service – a scenario that Teligent currently have running in the live network with a major operator.

The list of transport protocols for signalling and media supported by the Teligent CSB extends far beyond the scope of this White Paper, and includes the following:

- CAPv2, CAPv3, CAPv4
- INAP
- SIP, ISC, SIP-T, SIP-I
- MAP
- C7 ISUP, DPNSS
- DIAMETER
- RTP
- SMPP, MM7

Network Abstraction

By residing both logically and physically between the transport layer and the service layer, the Teligent CSB effectively abstracts the networks from the service platforms. In the SIM scenario where multiple applications are used in a single call flow, the CSB appears and acts just like an SCP from the switch perspective; answering an inbound call and returning a result at the end of the call flow. What happens “on the other side” is not seen by the switch. Conversely, to each SCP involved in the call flow, the CSB takes on the role of the network switch by “placing” the inbound call to the service and responding to the instructions from the service platform (play media, request DTMF, place outbound call, etc).

The result is an architecture where each major network element (switch, SCP or NGN AS) operates independently, linked together yet equally abstracted by the Teligent CSB.

The CSB in detail

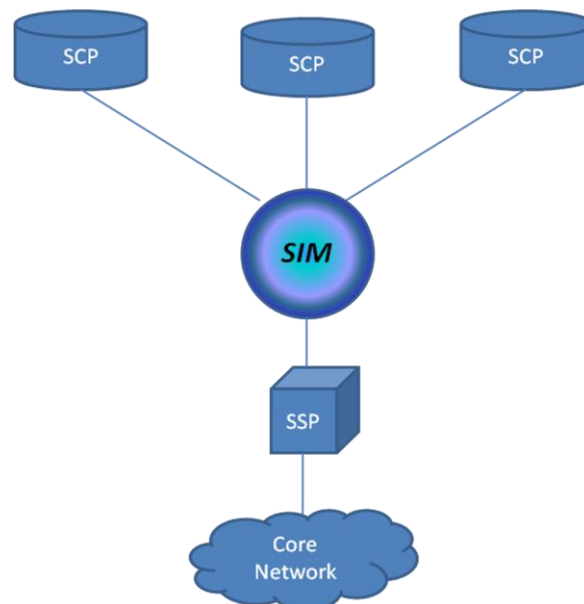
Software Functions

The Teligent CSB consists of three major software functions based on the same core P90 technology. These functions can be delivered standalone for specific use cases or packaged together to provide the full suite of convergent features.

Service Interaction Manager (SIM)

The SIM component is responsible for allowing multiple services to participate in a single call (trigger) from the network. Appearing as an SCP to the switch, and as a switch to each SCP involved, the network and the application layers are completely abstracted from each other.

Using Teligent's SIM GUI, service orchestration can be easily configured allowing rapid deployment of hybrid applications as the SIM takes full control over the call, interacting with service platforms via signalling and media according to the provisioned rules.



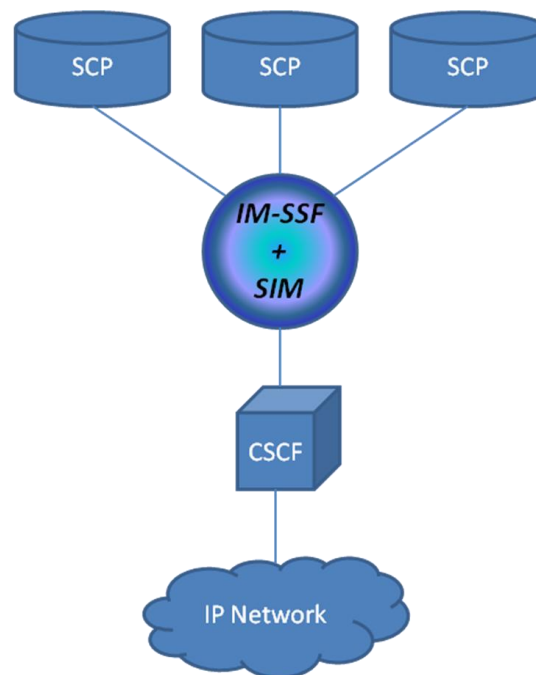
IP Multimedia Service Switching Function (IM-SSF)

With the migration of subscribers from TDM to IP, operators are looking to continue leveraging the revenue from proven SCP services. The IM-SSF function allows subscribers from next generation networks to connect to services residing on these legacy TDM platforms, making full use of their features.

The IM-SSF effectively acts as a protocol conversion server, handling both signalling and media in both TDM and IP arenas, allowing feature transparency for the operators as their subscribers move along the IMS migration path but retain access to their legacy services.

Combining the SIM and IM-SSF features provides a solution whereby network operators can generate hybrid applications based on their legacy VAS platforms and make these available to their IP-based subscribers.

Handling the cases where User interaction (or IVR) represents a challenge, since IVR is performed in quite different ways in TDM and IMS. This very issue has been deemed as impossible to address by some vendors, leading them to the conclusion that an IM-SSF, although defined by 3GPP, is in practice very limited in functionality. Teligent has solved this issue with an innovative approach and can ensure that User-Interaction is indeed handled perfectly.

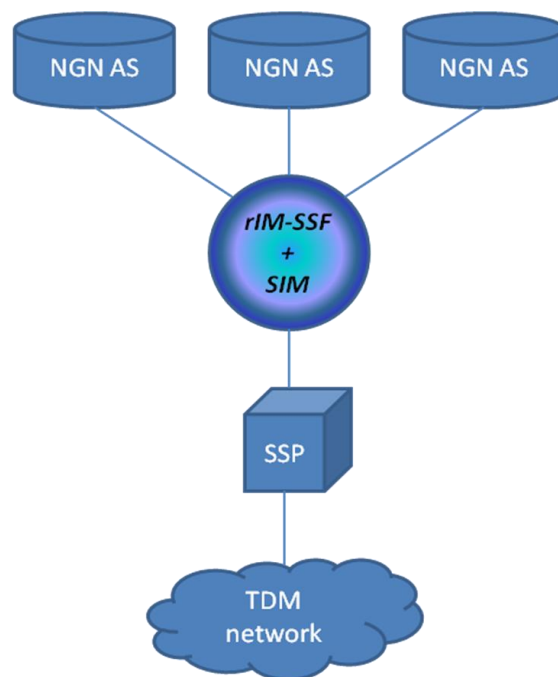


Reverse IM-SSF (rIM-SSF)

For those operators investing heavily in NGN Application Servers but with a large TDM subscriber base, the rIM-SSF functionality allows those users still residing in the TDM network to make use of the new, feature-rich services deployed in the IMS environment.

Combining the rIM-SSF with the SIM functionality provides a powerful solution to the operator whereby a range of next generation applications can be orchestrated into a single call for the end subscriber based in the TDM network.

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Messaging Service Broker

The Messaging services, which include Voice Mail Services but also SMS and MMS, have been hugely successful in mobile environments. Today, during the migration path, there are numerous challenges in ensuring that end-users in the NGN/IMS network can send and receive SMS, MMS, MWI (Message Waiting Indication)...

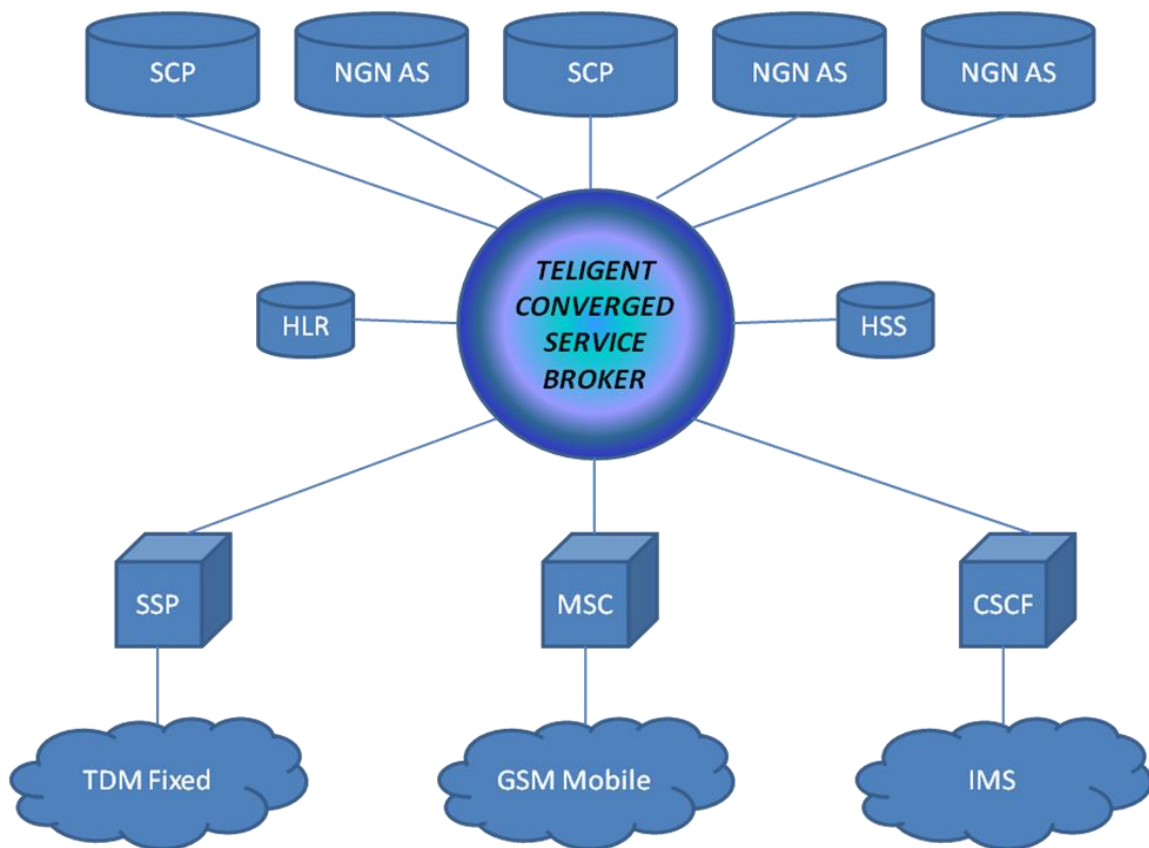
The Messaging Broker function addresses those issues with minimal modifications on the existing nodes, by mediating between SIP (SIP SIMPLE) on the IMS side and MAP/SMPP/MM7 on the legacy side. It also allows online charging of SMS/MMS, through CAP or Diameter interfaces.

Using the Teligent MSB, it is possible to deliver VMS notification and to deploy new SMS based application in the NGN/IMS environment.

Full Converged Service Broker

By combining the SIM, IM-SSF and rIM-SSF features into the full Converged Service Broker, operators are presented with a single, scalable solution that provides full, uncompromised access to any application from any network.

With additional interfaces to external network elements (e.g., HLR, HSS), the Teligent Converged Service Broker is the complete solution to bridging the gap between TDM fixed, mobile and IMS subscribers and services, taking network convergence to another level.



Use Cases

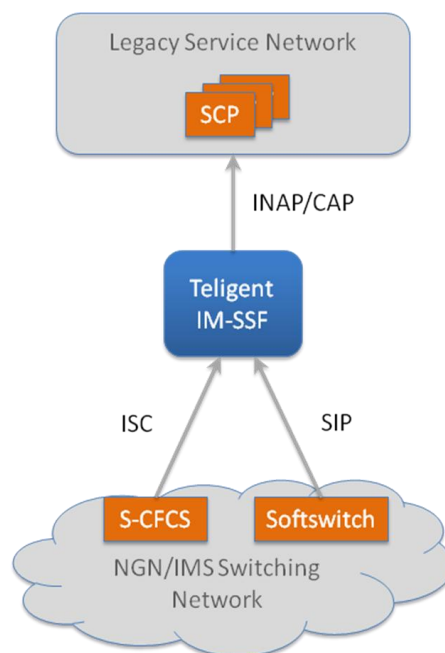
Scenario 1

Many operators have started to invest in Next Generation IP based technology e.g. IMS/TISPA or basic NGN. In order to utilise their investments operators are now seeking for technology which allow the reuse of their investment in the new IMS architecture. Examples of services that may be subject for reusability include Real-time Charging and Prepaid services, Number Translation services (Premium Rate & Free Phone), Access Screening, Number Portability, Least Cost Routing, Personalised Ring-Back Tones etc.

Teligent Solution

By deploying the Teligent IM-SSF, operators are able to reuse existing applications which are currently used in the legacy TDM network. The IM-SSF will act as a Gateway/Mediator between the Next Generation switching architecture and legacy service architecture. The IM-SSF will integrate via SIP to the IP-based core network and via a variety of different interfaces (CAP, INAP CS-1, INAP CS-2, vendor proprietary) to the legacy SCPs. In order to provide Real-Time Charging applications the Teligent IM-SSF may also interact with a legacy using a variety of Charging APIs such as Diameter, Corba or SOAP.

The Teligent IM-SSF far more than just a simple protocol converter between legacy SS7 signalling and SIP/ISC interfaces. The IM-SSF contains an advanced routing capability which ensures that routing can be performed to the correct SCP (as the service may be distributed between multiple SCPs). The routing capability may be used together with the Subscriber Profile capability. This functional combination is essential when providing e.g. Real-time charging service such as Prepaid where subscribers are distributed over several SCPs.

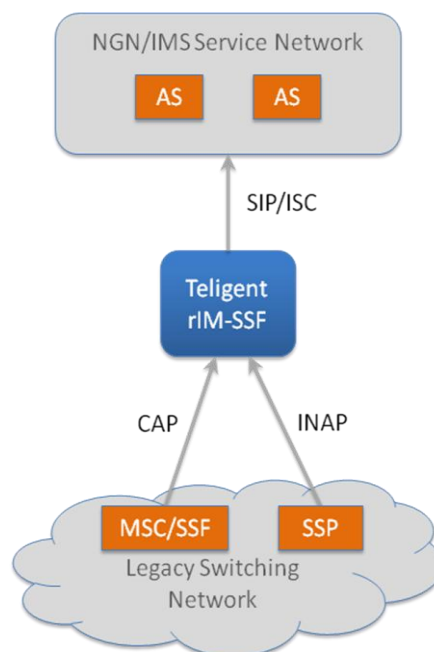


Scenario 2

the network operator wishes to leverage its investment in the new IMS/NGN network and does not want to develop new services in the legacy TDM environment.

Teligent Solution

The reverse IM-SSF function within the Teligent CSB acts as a Gateway/mediation between the legacy switching network and Next Generation service architecture. As such the Teligent CSB can mediate between legacy SS7 protocols such as INAP CS-1, INAP CS-2, CAP, vendor propriety IN protocols or even ISUP (e.g. ISUP Loop-Around) and SIP. The reverse IM-SSF allows operators to develop new services based on NGN Application Servers and to make these accessible to subscribers from the TDM network.



Scenario 3

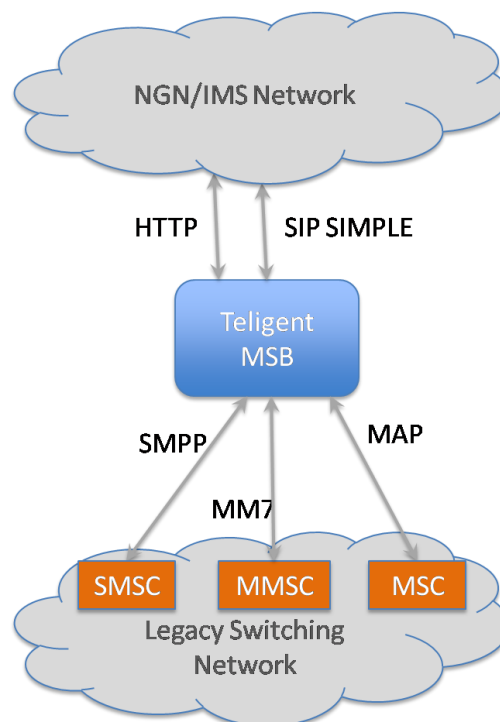
One of the most successful services in the mobile environment is the SMS service. Over time, thousands of different SMS applications have been developed. When implementing NGN/IMS based service/switching architecture it is important to deploy an architecture which can also handle SMS services. Unfortunately the IMS standard is not focusing much on these services.

Another common issue is the limitation of existing VMS platforms to deliver notifications and Message Waiting Indications over the IMS network.

Teligent Solution

The Teligent “Messaging Service Broker” (MSB) allows for a smooth integration between legacy switching network and NGN/IMS service network to allow SMS and MMS services to be deployed in the NGN/IMS environment, still with the ability to distribute the information to the large subscriber base using the legacy switching network.

The Teligent MSB mediates between SIP (SIP SIMPLE) on the IMS side and MAP/SMPP/MM7 on the legacy side (vendor specific interfaces such as CIMD2 and UCP may also be used). The advanced routing capability and subscriber profile DB may be used to provide the required flexibility. Using the Teligent MSB, it is possible to deliver VMS notification and to deploy new SMS based application in the NGN/IMS environment.

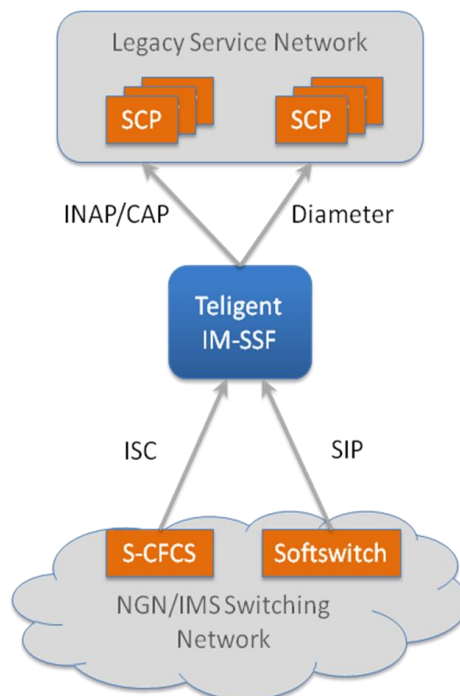


Scenario 4

In the mobile environment the majority of today's market is using prepaid subscriptions (in most countries the prepaid penetration varies between 50-90% of the total subscriber base). This presents a real need to charge for services in real-time.

Teligent Solution

The Teligent CSB can be configured in an IM-SSF + SIM. This combination allows operators to provided IN-like services as described above, but with the additional capability that any services may be charged for in real-time. The Teligent IM-SSF may integrate with existing Prepaid system to ensure that sufficient credit is available before the services are provided. Integration with Prepaid system may be performed via SS7 based signalling such as CAP, standardised charging API such as Diameter or using vendor propriety charging API based on e.g. Corba, SOAP/HTTP.

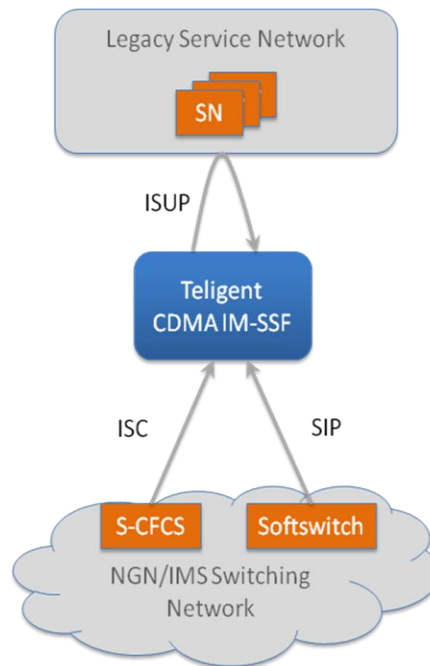


Scenario 5

Many operators (fixed and mobile) have implemented IN-like applications on Service Node architecture. Particularly, CDMA operators have used this method since the support for IN has been very limited. Instead of IN call control, a technology called ISUP Loop-Around have been used where the ISUP signalling is looped via a Service Node.

Teligent Solution

The Teligent CDMA IM-SSF allows operators who are currently using Service Node architecture in the Legacy Service Network to smoothly migrate towards IMS/NGN.



Summary

The reality of an all-IP core network is long into the future. The investment available in this future vision remains high whilst its legacy TDM counterpart (and the reality of the present day) finds itself top-heavy with challenges with only a relatively small budget available for investment. The migration of networks and subscribers from TDM to VoIP and also that of intelligence from legacy SCPs to low-cost NGN Application Servers are both critical for operators who aspire to stay on the IMS transition path but the imbalance of available investment between TDM and IP technology demands them to be decoupled.

In addition to this, the situation where many operators find themselves is in having several value-added service platforms from a number of vendors. Consolidating them onto a single vendor-operated multi-service platform requires budgets that simply do not exist in the current economic and technical climate.

The Teligent CSB represents an all-encompassing and realistic approach for network operators and service providers alike, allowing the IMS journey to continue whilst ARPU is retained at its maximum by leveraging the services that have generated the majority of revenue for many years.

1. How can network operators safeguard the investments in legacy circuit-switched VAS platforms whilst continuing along the IMS transition path?

By utilising the Teligent Converged Service Broker's IM-SSF functionality, operators can continue to generate revenue from their SCP deployments by making the services available to subscribers as they make the transition from TDM to IP.

2. What methods are available to ensure rapid deployment of personalised, hybrid applications?

The SIM and its associated intuitive GUI within Teligent's Converged Service Broker allow hybrid applications to be generated by blending existing services together, resulting in a fast time-to-market of new, personalised services based on existing applications.

3. With the majority of IMS investment being in Application Servers as opposed to core IP-based networks, how can network operators maximise ROI of these NGN services with a TDM-heavy subscriber base?

Teligent's Converged Service Broker utilises rIM-SSF technology to provide access to NGN Application Servers to subscribers in the TDM network. Operators are therefore able to immediately generate revenue whilst the transition from TDM to IP at a network level continues as a decoupled activity.

The Teligent CSB fulfils a vital network role by cross-connecting core networks and service platforms to provide compatibility for users on all networks to access services on all platforms, whilst also opening the door to service orchestration which, by using Teligent's intuitive GUI-based SIM, allows rapid deployment of new services to the market.

As the world prepares to embrace the future of IMS, those network operators and service providers who make use of Service Brokers to ensure continued return from their legacy investments whilst utilising the additional opportunities they provide will surely exit the storm at the front of the pack.