Redefining Interpersonal Communication

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Diversity and simplicity: two diverging end-user requirements which service providers must reconcile. IMS is the architecture designed to do so, joining agile service creation with QoS and security assurance.

Introduction
The entry of new players into the person-to-person communication services market has induced many conflicts of interest (Figure 1).

All players want to “own” and keep subscribers. New entrants and incumbent service providers may deploy IP Multimedia Subsystem (IMS) in order to deliver or combine innovative services in new and flexible ways (e.g. service blending) over different types of access networks.

This article addresses the way incumbent fixed, mobile or cable operators may leverage both IMS and existing assets, in order to respond to customer requirements for diversity and simplicity, while mitigating the threat of churn or revenue loss. This is one of the fundamentals of Service Transformation, as explained in the Service Providers’ Competitive Response article, and part of our Acuity™ Transformation Framework.

Fixed telephony providers are faced with competition from Internet VoIP providers due to the high penetration of fixed broadband access, mobile substitution and cable operators (country-specific).

Terminal evolutions, including alternative Radio Access Technologies such as WiFi, and operating systems such as Linux, Windows Mobile, etc., open the way for other market players to enter the mobile service arena (Figure 2):

• Hybrid phones (WiFi/2G-3G) offer an alternative connection to third-party operators for delivery of data and VoIP services using ADSL access, for example;

• Internet players such as Skype, Google-Talk and MSN may turn mobile operators into sole connectivity providers.

Skype, Google-Talk and the like, have become viable alternatives to legacy phone calls, at least for early adopters. Besides traditional voice services, Internet players offer ever richer services including presence, chat, video, etc. The risk for incumbent operators is that they might be sidelined into providing only emergency calls, or low-revenue back-up lines.
Enterprises seem to be more sensitive to the potential issues (security, QoS, etc.) that Internet-based communications present. They are interested in lowering the total costs of their communications, but have stringent requirements in order to eliminate any potential impact on their business.

The opportunity for incumbents to address the new market competitors involves coupling new service creation with the comfort that only legacy assets can offer. The IMS architecture may enable them to offer security, Quality of Service (QoS) and integration with legacy networks/services in a way that is difficult for challengers to replicate. IMS services can for example, be extended to inter-work with non-IMS terminals or network services. Examples include deriving presence information from non-IMS terminals through legacy network elements (MSC, HLR/AAA); or new services that can be extended, such as instant messaging (IM) through SMS-IM inter-working.

This is balanced by the requirement, as consumer research shows, that communication services remain comfortable and simple to use. A seamless experience is expected when moving from service to service and from access to access.

*The demand for diversity and excitement*

The new service delivery architecture, which is part of our Acuity Transformation Framework will enable the following services:

*Augmented services*

To start with, IMS can be used to augment the services that people are using today. For example, a mobile phone’s directory could be stored in the network. It would not only be device-independent,
but could also be extended by adding status information (e.g. presence, time zone) for each person in the list. This would not require the people in the list to have an IMS client in their phone, since presence information can also be derived from the legacy serving network.

**Composite services**

Furthermore, IMS and Services Transformation via Alcatel-Lucent’s carrier-grade Service Delivery Environment (SDE) offer the possibility to combine services easily, providing richer multimedia offers. For example:

- **Combination of voice communication and instant messaging:** IM users transform their chat into a voice call whenever the involvement and complexity of the conversation require it. Similarly, this combination is spreading in enterprise collaborative environments (refer to Alcatel-Lucent 8628 MultiMedia Instant Conferencing/ Omniture My Teamwork Conferencing and Collaboration application for the operator/PBX market – for further information and for the new reference to this product, please access our website).

- **Combination of voice and video:** This is an option for TV users, who would like to move from terminal (TV) to terminal (phone) for all sorts of communication. Primary market research conducted by Alcatel-Lucent in Western Europe shows that 21% of consumer end users cite this as their most preferred service enhancement. This research indicates consumers consider Interactive Internet TV a service enhancement worth paying for and it could command a monthly fee of $10 USD or more.

- **Hybrid phone,** combining the use of fixed and mobile networks. Besides cost benefits, this creates the possibility for the end user to experience a consistent communication environment across various (fixed/mobile) accesses (e.g., BT Fusion and BT Enterprise FMC).

- **Integrating communication capabilities with vertical enterprise markets** also offers a new set of attractive possibilities, such as those demonstrated by Alcatel-Lucent with “ICT Workforce Management”, which integrates location and presence information with person-to-person communication capabilities to build a fleet management application.

**Innovative services**

The end user experience will also be transformed because IMS supports new applications and new communication habits:

- **Multiple numbering,** registration on different terminals;

- **Community-oriented services:**
  - User hunting (find anyone within a community);
  - Community (e.g., family) push services alerting group members when someone has posted an event on a shared virtual area;
  - SOS services for people in need of assistance: pressing a “red button” calls the nearest available neighbor, rescue services and alerts their family;

- **Find information about the caller and display it on the device of the called party** (integration with business logic in a corporate environment).

**The demand for simplicity and comfort**

Legacy telephony was only voice plus SMS. However, it offered simplicity, security and comfort: “black” phones and 2G handsets are simple to use, and can call anyone in the world.
Simplicity and comfort requirements include the following categories:

**Continuity of service**
- Migration from legacy to new services must take place without disruption; otherwise subscribers will go to a competitor.
- New and legacy services will co-exist for a long transition period. Legacy and new users will communicate with one another, and users will often jump from legacy to new terminals. Inter-working between IP and legacy domains is needed, with cross-domain handover and cooperation.
- A proportion of the user base will request the retention of old features: legacy services may be emulated.
- Seamless handoff of calls/sessions from one network to another (wireline to/from wireless but also between providers).

**Universal service**
A universal (standardized) service that allows users to reach anyone in the world.

**Ease of use**
Self-subscription to new services, automatic installation and configuration of the terminal, and ergonomics.

**Security**
When (especially business) sessions are established over the public Internet, can it be guaranteed that an intruder cannot intercept calls or launch virus or denial-of-service attacks?

**Quality of Service**
What works today on a fixed backbone might not work as well in cases of congestion due to scarcity of access resources (e.g., radio).

### Table 1: Relative preferences for different IMS applications (from most to least preferred)

<table>
<thead>
<tr>
<th>Consumer</th>
<th>Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Interactive Internet TV</td>
<td>VoIP Solutions</td>
</tr>
<tr>
<td>2 SMS Missed Call/Callback Manager</td>
<td>Wireless Office</td>
</tr>
<tr>
<td>3 Person-to-Person Video Sharing</td>
<td>SMS Missed Call/Callback Manager</td>
</tr>
<tr>
<td>4 SMS Text</td>
<td>Smart Messaging Manager</td>
</tr>
<tr>
<td>5 Voice IM</td>
<td>Integrated Mailbox</td>
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<tr>
<td>6 Dual Mode Phone</td>
<td>Video Conferencing</td>
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<tr>
<td>7 Video Surveillance</td>
<td>Phonebook Manager</td>
</tr>
<tr>
<td>8 IM</td>
<td>Dual-Mode Phone</td>
</tr>
<tr>
<td>9 Mobile Phone Spam Blocker</td>
<td>Locator</td>
</tr>
<tr>
<td>10 Integrated Mailbox</td>
<td>Communication Manager</td>
</tr>
</tbody>
</table>
**Transitioning the end-user experience with IMS: the solution**

*How can network operators compete?*

Competitive players from the Internet are well positioned to deliver service diversity, like peer-to-peer VoIP (Skype, Vonage), blog hosting (Blogspirit, Blogging, etc.), or audio and video streaming (iTunes, Napster). Through alliances, they may also provide multi-access service. Skype, for example, is delivering VoIP on an increasing variety of devices, including mobile ones, but starting from a different perspective: peer-to-peer service, with no IMS-like value in the network. Their Service Factory is thus simplified as a client delivery engine.

Network operators can fight back with blended services (IMS + IPTV, etc.) over any access, including legacy, which single-service, Internet-only companies that have no ties to legacy access cannot do.

Incumbent operators can also take the lead in terms of offering comfort and simplicity by:

• Putting the subscriber in control with one subscription, one bill, one customer support across new and legacy services and accesses;

• Leveraging their existing expertise/assets of legacy technology and services (and their existing inter-company peering agreements) to allow cross-domain (legacy/IMS) services, handover, and – more globally – service integration (e.g., ringing both a legacy and an IP phone when there is an incoming call);

• Emulating legacy with a new, IP-based architecture;

• Leveraging access beyond price bundles: guaranteed QoS multi-service delivery, secure network attachment, and service and access co-operation in general. Customer support proximity is also an asset that is difficult to match.

Thus the non-IP legacy and heavy access infrastructure, which might have been considered a drawback, may in fact become a key asset that allows incumbents to stay in the game.

IMS is the solution for new person-to-person communication services, since it leverages legacy telephony while introducing new, IP-based communication services (IM, integrated applications, etc.) and can combine them with other, non-IMS IP services like IPTV, allowing the incumbent operator to be a true multi-service operator (Figure 3).

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**Figure 3: Different types of service that providers can offer**

1. Limited/No service interaction especially with legacy
2. Leveraging an IMS to provide full spectrum of services (from legacy to innovative), needs to catch up with Application SP for the Innovative Services.
Hence, legacy inter-working and service continuity is central to IMS and to network operators’ competitiveness.

What does this mean for the service control and creation that operators will deploy?

**Service control: core evolution**

**Interworking between IMS and legacy communication systems**

Subscribers served via a legacy network and subscribers served via IMS are able to communicate via call and/or messaging services. Furthermore, IMS specialized resources such as Media Resource Functions (conference bridges, etc.) and voice/video mailboxes are reachable via both legacy and IMS.

**Emulation and simulation of voice services**

For conservative users with legacy terminals (possibly moved to IMS at the behest of the operator), POTS feature continuity offered by PSTN Emulation (PES) is needed to mimic legacy networks and services from the view point of a legacy terminal connected to an IMS/IP network.

For innovative users (with brand new phones) who request service diversity, and accept trading off some POTS features for new capabilities such as nomadism and multimedia, PSTN Simulation (PSS) coupled with advanced multimedia features is a more attractive offering.

Fixed service providers are using both approaches (on a single IMS Core infrastructure), with PES to replace the PSTN, and PSS to bring in new service offerings.

Mobile service providers are also considering the equivalent of PSS – as soon as wireless access bandwidth constraints allow voice to be carried on SIP & IP (e.g., WiMAX) – and the equivalent of PES, with phones on legacy radio coverage where VoIP is not possible being interconnected onto IMS service delivery.

**Other aspects**

- IMS control can request the access network, via an appropriate interface, to establish QoS-oriented bearers needed by the media (e.g., voice) components of a session. Coordination between access and service charging is also provided.

- Given the very strong security requirements of IP-based services, a strong border node (with the capacity for a high number of secured tunnels, prevention against Denial of Service, NAT, firewall, etc.) is provided at the borders with access and other IP domains.

**Service creation: service layer evolution**

To cope with the demand for service diversity, and to allow IMS operators to keep pace with pure IT service providers, the IMS service delivery capability is provided on an optimized Java platform. A software development kit easily allows the operator and/or manufacturer to prototype and deploy new person-to-person IMS services with stringent performance and scalability requirements.

This Service Delivery Platform is complemented by a Web Services capability to provide service exposure to facilitate orchestration when applicable (e.g., for composite applications like IPTV, enterprise applications (call centers, collaborative conferencing, etc.) and incorporation of Internet-based applications from ASPs.

**Interworking between IMS and legacy communication systems**

In the service layer, inter-working with legacy systems is also crucial. To deliver coherent services over IMS and legacy networks, the supporting IMS SDP must be able to handle legacy IN/CAMEL

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1 See also the article by Johan De Vriendt, Gary Hanson and Alistair Urie, in ATR Q4 2005 at http://www1.alcatel-lucent.com/atr/DATR_table_of_contents.html?atnissue=tm%3A172-519481635
signaling as well as SIP-based service control. The Alcatel-Lucent SDE is able to handle hybrid services such as:

- **Voice Call Continuity (VCC):** As a dual (CS-IMS) terminal comes to a WiFi hotspot, VCC/IMS takes control. As the dual terminal exits the WiFi hotspot and enters a CS zone, radio is controlled by an MSC: inter-working between this MSC and the IMS control ensures that the VCC application continues delivering the service over the CS network. This happens during seamless handover from WiFi to GSM.

- A common pre-paid service between legacy and IMS services handles the unique pre-paid account of the user.

- For an operator providing both IMS and legacy, the Alcatel-Lucent Presence Server contains presence and location (including time zone, type of access) information coming from both IMS and legacy systems. An associated Presence Network Agent obtains relevant information from legacy nodes and protocols.

- The integration of mobile AAA servers and user profile database functions in a single HSS allows IMS and non-IMS (e.g. legacy) applications to share subscriber profile information, thus allowing coordinated service delivery between these environments. For legacy applications that do not store their data on HSS, GUP provides data coherency.

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**Figure 4: Pulling it all together: coordination of IMS and legacy systems**

Co-ordinated Services that may be provided by an FMC operator via hybrid (2G-3G) and (WiFi,...) terminals

- **IN**
- **SIP AS**
- **3GPP and TISPAN IMS**
- **GPRS/UMTS WiMAX WiFi/ADSL**
- **UMTS WiFi/ADSL**
- **GSM/UMTS Call Control**

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**Legend:**

- Hybrid Service Delivery Platform
- Common Network and Service DB (HSS)
- All layers feeding Presence and Location information
- Interactions between session and access for QoS and charging
- Legacy ↔ IMS interworking for call and messaging (SMS)
Conclusion
As networks evolve to IP, operators are concerned about whether they will be turned into mere
connectivity providers. IMS is the key tool for operators to remain in the services arena, thanks
to its ability to provide a balance between attractive, advanced services and integration with existing
services and accesses (Figure 4).

IMS enables a secured service with quality of service guarantees, together with service and network
integration with existing networks (e.g. IMS PES). Furthermore, it ensures proper integration
between the service and access layers (for bearer establishment and for adapted charging), and
with advanced IT-based applications such as corporate business applications.

Several things are required of an IMS solution if it is to enable service providers to migrate users
from legacy to advanced services.

There must be true integration with the access layer, especially for mobile. Its Service Delivery
Platform must inter-work with legacy and IMS Core systems, and with other networks and business
logic via Web Services. Strong and scalable security must be provided by its Border Node.

Finally, its Application server must be sufficiently flexible to quickly prototype and then deploy
new applications, and to build an IMS ecosystem including support for terminals from many
different vendors. ⬤

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