

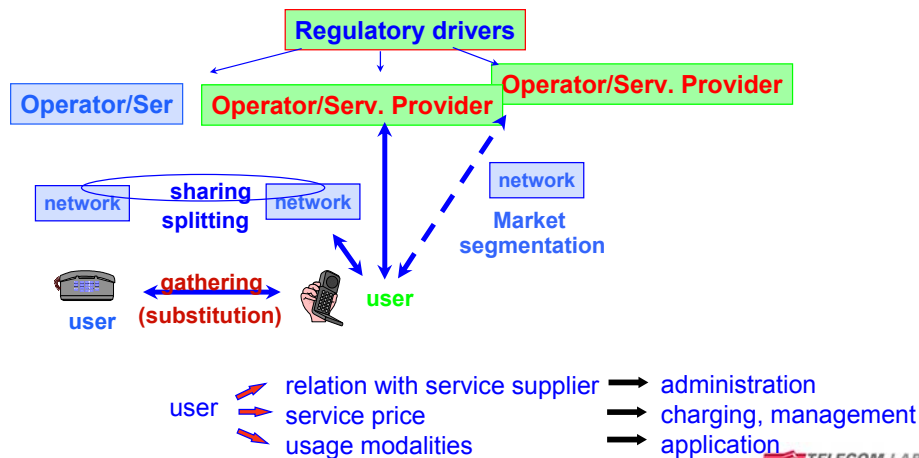
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Convergence and IN

**Politecnico di Torino
2006**



Fixed – mobile convergence a reference scheme



In the competitive context the mobile communication is experiencing, some elements suggest to consider the advantages offered by the fixed-mobile convergence.

- the continuous reduction of the economic return per user
- the growing need of improving service time to market in a full connectivity context
- the growing impact of the infrastructure costs.

In spite of the convergence drivers and regardless the Operator's needs, the user would have:

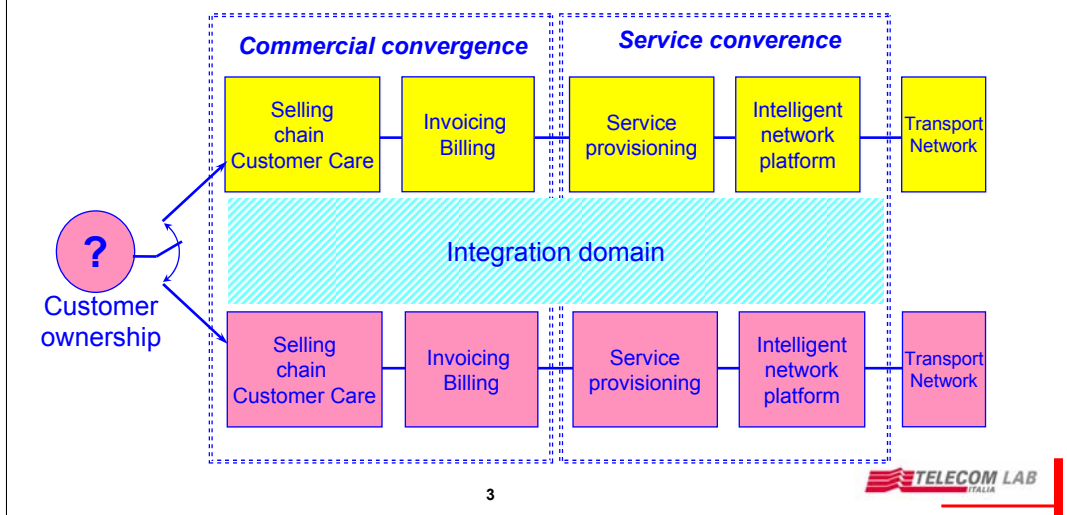
- a better service quality, mostly in terms of transparency of both service offer and service simplification
- a better service (terminal) usability and a service transparency with respect to the access technique and the context where service is used
- a transparent service price.

Any convergence model must take into account several factors, ranging from technical to market level. The Regulator defines the framework bridling the Operator's and the Service Provider's choices can take place. Constraints and rules are put in place by acting on: spectrum assignment, accessibility of third parties to common resources, regulated prices.

On his side, the User is facing two aspects of the service supply:

- The commercial organisation of the service supplier (*service selling, customer care, billing*)
- The service and the degree of service quality.

Fixed – mobile convergence the service chain



The User is then facing several *degrees of freedom* in his choices. The latter range either within the context of the same Operator (or Service Provider) or between different Operators.

Among these possibilities, one of the most evident consists in changing his role, from *fixed* to *mobile* user or vice versa.

Considering the User's degrees of freedom, the Operator controls some important attraction tools:

- adopting advanced solutions leading to substantial savings of the Capital and Operational expenditures related to the network infrastructure
- improving the service accessibility and interoperation between the mobile and the fixed service mode and increase the interaction level also towards the other Operators.

In general, acting simply on the cost saving is not enough: most of the convergence choices are in fact addressing the service and the administrative aspects that can achieve a much greater impact on the market side.

The phases of the service chain that can be addressed in a convergence perspective belong to several segments of the chain itself: the commercial segment; the service supply segment and the service creation/control segment.

Short term approach in F-M convergence - service bundling

- often compatible with national regulation (UK, Germany, Norway)
- it must not include cross-subsidy mechanisms
- service management and support chains affected
- no network modifications are needed
- service continuity

Evaluation criteria



- induced retention level
- service differentiation opportunities
- level of reciprocal advantages between fixed and mobile operators

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For instance, the convergence between different networks and the related services can be fully recovered through the capacity of the terminal to access and inter work with several networks (*multi mode* terminal). This configuration does not require (in principle) any modification in the reference networks.

However, also in this case, some modification should occur at the level of *network intelligence*.

The *Service Bundling* may represent a short term convergence choice and it is simple to realise. It consists in the grouping of mobile and fixed services in a single contract, with the commercial implications as well as the service use and the administrative consequences. The User can take advantage from this service configuration:

- price advantages (e.g. volume-based pricing for *business* users)
- single relation with the Operator/Service Provider (single billing and single point of contact).

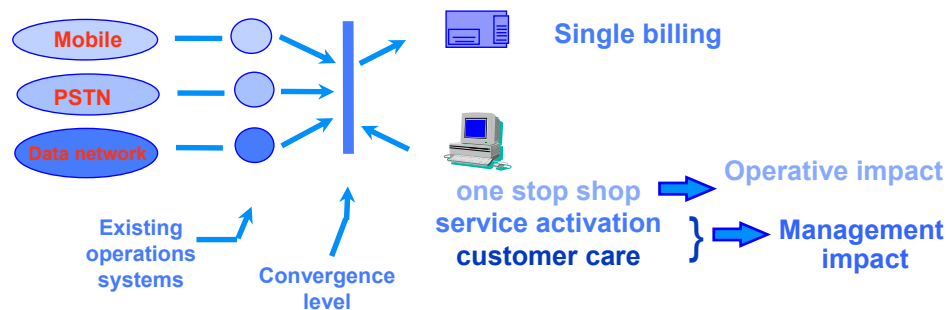
The *bundling of services* increases the degree of user retention and allows the Operator to tune his pricing policy in function of the addressed market segments.

The *service bundling* is however limited through regulatory constraints (e.g. no cross subsidies between different Operators).

F-M commercial convergence

Advantages

Single contract
service offer visibility
customer care, billing, selling costs
customer retention



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Reducing the contact points between operator and user to one, may present considerable advantages for both.

The “one stop-one bill” rule offers the user of convergent services:

- a single point of contact for any customer-tied operation, hence a lower overhead
- an easy extension of the service profile to innovative service packages
- an easier way to understand service conditions and opportunities.

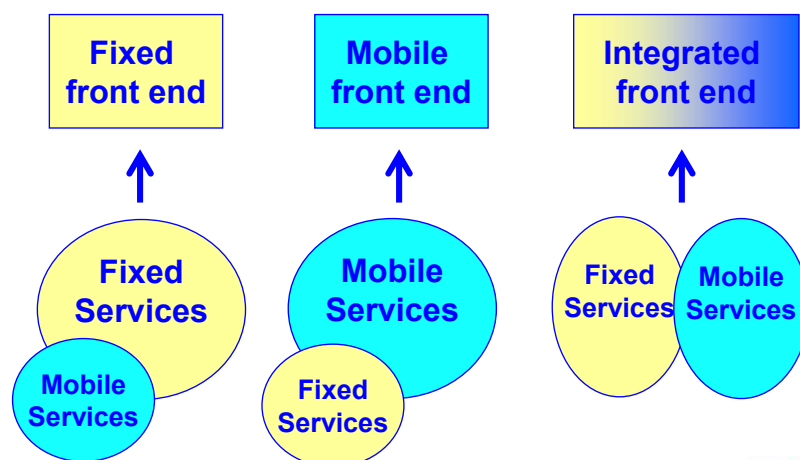
On the operator side, this solution leads to:

- a cost reduction for the customer care functions
- more powerful opportunities for commercial differentiation and extensions (e.g. fixed-mobile market overlapping)
- a more efficient use of the involved infrastructure and provisioning tools.

This kind of convergence can be reached by introducing convergence systems which represent an add-on to the existing systems. Of course, this would imply strategic alliances between fixed and mobile vendors.

The integration of commercial chains and processes can be tied to any service convergence configuration.

Service offering for fixed - mobile convergence



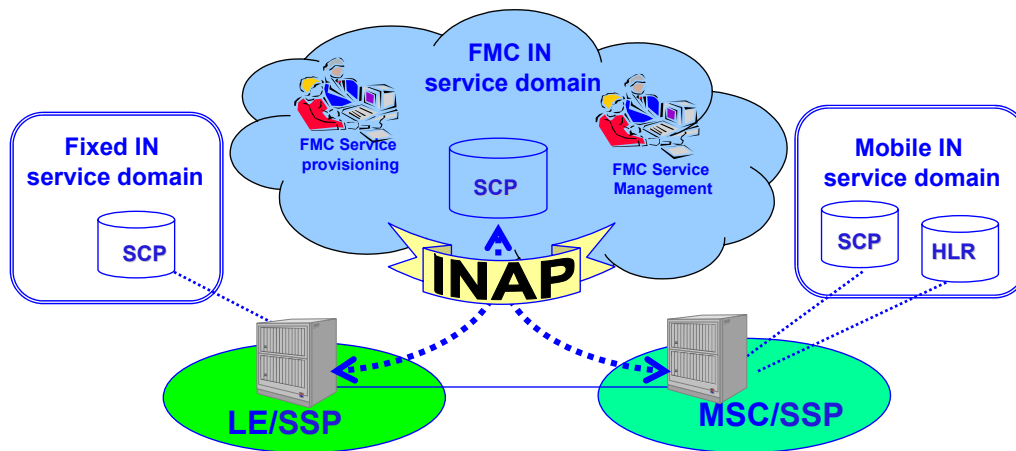
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Concerning the relationship with the end user, the convergence strategies are adopted in function of the positioning of the operator, i.e., whether fixed or mobile, and whether incumbent or new entrant. Fixed and mobile operators intending to offer convergent services, must exploit appropriate alliances aiming at the integrated offer of service packages.

Within a convergent offer, each of the two operators (fixed and mobile) can address his typical customer base with some of the services of the other operator, as indicated in the first two cases of the figure. This solution implies that one operator is assuming the role of service provider for the other. A joint role of the two operators with respect to the potential user is sketched in the third case of the figure. In this offer configuration, a third party role has typically to be identified.

The possible relations (and the relevant regulatory constraints) arising between operators and service providers are of course determining the most suitable service offering configuration.

Fixed - mobile convergence Intelligent Network role



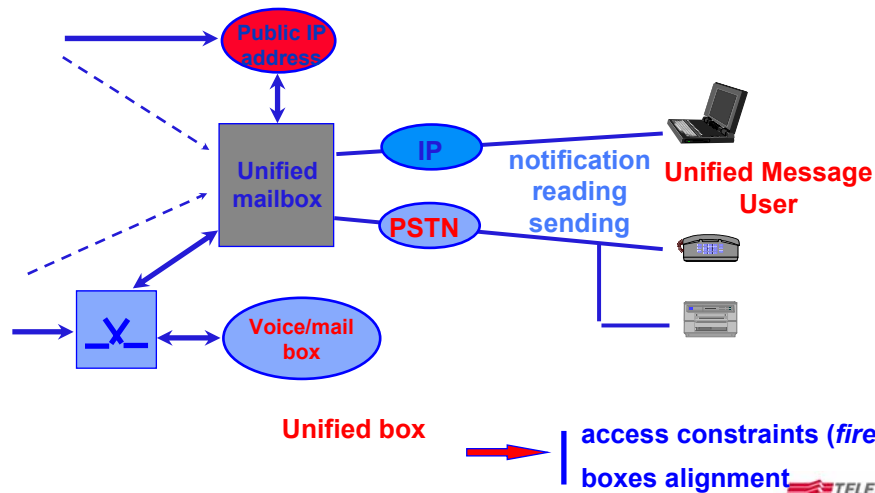
Intelligent Network functions and the related platforms are key elements to enable the integration of fixed and mobile services as well as seamless service provision to roaming users.

The definition of the IN functions, is nowadays completely polarised by the evolution of the IP-based services. In any case, the definition of convergent services depends on the possibility of realising control functions interoperable between the two networks.

Hence, to evolve from the present situation (separation between the two networks), a master IN network operator should be identified for service delivery and a convergent service control.

Mobility management features for mobile users will be in any case independent of the IN-based service control and will rely again on MAP or MAP-enhanced protocols.

Convergence on messaging unified messaging service



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The unified mail box service allows the user to receive and send any kind of messages (voice, fax, e-mail) through his (virtual) mailbox. This can be done through any kind of terminal (fixed, mobile, screen-phone, PC) and through any kind of network (fixed, mobile, Internet).

The figure highlights the case of unified mailbox realised at the level of the fixed network only.

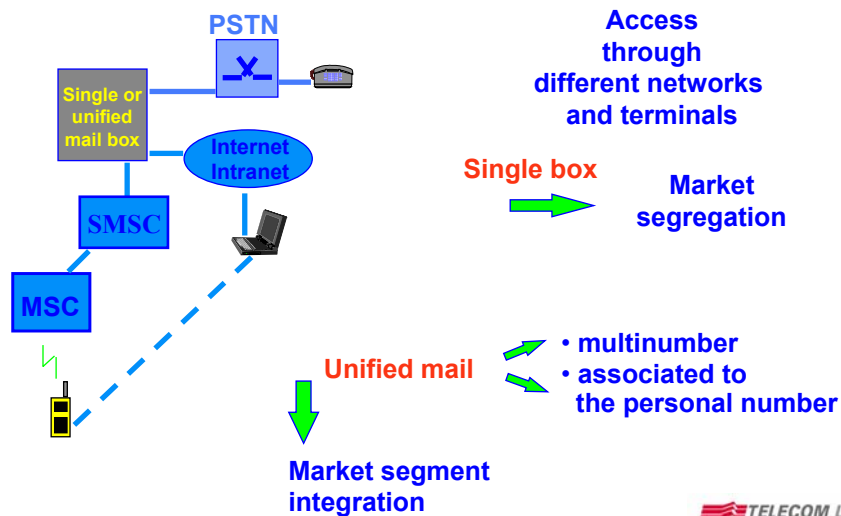
The unified message user is notified of any new message reaching the unified mailbox.

The user accessing the unified mailbox through a PC, may listen to and register new messages as well as send new messages through his fax or e-mail applications.

The telephone user may access his own voice mail and re-send related messages to any new destination (call return); he may print and transfer faxes and listen (text-to-voice) and print e-mail messages.

Some important opportunities are associated to the Unified messaging service: it may induce a high level of customer retention, since it aggregates different user roles. In addition it can be associated to the personal number service.

Unified messaging in the fixed - mobile contexts



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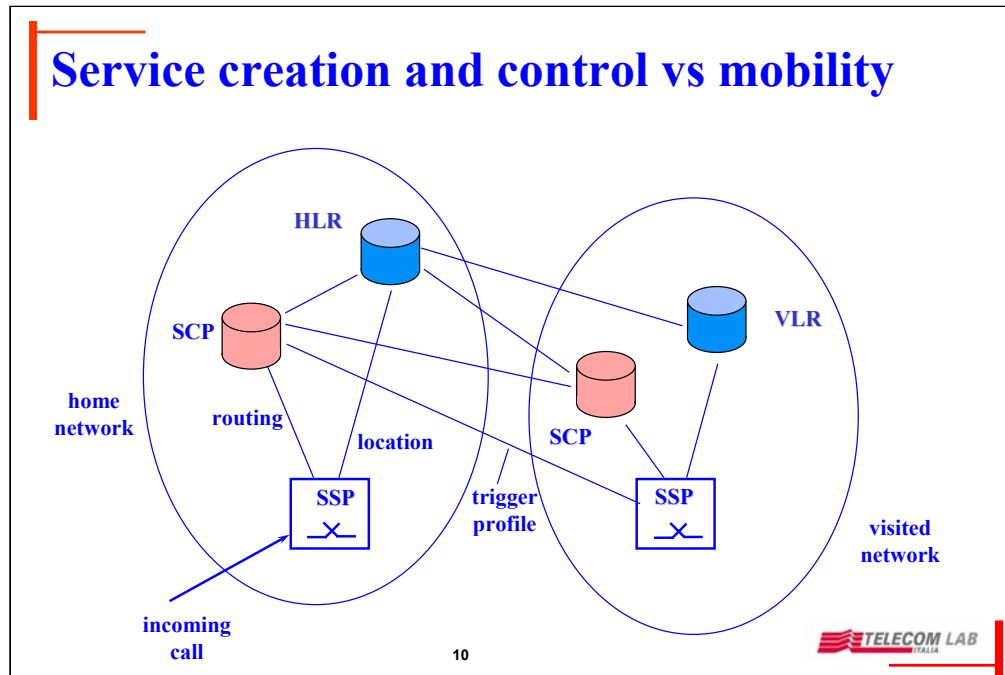
Of course, the Unified Message service may group fixed and mobile roles as well.

In a convergence perspective, two configurations can be envisaged:

- The multi-number unified box to which all the user numbers (still used by the calling party) are associated (cellular phone number, one or more domestic or business numbers, fax numbers, e-mail addresses). The Unified Messaging subscriber can interrogate all his messages by accessing the unified box either by means of a fixed/mobile telephone or a PC.
- The single number unified box; in this case, a single number is used by the calling party to send messages to the user. The unified messaging user can then access the single mailbox, regardless the current access termination (fixed or mobile).

The implementation of Unified Messaging services does not necessarily imply an integration of the pre-existing messaging platforms. It simply requires inter-working solutions realising the appropriate alignment of the involved platforms. For incumbent Operators, the Unified Messaging configuration, (particularly if associated with a discount mechanism) could represent a further element leveraging the customer retention objectives.

Service creation and control vs mobility

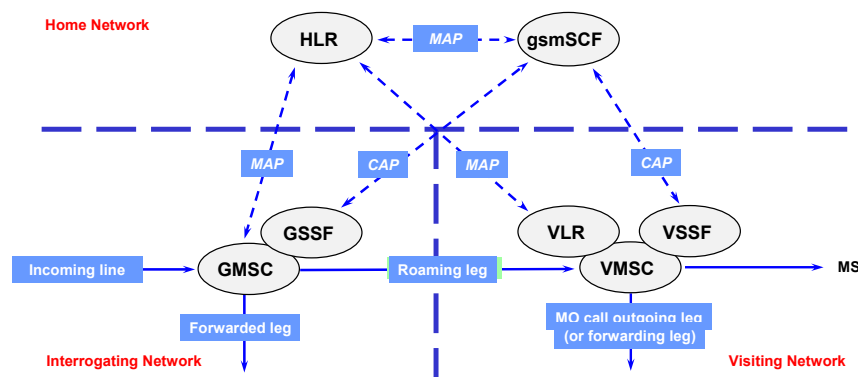


Important similarities exist between the typical Basic Call Processing-Service Logic of IN and the Query and Location Management procedures needed within a cellular network. So, in principle, significant levels of integration can be foreseen between the two contexts about service (and possibly mobility) control.

Nevertheless, some elements make this convergence quite complex to attain:

- in the mobile context, non-call related state models have been developed (e.g. location updating and registration)
- SSP-SCP triggering profiles can be defined in a fixed way; this is not true for mobile networks, where they are supplied to the visited network upon user registration
- the same SCP can be queried by different SSPs along the same call: the visited can act for arming the triggering profiles, the resident to optimise the call routing
- service control interactions can arise either along or outside a call; this requires that new interfaces are developed between SCP and HLR.

The GSM Camel service



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A good example of the above difficulty is offered by the solution adopted within GSM to offer service mobility to the GSM users roaming outside their home network.

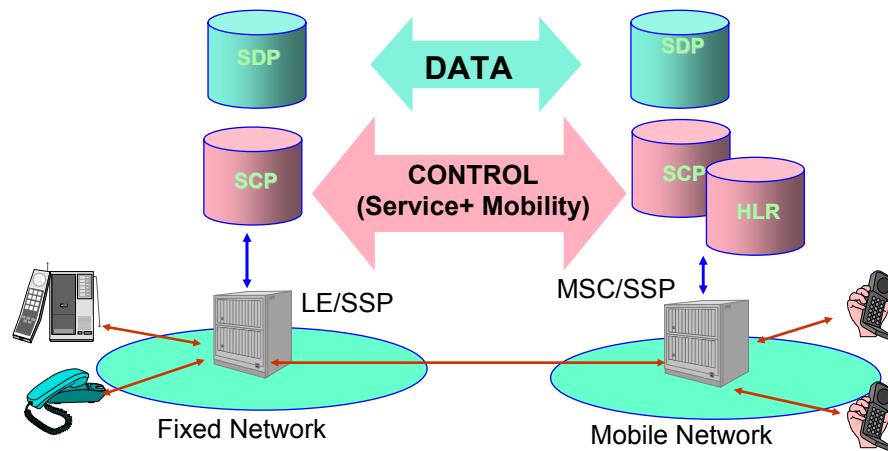
Being INAP an “open” standard, if the inter working between two GSM networks is pursued, the operators can either agree on a common INAP version or, conversely, adopt a newly defined protocol solution.

CAMEL (Customised Application for Mobile network Enhanced Logic) plays exactly this role. It realises a complete service transparency between different GSM networks through the definition of common interfaces. CAMEL Application Part (CAP) is an application based on ETSI Core INAP CS-1 specifically developed for GSM. Within any GSM network, RI-like solutions will enable operators to develop user-specific service profiles (beyond the standard supplementary services).

CAMEL allows to supply IN services also to a roaming user (whenever the visited network supports CAMEL services). If a roaming user asks for an IN service, CAP re-routes the call to the home network, where the local INAP can be used with its full capability.

CAMEL services can be activated on mobile originated or terminated calls.

Convergence - IN platforms alignment (I)



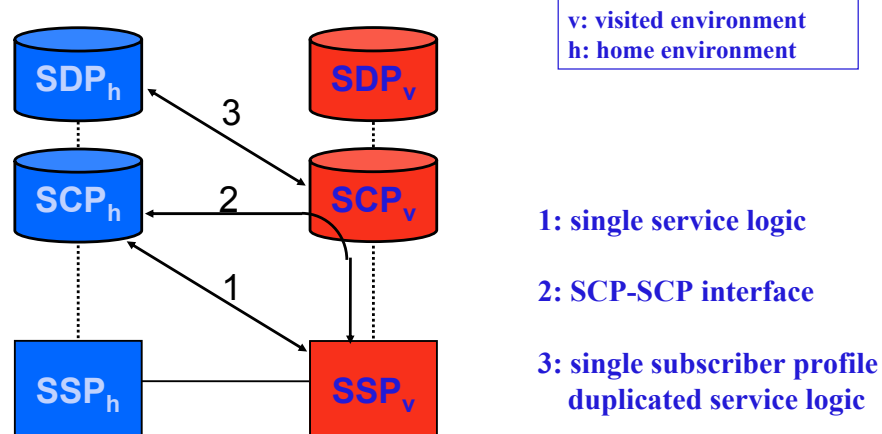
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The integration difficulties suggest to limit the integration level to the alignment of fixed and mobile IN platforms (namely the relevant service control levels). Just the service control level is integrated.

Whenever user data are exchanged between the two networks, a real time alignment of network databases is needed in order to maintain user data consistency (for instance the access point of the visited network).

Convergence - IN platforms alignment (II)



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Concerning the information exchange between the home and the visited networks, two types of functional interfaces are to be considered:

- the control interface, where service and mobility procedures interact; these procedures are activated both in-call and outside the call (call and non-call related state models developed in the two networks should be compatible)
- the data interface, where user data profiles can be seen or accessed in both networks; this type of interaction is possible only if the two networks share the same data model.

The figure shows alternative solutions for the IN context dialogues needed to realise the complete transparency between the networks (v and h suffixes stand for visited and home respectively).

- A direct SSPv-SCPh dialogue on a service and per call basis (option 1) implies that a single service logic and subscriber profile are present in the home network; data configuration is needed at the SSP level for triggering criteria.
- A mediated SSPv-SCPv-SCPh dialogue on a per call basis (option 2) require that a meta-service logic is implemented in SCPv; the SCP-SCP interface is not “standardised” for the hand-over of call control function; no impact to SSP capabilities and SS7 network.
- A direct SCPv-SDPh dialogue on a per call and subscriber basis (option 3) requires a duplicated service logic at SCP level but a single subscriber profile is present (in SDPh).