Communication management or "How to use presence information"

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Any kind of communication needs at least two persons, a topic and a communication channel. The mobility of the communication devices (Mobile, Handheld, Notebook) and the growing options of communication channels (Voice, SMS, Email, Instant Messaging, Combox® etc.) make it more and more difficult to choose the right channel at the right time to reach a specific person. This is where in the near future (about 2–3 years) users will be supported by a Communication Management offering to benefit from presence information and to communicate across channels.

The CTO Office supports the Swisscom CTO (Chief Technology Officer) by tracking technological developments, market trends, and strategic research. The objective is to deliver aggregated technology forecasting and to provide an expert view on technological trends to ensure future-proof technology management within the Swisscom Group. The programme also runs an office in Silicon Valley to closely monitor new developments in the telecommunication industry and to establish business relationships with attractive startups.

With its Innovation Programmes, Corporate Technology follows the objective of recognising the impact of technological developments early on, finding new business opportunities, promoting technical synergies, and developing concrete innovation proposals. Further, the expertise built up enables active engineering support of business innovation projects.

The communication market currently shows Telcos and ISPs offering communication services like phone, email, instant messaging etc. But as these services are becoming a com-

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modity they have to be offered at lowest cost. Therefore they will not be profitable in the future.

The importance of presence information for communication is emphasised by the growth of instant messaging. Knowledge about the communication possibilities and the current state of a person is an important form of communication itself and will be the key driver for unified communication.

Providers of Internet services are growing from content to communication by providing services like instant messaging, chat and voice calls. They put focus on integrating these new services into their existing ones (e.g. address book, communities, content etc.). Their goal is to become a communication portal, too. Examples are:
– MSN with the MSN Explorer and MSN Messenger
– Yahoo! using the Yahoo! Messenger and myYahoo
– AOL using the AOL Instant Messenger
The incumbents in this area (classical Telcos) could respond to this trend by integrating their core services into a communication portal and grow into content services.

Another functionality targeted by Internet startups is the one-number concept, although previous attempts at providing one-number services failed. But their advantage is to use Internet instead of PSTN technology and, by doing so, to be open for any useful, fancy or currently hyped service or content combination. Normally they offer a complete set of communication services which are reached by one number. One example of such a startup is www.uReach.com. Telcos should investigate combining their phone-based one-number knowledge with Internet communication services.

The Future Communication Management
Please refer to figure 1 for a visual representation of the "Communication Management" concept:

(1) In order to offer integrated communication across devices and technologies, different networks have to be linked. Best known *communication networks* are the PSTN and the Internet. This is needed to allow communication across networks using channels like Voice, Email, SMS, Fax, Instant Messaging independent of the network connection.

(2) *Communication Applications* combine the functionalities of communication channels (Voice Call, Voice Message, Text Chat, Text Message). Every device class needs its own implementation of the Communication Application, with the goal to communicate across devices and technologies. An example of such a Communication Application would be a PC client allowing Voice Call and Voice Message across the PSTN and the Internet, Text Chat across SMS and Instant Messaging, as well as Text Mes-

sage across SMS, Email or Fax. Current Instant Messenger Applications fulfil quite a lot of these functionalities (see at the MSN Messenger).

(3) Once it is possible to communicate across networks, devices and technologies, the next step is to offer options in managing the personal communication preferences. This can be done by creating a personal Communication Profile by which the currently available communication channels and reachability preferences of a person are stored. This Communication Profile is the fundament of a person-oriented one-number concept. The Communication Profile supports the Communication Applications in providing the current reachability of the communication partners.

(4) *Privacy Management* allows the users to maintain their personal communication data. It allows them to keep all phone numbers up to date or to disable emails that should no longer be used etc. The personal communication data can for example be published in a public address book. To guarantee privacy the owner of the communication data decides who is allowed to use what information for which purpose. It should also be possible to publish the Communication Profile which would facilitate communication between persons.

(5) The user can manage the personal Communication Profile manually, but it is more convenient if it is updated automatically. The automatic update of the Communication Profile should include monitoring of services (e.g. mobile turned on or off), time based changes (e.g. weekdays or weekend), location based information (e.g. at work or at home), and switching contexts (e.g. meeting, abroad, holidays etc.). To dynamically reflect the current reachability status in the personal Communication Profile it is necessary to add state *signalling* from devices, services and networks.

Communication Applications
Future Communication Applications can for example offer 4 person-oriented communication channels and integrate them across devices, services and networks. Each communication channel will include specific options and offer well-defined media breaks. If, for example, a voice call cannot be initiated because the
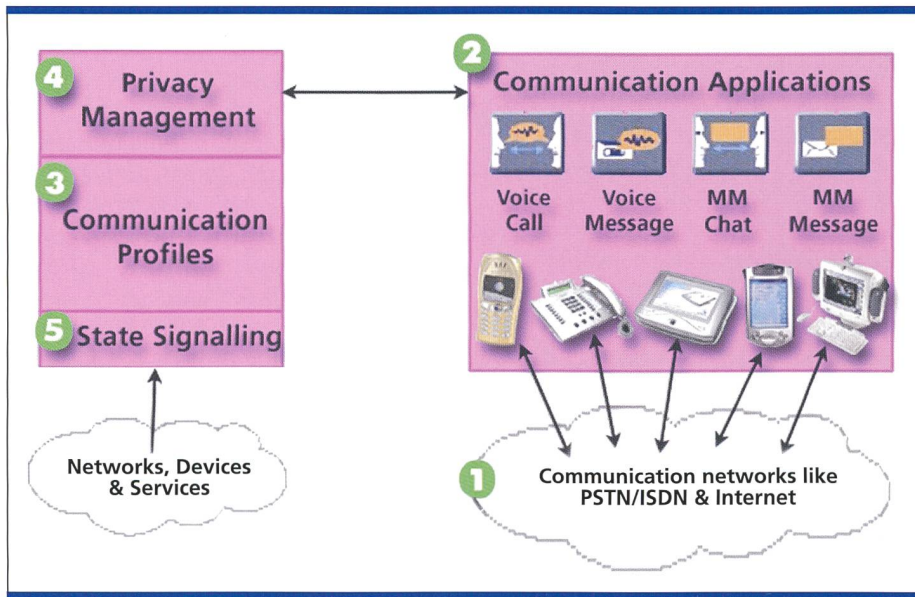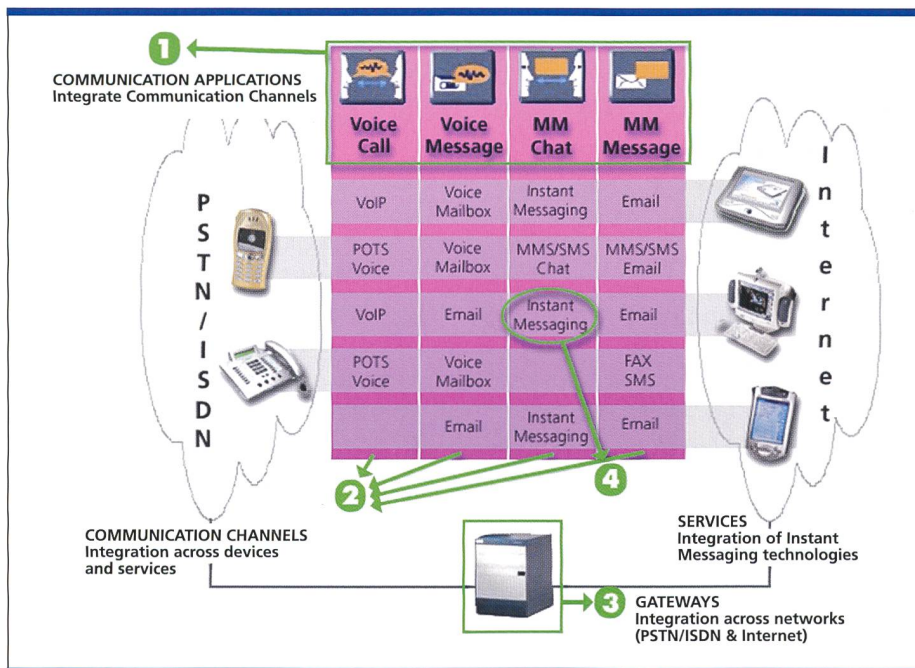
Fig. 1. The Communication Management concept.

Fig. 2. Four different communication areas need integration.

(2) Every communication channel integrates different technologies and devices. For example, the channel "Voice Call" has to integrate PSTN/ISDN Voice and Voice over IP (VoIP) for the devices mobile phone, fixed phone, Screen Pad and PC. Another example is the integration of the channel "MM Message" that includes Email, MMS, SMS and Fax for all device classes.

(3) The provision of communication channels requires an integration of networks. For example, the Voice Call needs a gateway between the PSTN/ISDN and Internet to allow integrated Voice Calls. Another example is the sending/receiving of MMS/SMS and email that requires a bi-directional integration of MMS/SMS Centre and email boxes.

(4) There are communication technologies that are an integration task themselves. For example, the Instant Messaging has to integrate AOL Instant Messenger, ICQ, Yahoo! Messenger and MSN Messenger. There are Internet companies focusing solely on this task (e.g. www.odigo.com, www.jabber.com, www.bantu.com).

The Communication Profile

The Communication Profile contains all communication addresses of one person. By defining presence states that activate or deactivate communication addresses the user controls his reachability. Thus the Communication Profile is a sort of one-number concept. The big difference from an ordinary one-number solution lays in the fact that a person and not a number is the key to start any communication. Therefore it is independent of devices, services and networks. Each user would just have an entry in a public directory, which then references one personal Communication Profile, i.e. individuals, families, clubs, companies and commerce will be linked by their own Communication Profile. These profiles will be filled with all publicly available communication addresses (e.g. all data in the ETV).

In order to get an idea of how this looks please refer to figure 3:

(1) In addition to the public data, the entry owner will add further personal communication data like work phone, emails, instant messaging IDs, etc., resulting in almost complete sets of

other side is busy, then the user will be offered to knock, to call back when finished or to send a voice message instead. The last option is called a media break, because a communication channel other than the initial one gets used at the end.

All communication channels will support point-to-point as well as group communication, i.e. a point-to-point voice call could easily be expanded to a group conference (e.g. a climbing group discussing the next climbing session). Furthermore,

the user is supported in switching between or adding another communication channel while communicating.

For an overview please refer to figure 2:

(1) The Communication Applications offer basically four communication channels: Voice Call, Voice Message, MM Chat and MM Message. Every device class (mobile phone, fixed phone, Screen Pad, PC/Laptop and Pocket PC) needs an implementation of the supported communication channels.

communication addresses linked to one person, a family, group, or a company.

(2) All the registered communication addresses have to be monitored if they are enabled or disabled. This can be

done either manually by the user or, more conveniently, automatically derived from services and networks linked with the communication addresses.

Fig. 3. A personal representation of the current reachability.
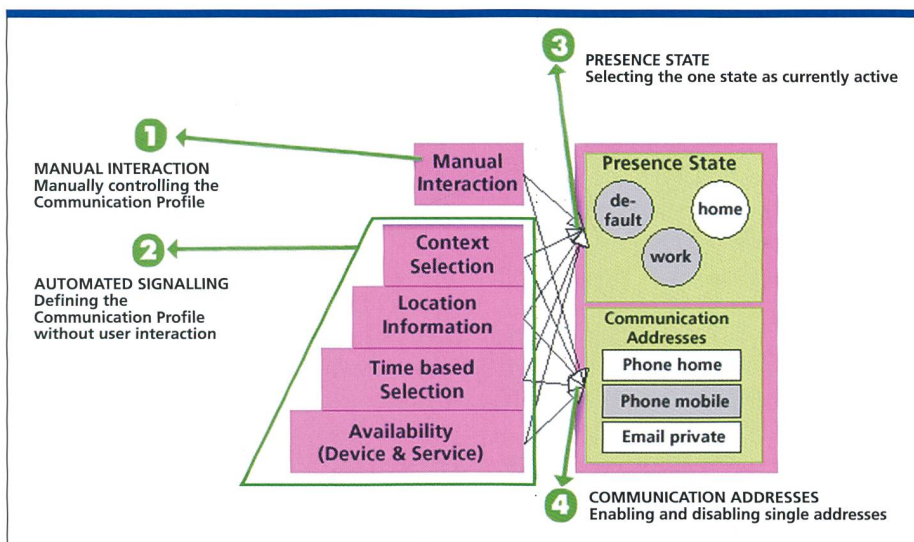
Fig. 4. Presence Information enables selective communication.

(3) The Communication Profile contains different presence states linked with the owner. One of them is selected to be active. This selection of the current presence state is done manually or automated by the status signalling. Each presence state activates and deactivates a subset of the communication addresses. In addition, every presence state can refer to an exception list, giving persons access to communication addresses although these addresses are currently not activated.

(4) Every Communication Profile has one predefined presence state. It is called *default* and is filled with all publicly available communication data (e.g. phone number, fax number and email registered in the Swisscom directories).

(5) The exception lists open access for specific persons to communication addresses even though they are deactivated by the current presence state. This allows defining a presence state which disables all phone numbers (if e.g. in a meeting) while still enabling one number (e.g. the mobile phone) for important persons (e.g. the wife/husband).

(6) The activation or deactivation of communication addresses by the currently active presence state and the exception list are superpositioned.

Out of this results the current reachability of a person A valid for person B. This information will be used if person B wants to call, chat with, or email person A.
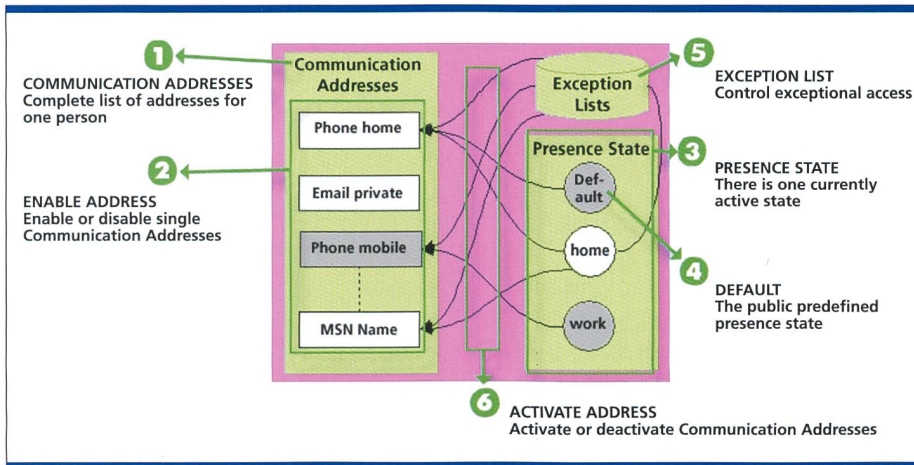
Status Signalling

Status Signalling keeps the Communication Profile (every single communication address and the presence state) up to date. In order to do this for the user in a convenient way there are two different approaches. The first one (overruling every automated signalling) is the manual interaction allowing the user to keep control on his/her communication profile. The second one is the automated signalling, which makes life easier.
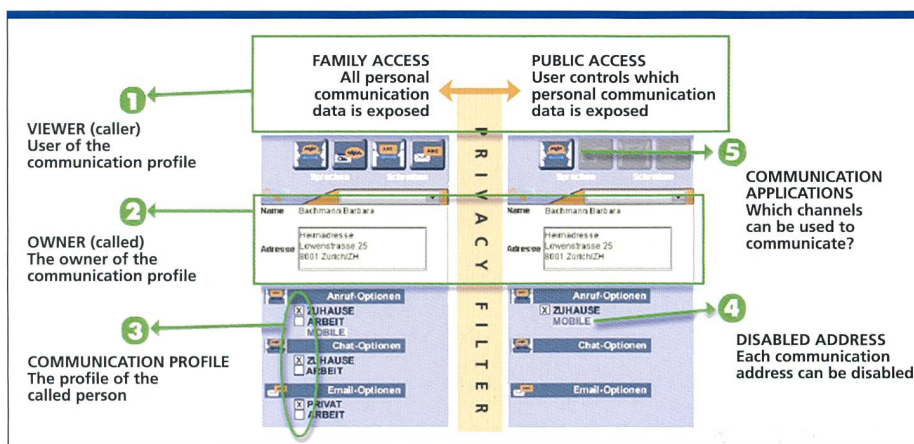
An overview of these ideas is shown in figure 4:

(1) The manual interaction allows the owner of the Communication Profile

Fig. 5. An example of how to combine an address book and Presence Information.

to manually select the current presence state and/or to define which communication addresses are enabled or disabled. By this the total control of personal communication options and reachability is given to the users.

(2) The Status Signalling automates the management of the Communication Profile wherever possible. There are 4 different layers defined which are overruling from top to bottom, i.e. the selection of the current presence state first investigates if a context selection is active. If not, the location information, time based selection, and the availability are checked in this order.
Context selection: You are in a specific context (e.g. a meeting) defined by selecting the profile meeting on your mobile.
Location information: Your geographic position is derived (e.g. via GPS or GSM), which then selects home as the current presence state.
Time based selection: There are fixed working days, holidays or free days that automatically switch the presence state from home to work to holiday etc.
Availability (devices & services): You turn off your mobile phone, which then automatically disables the mobile phone number. Or your MSN Messenger is disabled because you are logged off from AOL Instant Messenger.

(3) One currently active presence state is selected. This takes into account the overruling of manual interaction and automated selection.

(4) Every single communication address can be enabled or disabled. For some addresses (like mobile phone numbers) it is easy to map a network service (e.g. GSM reachability), for others (e.g. email addresses) it is quite difficult.

This combination of Presence Information and Communication Addresses enables personal-need oriented communication. Instead of being reachable any time, anywhere, and on any device, the users decide themselves about their personal selective reachability.

Example of a Communication Management

Figure 5 shows a Communication Management example implemented in the *ComSpace* demonstrator developed at Corporate Technology. Here, the Communication Management is linked with an address book containing Presence and Communication Information. It presents the Communication Profile (as outlined above) of one person and how it is published to people with different access rights (based on the exception list).

(1) The person viewing a Communication Profile of someone else may only be permitted to view parts of it. It is possible to protect single addresses or the whole Communication Profile. In this example the family has access to all communication addresses, while the public only views the phone numbers for *ZUHAUSE* and *MOBILE*. The Privacy Filter controls this access.

(2) The owner of the Communication Profile defines who is allowed to view which communication addresses. Furthermore he/she may define additional personal communication data. The information shown about the owner is the public available postal address.

(3) The Communication Profile shows for each communication address if it is currently activated (☒) or deactivated (☐). This activation state can be defined manually, but is as well monitored automatically by the Status Signalling.

(4) Each communication address can be enabled (e.g. *ZUHAUSE*) or disabled (e.g. *MOBILE*). This decision to enable or disable addresses can be done manually and also automated by the Status Signalling.

(5) The Communication Application immediately shows which channels can be used to communicate with this person. A single click is then needed to send a text message or initiate a voice call.

Conclusions

The creation of a future Communication Management requires the integration of communication networks, communication technologies and devices. For every supported device class an implementation of the Communication Applications is needed. Therefore the following requirements arise:

– The platform for the Communication Applications has to support different device classes like mobile phones, fixed phones, Screen Pad, PC/Laptop and Pocket PCs.

– Every implementation of the Communication Applications for one device class needs instant access to the Communication Profiles.

– The PSTN/ISDN and Internet need to be linked allowing bi-directional communication using Voice, MMS/SMS, Email, Instant Messaging and/or Fax.

The Communication Profile is needed to create a person oriented one-number concept. This implies the following requirements:

– The Communication Profiles need to have permanent access to the status of devices (e.g. mobile phone turned on or off), services (e.g. current presence state of MSN Messenger) and networks (e.g. call forward of home phone number).

– The Communication Profiles will be highly dynamic because they need to reflect the reachability of every user instantly or at least before a call is made.

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