

Seamless Infocommunications

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1. Overview

Nowadays, infocommunications (telecommunications and information technology) have become so widespread that they are having significant influence on our lifestyle. By now, it is impossible to imagine everyday life of modern people without such things as mobile phones, e-mail and the Web. While an intensive development of telecommunication systems is continuing it is mostly determined by the development of transport networks towards increase of throughput, reliability, availability and other factors. Surely, these factors are very important, but they do not directly determine how much valuable these systems will be for human. We believe that in the next coming period an improvement of user value and usability at the service level will become the prevailing trend of an infocommunications development.

We, at the Magcomline Company, see our mission in building human-oriented infocommunications, in which recent achievements of telecommunication and information technology found their implementation in the manner that brings maximum value to the end consumer. To do so, we are developing technologies, solutions and software that allow infocommunication systems to harmonize with a lifestyle, match to psychology and needs of human.

One of the important telecommunication aspects, especially from the user's point of view, is the addressing. Really, it is impossible to make a phone call, send an e-mail or visit a web site if you do not have necessary phone number or address. Of course, you can use a contact list, a phonebook, a directory-inquiry service or a web search engine but their usage consumes much time while not always lead to expected results.

Addressing systems of various modern telecommunication services significantly differ from each other because they were designed at different time on various technological bases. However, all of them are intended rather for ease of automatic address processing than for ease of address remembering. Thus, we need to store and remember a great number of various addresses such as phone numbers, e-mail, web and internet communicator addresses, etc. This made us thinking about following questions:

- Could one choose own address on his or her own being not limited by strict addressing rules of particular telecommunication system?
- Could this address be the same for various telecommunication networks he or she uses?
- Could one be available at multiple alternative addresses simultaneously while using single terminal and user account?

Definitely no. Infocommunication systems those are widespread today are not capable of providing such abilities.

Our flagship technology of **Seamless Infocommunications** (SI) is the unique complex of telecommunication and information technologies and solutions, which for the first time allow positive answering to those questions. The purpose of the SI technology is a creation of unified user [service space](#), independent from addressing and technical specificities of transport networks. Its main advantage is the introduction of the [natural addressing system](#) that is most close to usual ways people identify themselves, each other and surrounding objects.

Let us examine in detail what is the natural addressing and what abilities it gives to the user. If we trace the development of addressing from phone numbers to Internet domain names and recent innovations then the development line becomes clear. This evolution provides the user with more and more freedom of choosing meaningful and memorable addresses while gradually removes technical restrictions to address formats. It is evident, that such evolution will result in the addressing system that is completely independent from transport network specificities and addressing of its technological elements. The natural addressing is just such a system that meets these requirements.

Well, the **natural (free) addressing** is the way of telecommunication customer addressing that allows any user, service or information provider to define own *public addresses* on his or her own without restrictions to a number of addresses defined and their content.

Usually, the **SI address** (natural address) is a textual string that is not constrained by strong technical restrictions in terms of string length, allowed characters, language, etc. This allows customers to express their individuality, business activity, services provided and so on in a form of most appropriate, well memorable addresses. A name of a person, his or her job position or an organization can be such an address. The SI address can also be any unique piece of digital information including those resulting from digital import, like multimedia objects or biometrical parameters.

Like postal addresses and Internet domain names, full SI address can consist of multiple segments. In this case, the second and following segments specify the context (customer group), to which the address belongs. This context can indicate a customer location, organization, interest or activity type, etc. These additional segments help to ensure uniqueness of full address while the first segment may be unique only within the context. At the same time, users operating in the same address context may omit additional segments entering called addresses, similarly to making local phone calls that do not require dialing of country and city codes.

For better understanding of the natural addressing, let us examine its basic elements with their differences from legacy counterparts.

By **public address** we will mean any address suitable for publishing as contact data of the customer. For example, a phone number is a public address while names in a phonebook of a mobile phone are not public addresses because one cannot indicate them as contact data. They are **profile addresses**. Similarly, for internet communicators a Skype login and an ICQ number are public addresses while arbitrary nicknames and other profile data items entered by the user are not usable as a public address.

With legacy addressing systems, a public address is usually a **technological address** determined by means of a telecommunication network. It is hard to remember and has no meaning to the user. This forces the user to create profile addresses, keep own phonebooks and contact lists. With the natural addressing, the user may even do not know technological addresses of his or her terminals because other users need only single SI address to access the user. Thanks to this fact, in many cases, there is no need in keeping profile addresses, own phonebooks and contact lists at all.

Personal ID: an identifier, for example, a number or a character sequence, assigned to the user on a registration to access infocommunication services and used for authorization and billing purposes. Unlike many legacy technologies, the SI technology does not treat a personal code as a public address and the user may keep it in secret. This provides an additional protection level against unauthorized access to the user's account.

The important advantage of the SI technology is the support for multiple own addresses per customer. For each address, it provides an independent ability to control a presence status.

One may consider the natural addressing as just advanced and more convenient replacement to plenty of legacy addressing systems. However, you will really wonder at how implementation of the natural addressing in modern infocommunications significantly changes their usage manner while opens new abilities of a comfortable access to communication services and information resources. It solves plenty of problems the user faces daily while opens new development perspectives for infocommunication and related businesses. Let us examine few examples of accomplishing daily user tasks with legacy infocommunications versus their solutions with the SI technology.

Suppose you have found some web site of a company, shop or organization you want to contact directly. To do so you need to open contacts page and record a phone number or copy an e-mail address specified. Now imagine, how it will be comfortable, if just opened a site with a browser you can instantly connect with a corresponding contact person just by clicking a button

of necessary communication type (Fig. 1. Instant jump from web site browsing to direct communication. Fig. 1 **Ошибка! Источник ссылки не найден.**). At the same time, before starting communication, you can see which communication services are available to the customer, does contact person ready to receive a call now or it currently answers another call, etc. The achieved usability level results from a normal implementation of the natural addressing features and does not require the web site to support any special features. There is no need for the site owner to publish any contact data at all, because with the natural addressing the name of the company or organization is suitable as its web address as well as a public address for phone communication, e-mailing and other services.

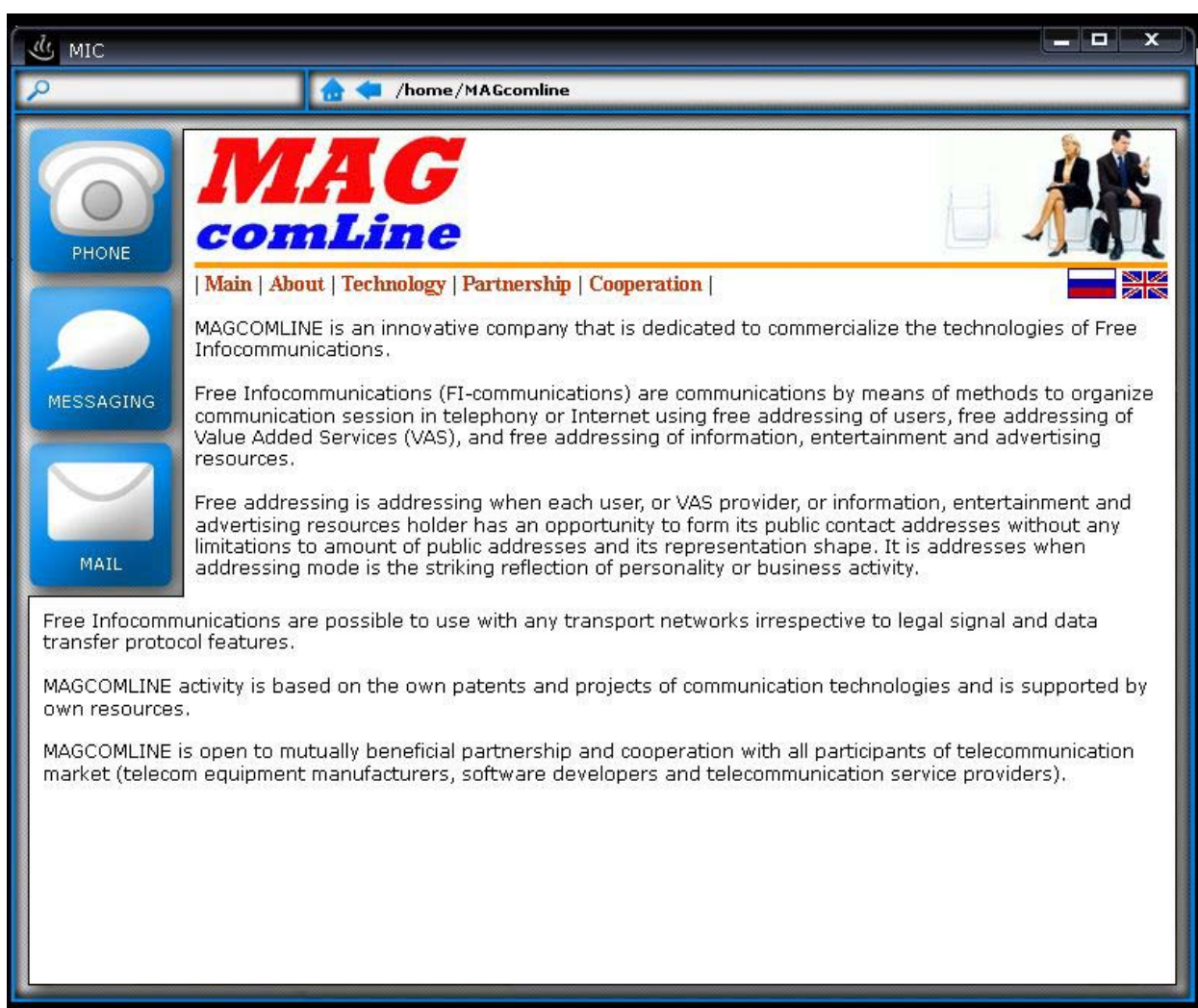


Fig. 1. Instant jump from web site browsing to direct communication.

From the previous example, you may understand that there will be only single address you need to publishing as your own contact data. This address simultaneously plays roles of a phone number, e-mail address, internet communicator account, etc. (Fig. 2). Moreover, this address may be a usual name of the user or organization, so you can easily remember such addresses because there is no need to keep any additional numbers or addresses in memory

except a name of a contact person or an organization. This also makes advertising significantly more effective because there is no need to specify hard-to-remember numbers and addresses in promotion materials. A potential customer needs only to know the trademark or the label of advertised company for a communication.

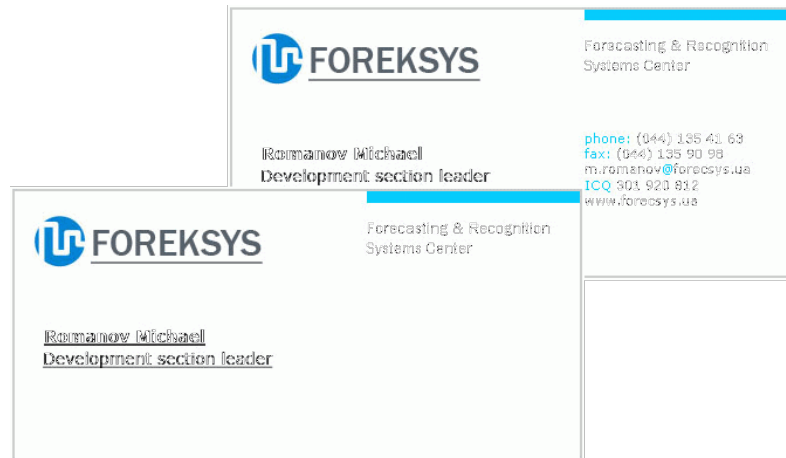


Fig. 2. Own names and organization labels are only contact data that SI technology users need to publish.

Do not forget the fact that every user utilizes telecommunications for intercourse related to various aspects of his or her activity, various parts of life and thus to various contact groups: co-workers, business partners, relatives, friends, neighbors, partners in a hobby or sport, etc. Many of us use two or more phones, e-mail boxes, internet communicator accounts just to divide business and general communication, for example. However, how much more comfortable it would be to keep using the same terminal and the same user account, being represented to various contact groups with various addresses (full name, job position, nickname, alias and so on) providing them with necessary parts of profile data and separately controlling indication of own presence for various addresses (Fig. 3). It becomes reality with an implementation of the SI technology based on multi-address approach to a customer identification and complete support for a presence capability. By managing indication of your presence (readiness to receive a call) at various own addresses you may, for example, suspend all incoming calls from users not related to your job except your family members when you have come to work. Alternatively, while on leave you may disable your public addresses for communication about work staying available for all other contacts.

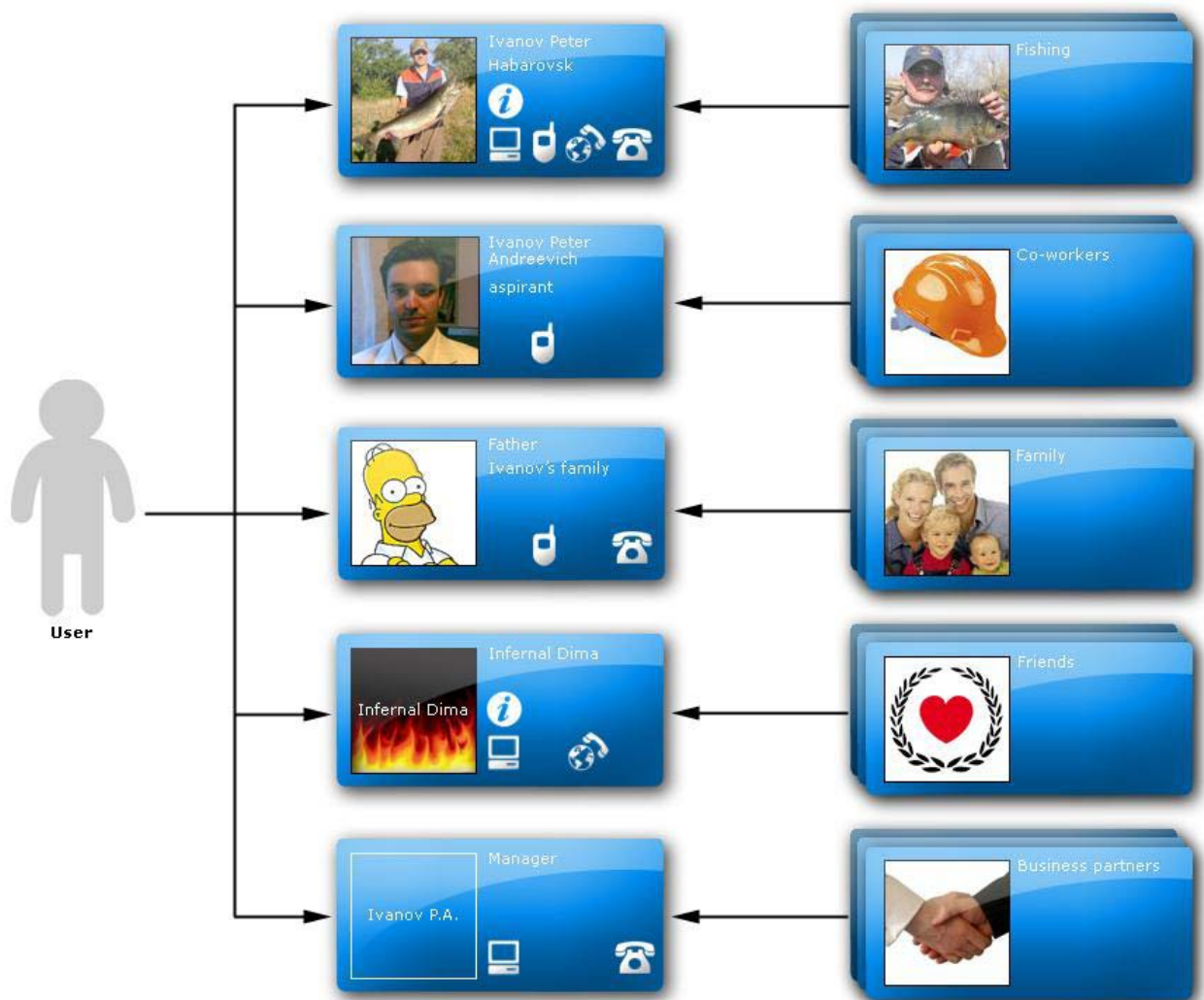


Fig. 3. Usage of multiple own addresses to separate contact groups related to various activity types.

This is just few examples of how seamless infocommunications allow users to accomplish their daily tasks more effectively. For complete list of SI technology advantages do not hesitate to read the charter “[Why Seamless Infocommunications?](#)”. Other charters contain detail descriptions of various SI technology aspects:

- [the natural addressing system](#), the SI technology is based on;
- SI technology [software components](#) and their operational prototypes;
- building unified [service space](#) on the foundation of the SI technology;
- and [advanced technologies](#) solving vital problems of infocommunications.

2. Why Seamless Infocommunications?

The rapid development of telecommunication and information systems (infocommunications) results in their very high level of technical perfection achieved now. However, their users are still daily facing many problems that we cannot call purely technical. These problems arise from dissociation and incompatibility of various telecommunication networks and systems as well as from mismatch between an automatic logic of their operation and the human psychology, behavior and perception manner.

The goal of the seamless infocommunication (SI) technology development is creation of the unified infocommunication service space that is transparently integrated and free from inherent design drawbacks of modern telecommunications. Its implementation allows the user to utilize full technical potential of communication facilities gaining maximum value to his or her self and spending minimum time and efforts to learning, configuring and maintaining them. Unlike other advanced infocommunication projects, the SI technology is intended mostly for application in existing telecommunication networks and does not need their expansive replacement or upgrade.

The main advantages of the SI technology are:

- Implementation of the unified [natural addressing](#) system that allows customers to define own addresses on their own following conventional ways they used to identify themselves, each other and surrounding objects. Moreover, [the same address](#) of the customer is suitable for various types of communication with him, her or it as well as for accessing the home page or the information resource owned by the customer.
- Ability of the customer to use [multiple own names](#) (addresses) simultaneously to introduce his or her self variously to different groups of interlocutors depending on the communication subject, language of each group and other factors.
- Ability of the customer to stay available at legacy addresses like phone numbers assigned to him, her or it earlier, regardless of a complete switch to usage of SI technology facilities.
- [Full presence capability support](#) for all communication services. Ability of the user to independently control a presence indication for various own addresses and communication services.
- Low probability of a conflict between users, which want to acquire the same unique address. It is achieved by implementation of convenient address contexts.
- Strong user [security](#), absence of spam and protection against unwanted contacts.

- Unified user interface and usage guidelines for various communication services that minimize spending of time and efforts to learn new telecommunication types and services.
- [The new dimension of mobility](#). It is the ability of the user to change an access point, a service provider and a connection type without any change to own addresses.
- Ease of building [social and virtual private networks](#) without lock to particular service provider and usage of special hardware and software.

The advantages of the SI technology referred above provide a basis for development of finished telecommunication products that are easy to integrate with each other, easy to use and intended to bring maximum value to the end consumer.

It is also worth noting that the innovations offered by us are valuable for all the development areas of modern infocommunication market because they are equally suitable for various telecommunication services and network types. Their application opens new horizons of business development for telecommunication service and information providers as well as for any enterprise that uses infocommunications to connect with its customers and carry out business processes.

3. Natural Addressing

The natural addressing of customers (users, organizations, base and value-added services, information resources and systems) is the basis of the seamless infocommunications (SI) technology. The main principles of the natural addressing are:

- **Absence of strict technical restrictions applied to an address.** The customer defines own address on his or her own. Usually such an address is a textual string that is not restricted by strict limitations in terms of a length, characters used and language. However, any unique piece of digital information is suitable as an address including those resulting from digital import like multimedia objects or biometrical parameters.
- **Independence from technological addressing of a telecommunication network.** A customer address depends only on a customer option and does not depend on properties of his or her connection to a telecommunication network.
- **Multi-address approach to a customer identification.** The customer may be available at multiple own addresses simultaneously, each of which was defined on his or her own. For every address, the user can independently state a presence status and communication services for which he or she is ready to receive a call.
- **Unrestricted customer grouping.** Customers may create and join groups connecting users, organizations, services and information systems, which are related to the same area, organization, activity type or interests group. This way, full address of the customer consists of multiple segments, in which the second and following segments specify the group address (address context).
- **Ability to incorporate other addressing and identification systems.** Existing addressing and identification systems like postal addresses, phone or identification numbers can easily integrate into common space of natural addresses because they are subsets of it. This allows users to stay available at their traditional addresses assigned to them earlier as well as to implement national or other addressing and identification systems for direct communication with users. To avoid conflicts, such addresses are registered in special contexts.

The main goal of the natural addressing is to allow infocommunication users to acquire most suitable and easy-to-remember addresses. It allows them to use for a communication session initiation their habitual ways to identify themselves and each other they used in a normal, face-to-face conversation.

3.1. Unified Addressing System for Various Communication Services

Under the SI conception a user identification does not depend on specificities of the physical data transmission environment used, protocols driving the network and technological addresses of its elements used to establish traffic routing. Thanks to this fact, the same public addresses of the user are suitable for various telecommunication networks regardless of their difference in technological addressing rules. The SI technology also provides unification of information resource and system addresses in a similar manner.

Using a present telecommunication terminals Address System of the SI technology enables to combine citizens and organizations into Common Information Space such as «ELECTRONIC MUNICIPAL (REGIONAL) ADMINISTRATION», «VIRTUAL CITY», «ELECTRONIC GOVERNMENT».

Unification of SI user public addresses provides prerequisites for creation of a seamless information environment like "i2010 - A single European Information Space", in which any user has the same own address for the Internet and the telephony.

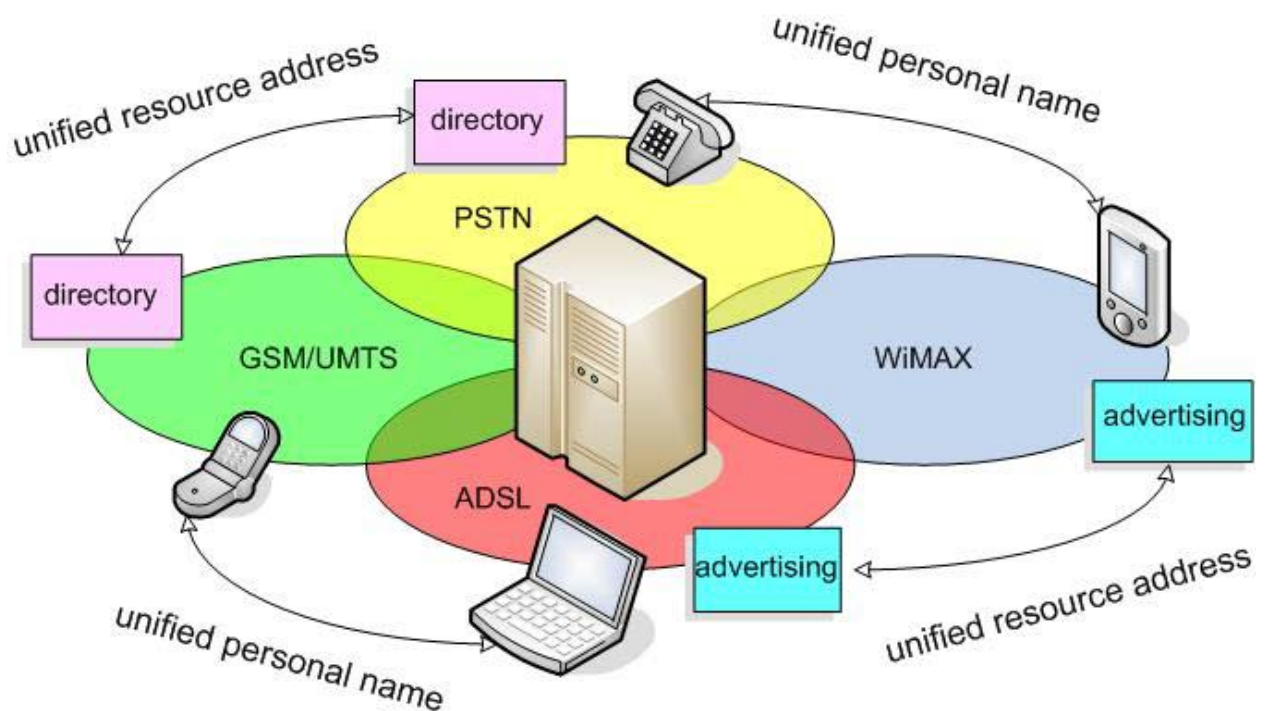


Fig. 4. Unified addressing of users, services and information systems.

3.2. Multi-Address Approach to Customer Identification

The special feature of the SI technology is the ability for a single user to set a readiness to receive a call for multiple own public addresses. SI server stores all the received messages with public addresses in association with the technological address of the device, which sent these messages. If another user requests a call to some personal address matching to one stored by SI server it automatically establishes a communication session between calling and called user terminals. Thus, SI multi-address feature does not depend on features of telecommunication networks.

The user is not limited in the ability to define new public addresses or remove any of previously defined at any time. The user can also temporarily disable some of his or her public addresses by changing their presence status with no need to remove them.

These capabilities allows SI personal address set to be flexible, dynamic and manageable in opposition to fixed, static addresses in legacy addressing systems.

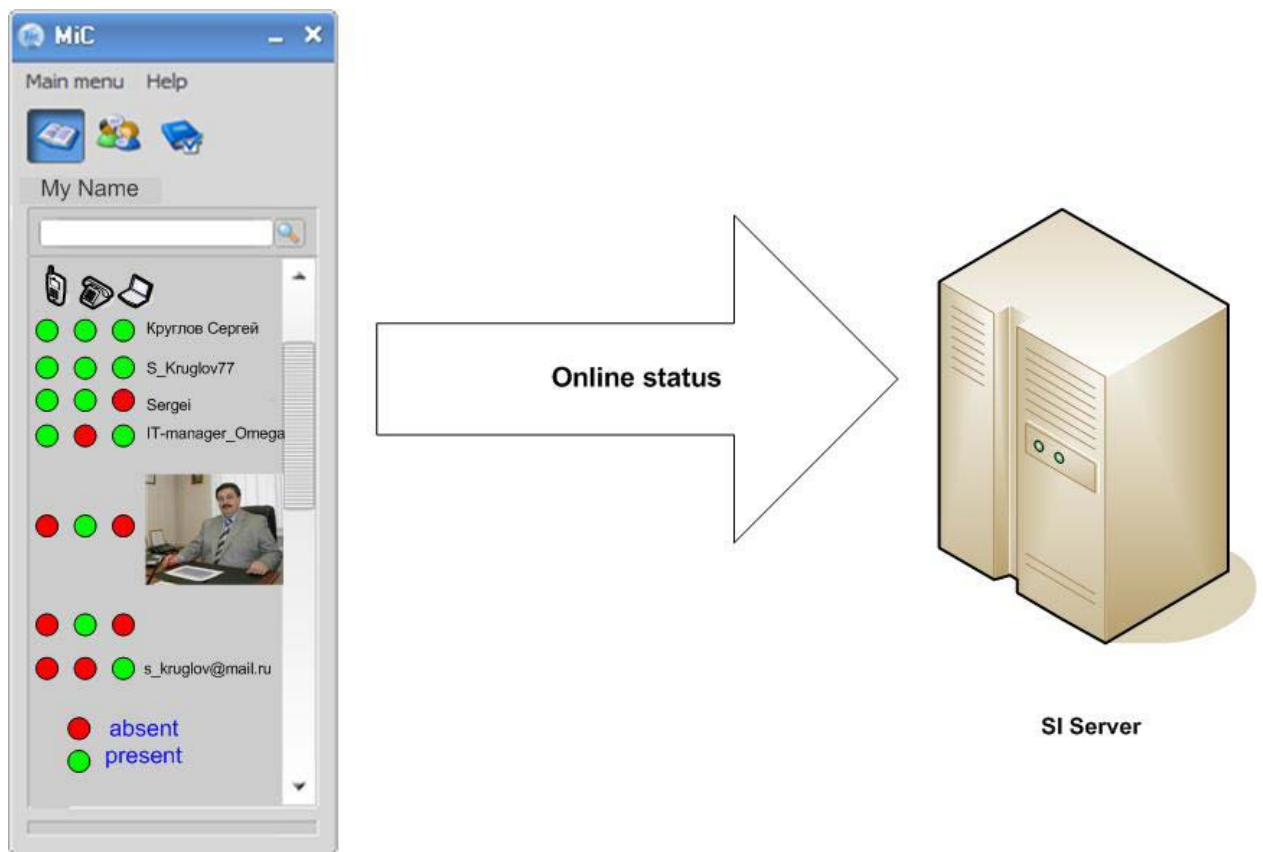


Fig. 5. Public addresses of the user.

The SI technology also provides multi-address approach to identification of value-added services, information resources and systems in the same manner. For example, an information resource provider can define multiple public addresses (aliases) actually pointing to the same resource (Fig. 6).

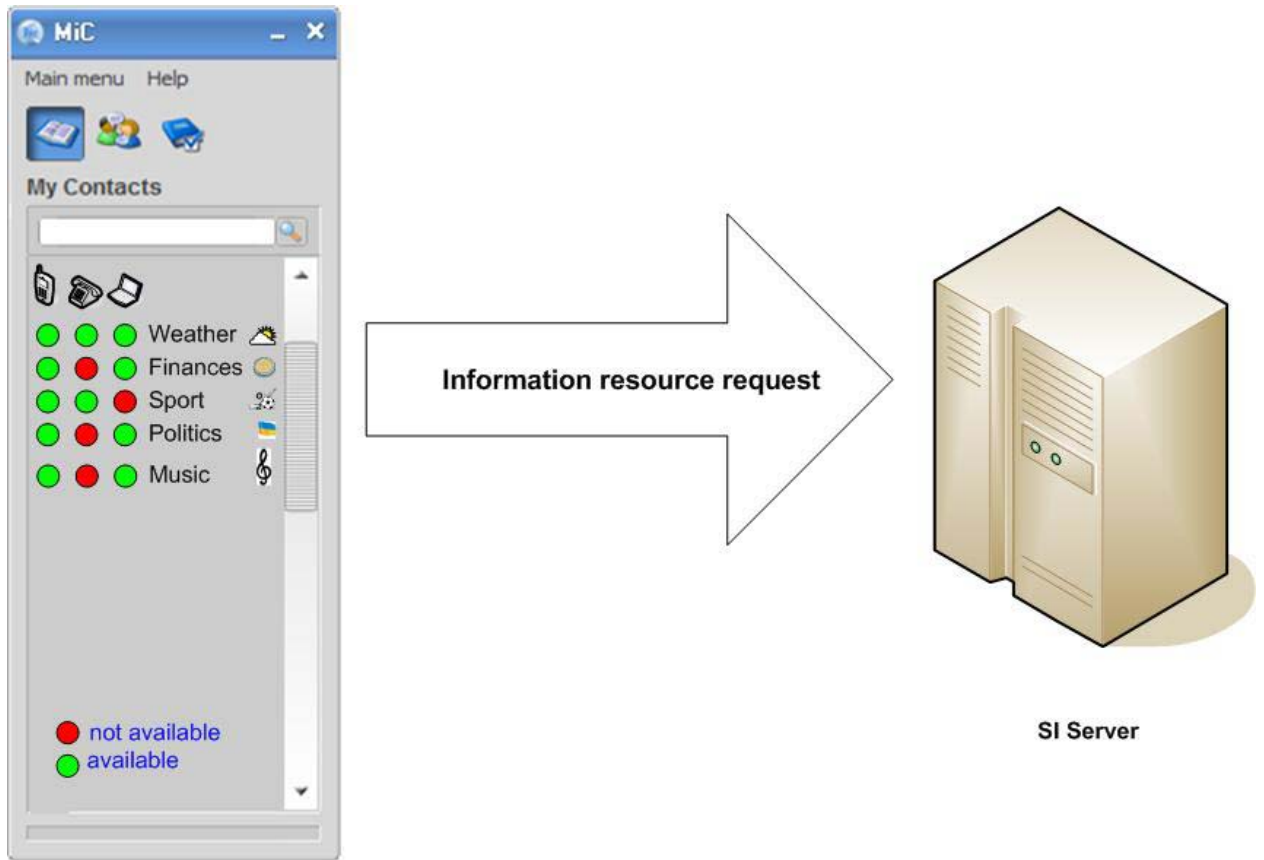


Fig. 6. Public addresses of the information resource.

Multi-addressing of an enterprise or organization allows correction of possible user typing mistakes and prevention of malicious attempts to define a similar address.

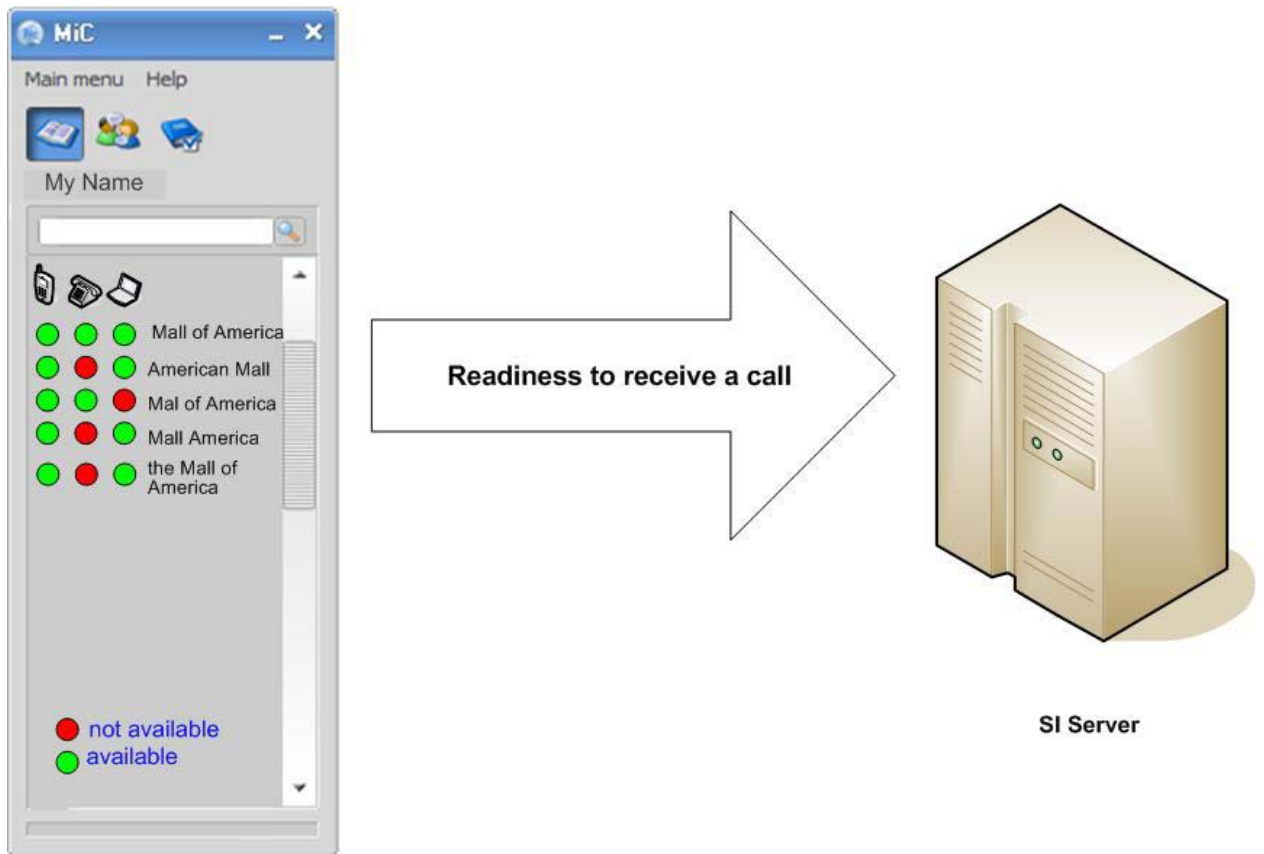


Fig. 7. Public addresses of the enterprise.

The special feature of the SI technology is the ability for the user to choose various address formats, each of which creates an independent set of possible unique addresses. Meanwhile, each SI address format practically does not limit a set of possible addresses.

Thanks to these features, even ability to have multiple addresses per customer does not significantly reduce high availability of unique addresses that are at the same time appropriate to the user.



Fig. 8. Space of possible unique SI addresses is substantially greater than address spaces of known addressing systems.

3.3. Unrestricted User Grouping and Address Contexts

A uniqueness of public address is a common rule of any user addressing system.

Legacy addressing systems limit the ability to choose a unique name by addressing rules and address formats. An address format specifies a set of possible addresses so the user address must belong to this set and do not conflict with any existing address.

For example, a continuous phone numbering system limits the ability to choose unique number by applied number width. Similar restriction constrains ICQ numbers. The rules of popular Skype communicator allows a user login to be 6 to 150 character wide but do not allow usage of spaces in a login.

Most communication systems support only single public address format and therefore single set of possible unique addresses. Constant increase of phone number widths and move to IPv6 addresses are examples of problems posed by fast occupation of fixed address spaces.

Additionally, not every address in a legacy addressing system is appropriate to the user. High additional fees for short and easy-to-remember phone numbers, theft of handy ICQ numbers and high speculative price of topical “speaking” Internet domain names are the examples confirming this fact.

The ability to create and join SI public contact groups provides the way to extend the ability of choosing an appropriate unique user address. This is so because SI public address may consist of multiple separate units each of which have its own meaning indicating a public user name or an address context.

This way a public address may represent a job position while contact group name represents a unique company name. Thus, various users may define the same public name but in different contact groups, so complete public address will stay unique. For example, various users may define the same public name “Chief Financial Officer” but with addition of a group name, that is the company name (fig. 25), full addresses became unique.

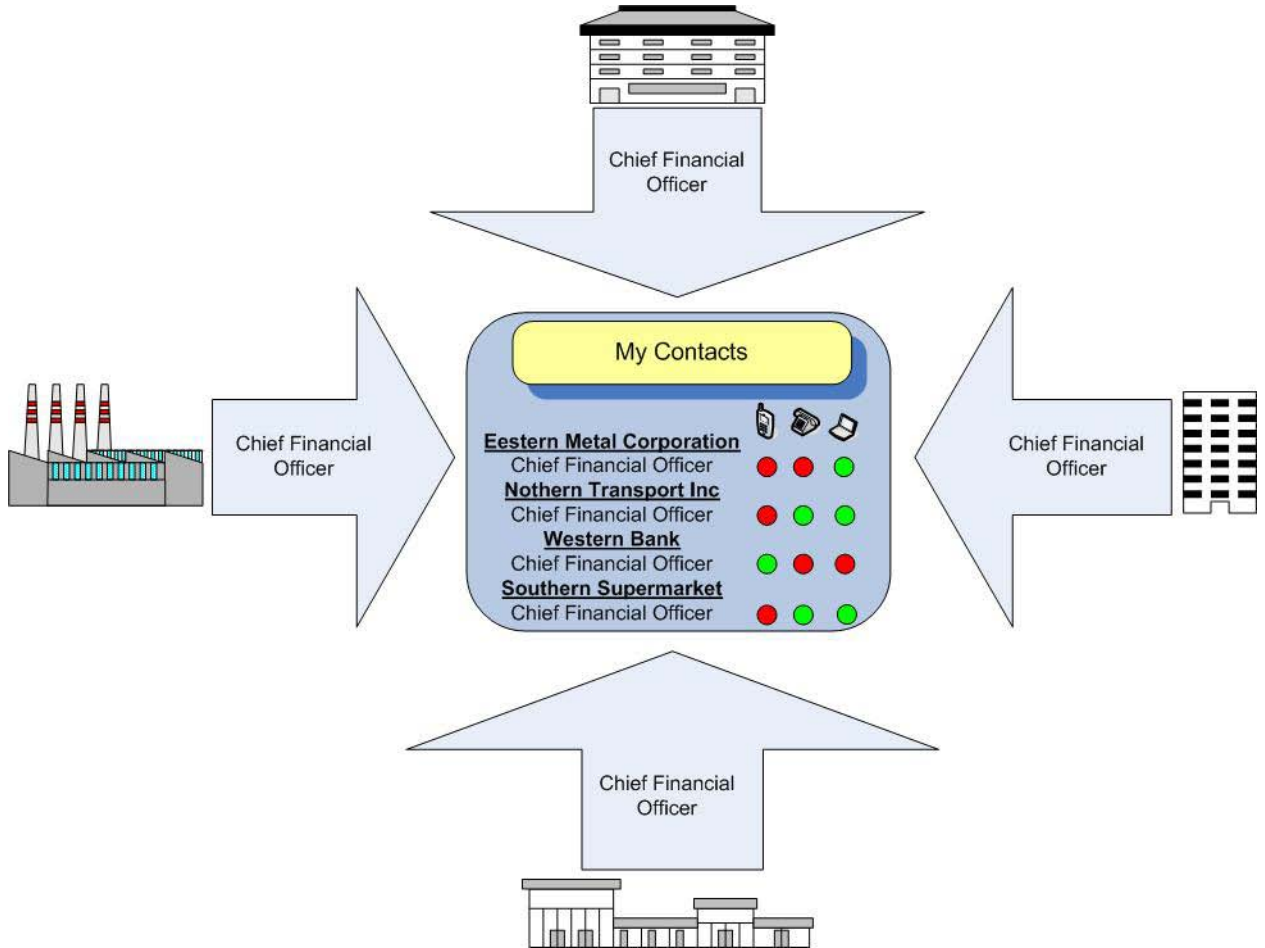


Fig. 9. Same named members of various contact groups.

SI address may include some area name (Fig. 10). It may be a name of the city, region or state, etc. This allows users and information resources included to a regional group have locally unique names as well as to indicate their location and provide some useful region-specific information about his or her self or an information resource respectively.

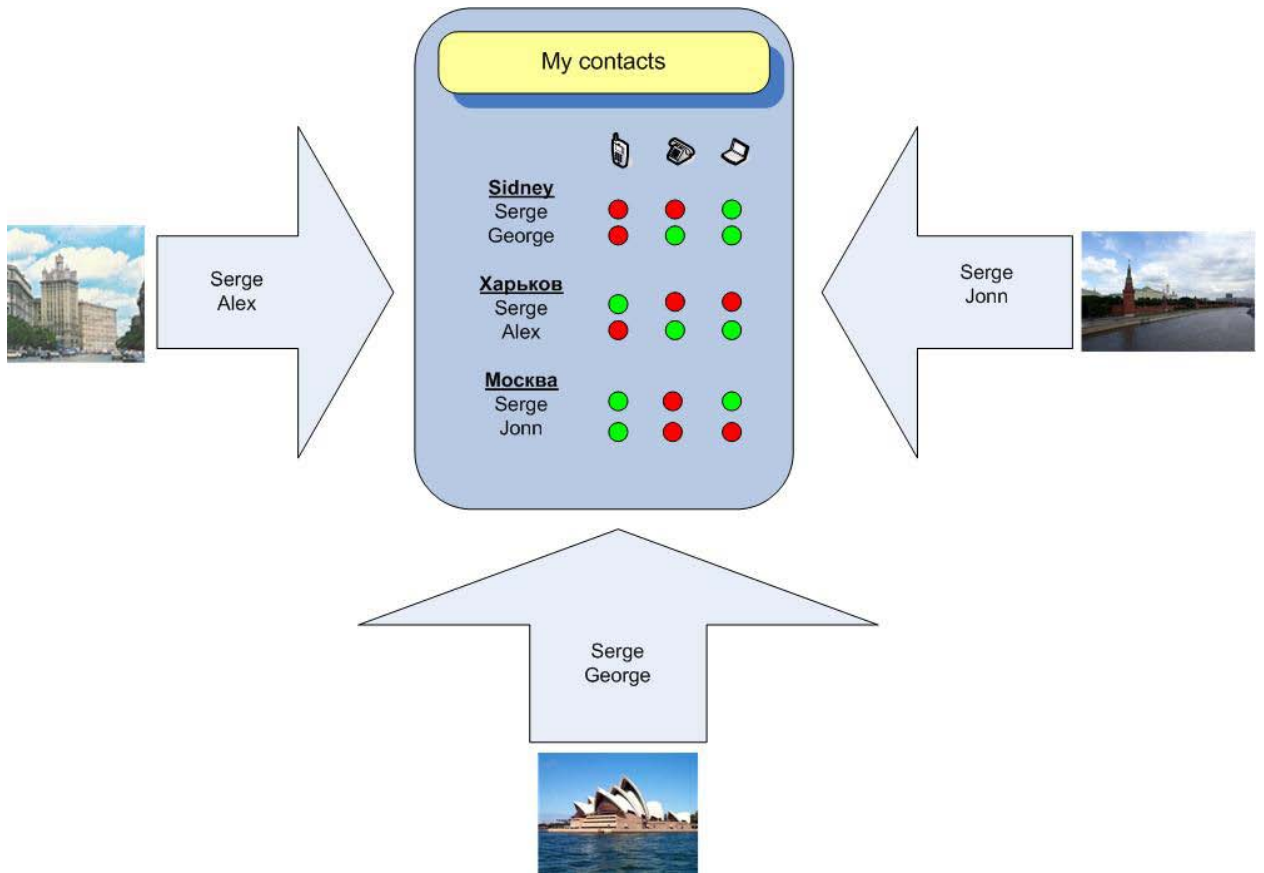


Fig. 10. Regional user grouping.

A public personal address may include a name of group created to connect people having the same interest (Fig. 11). It could be such a social network as a group of classmates, co-workers, hobbyists, sportsmen, etc. This allows users or information resources included to an interest group to have group-unique names as well as to indicate their interest category and provide some useful interest-specific information about their selves or information resources.

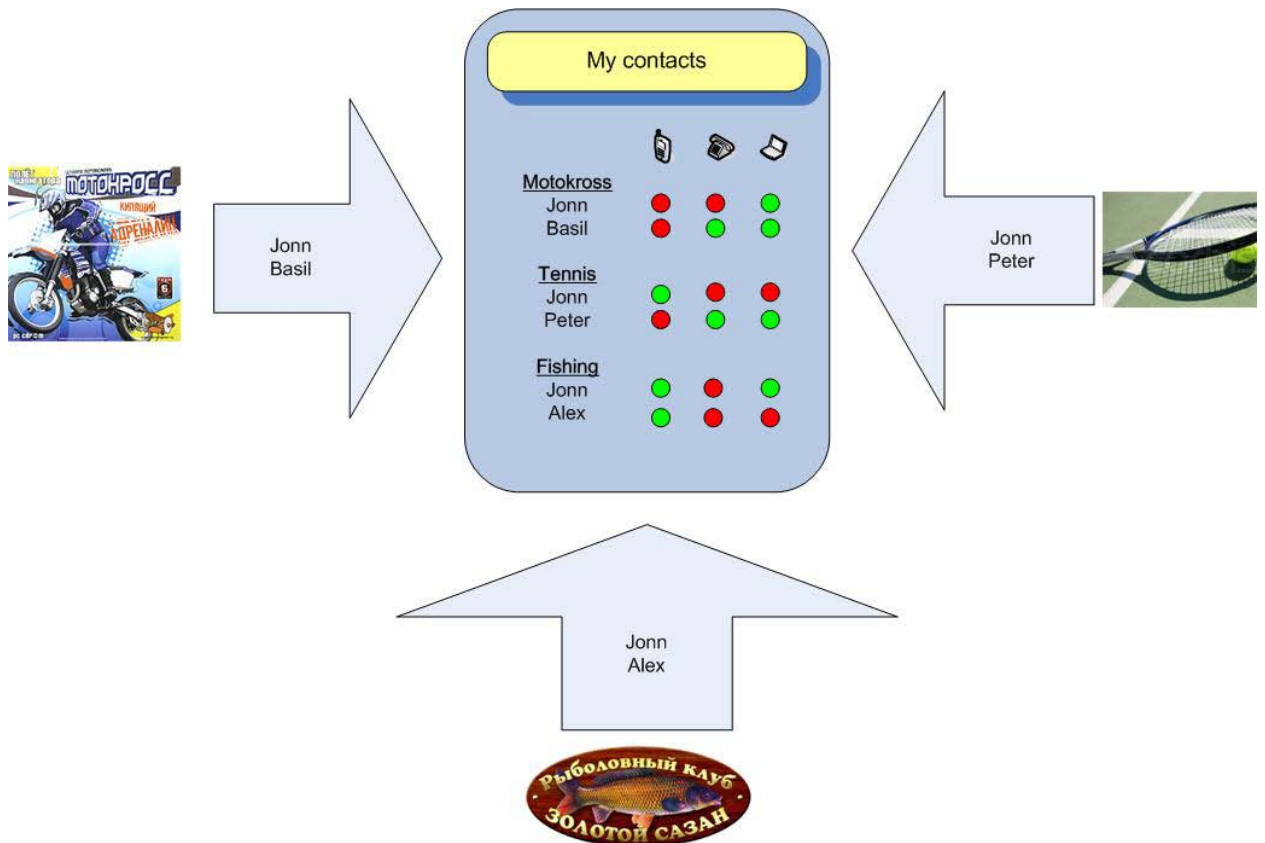


Fig. 11. User grouping on the interest basis.

In addition to social networking and address context, the user-grouping feature is also useful for [building virtual private networks with ease](#).

3.4. Integration with Legacy Addressing Systems

The user may include any number or textual address assigned to him or her in a legacy network into his or her personal address set. This allows the user to stay available at legacy addresses, which he or she used earlier (Fig. 12) not only at SI addresses. It worth noting that owner of such a legacy address may receive calls from legacy communication devices as well as from SI-enabled ones.

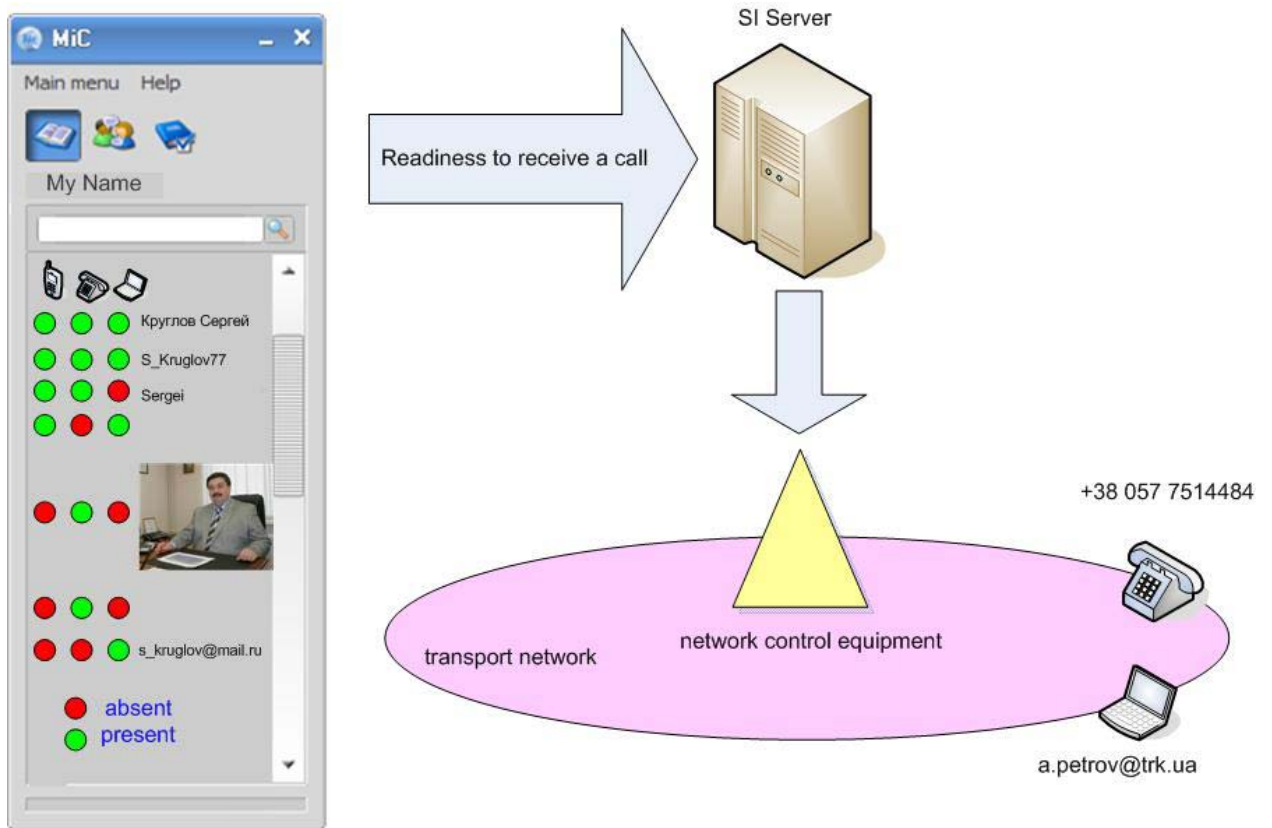


Fig. 12. Availability at legacy addresses.

Similarly, the SI technology allows easy usage of fixed legacy addresses for outgoing calls from SI users (Fig. 13). This is so because SI address database may also incorporate fixed addresses assigned by legacy communication systems following their respective addressing rules. These addresses act as ordinary SI addresses for which, for example in case of phone numbers, a readiness to receive a call is permanently set on.

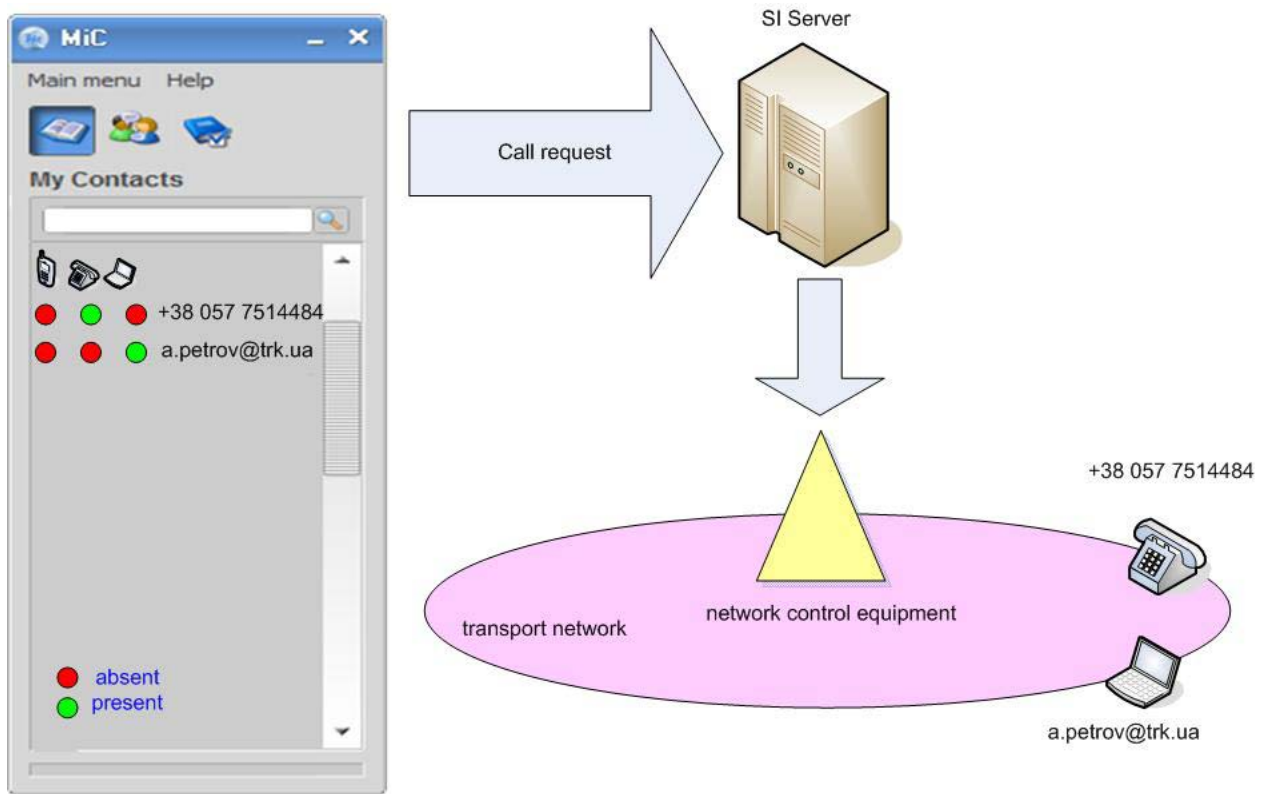


Fig. 13. Calling legacy addresses.

3.5. Communication Session Initiation Protocol

As is known, a communication session execution in telecommunication systems consists of two basic stages. The first stage is the session initiation stage and the second is actually the communication stage. For better understanding of the SI technology it worth noting, that those stages differ from each other not only by their objectives but also by requirements to possible data transfer delays.

The conventional approach to a session initiation procedure now implemented in the Internet has its roots in the area of telephony. Following this approach, only calling user interacts with a telecommunication system that is responsible for establishment of a communication channel between the calling device and the destination device pointed out in a result of this interaction. A called user plays passive role under the conventional session initiation approach (Fig. 14). The approach considers that any access to a communication network is an activity of a calling user aimed to start the procedure of session initiation.

It is obvious that in this case, the main function of the system for session initiation is a parsing of an address entered by the calling user and thus an addressing system must be native to the telecommunication system and corresponding to its internal structure.

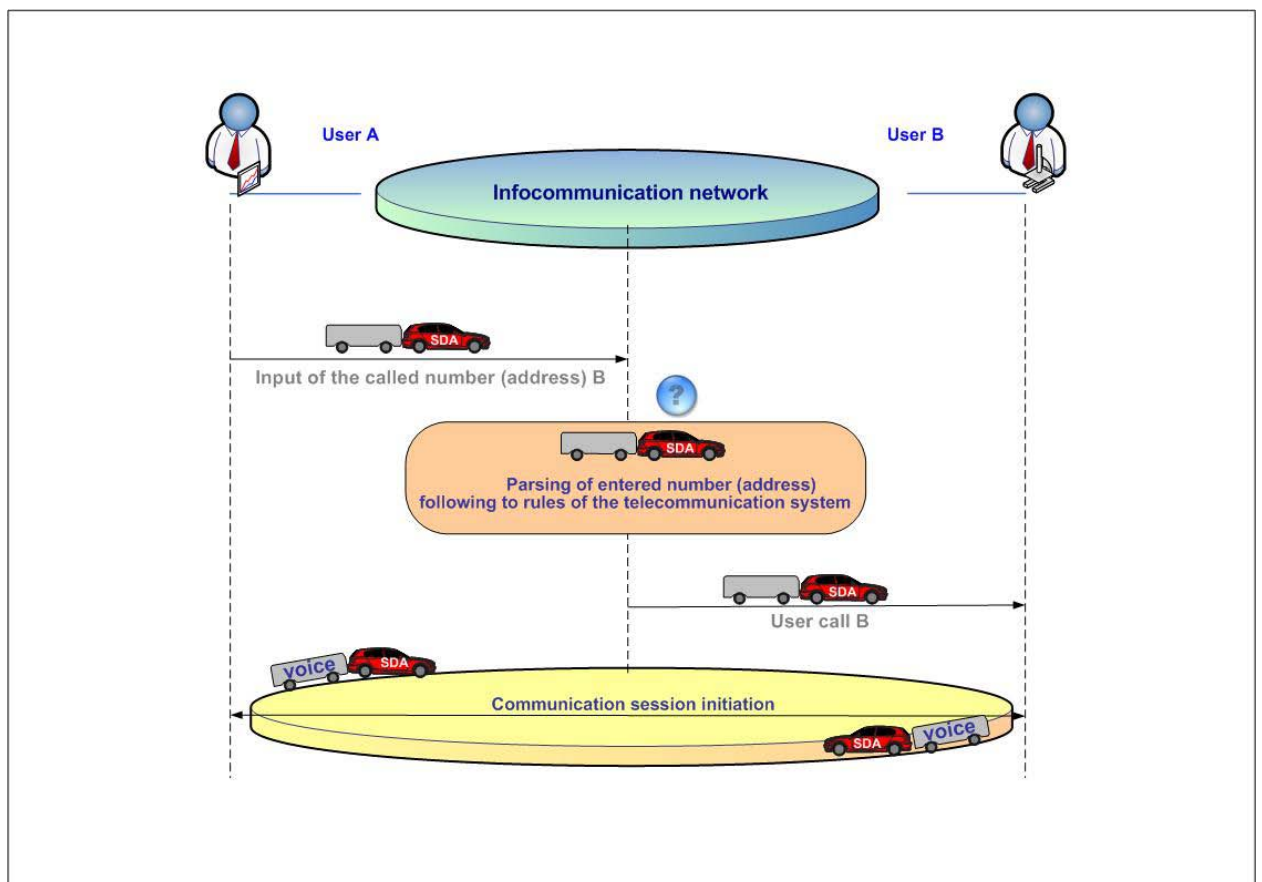


Fig. 14. Conventional approach to a session initiation.

SDA: source (S) and destination (D) technological (network-specific) addresses.

A Human-to-System interaction under the conventional approach to a session initiation may base only on addressing rules well known to the user while intended mainly to a telecommunication system allowing it to complete identification of the destination device owned by a called user.

Such addressing rules are always unambiguous and simple but they are suitable most of all for equipment not for human. Human overcomes inconveniences of addressing system by keeping auxiliary contact list records in memory of his or her terminal or client software. However, the convenience of auxiliary records achieved at the level of a user terminal is not available at the level of public contact data.

The SI technology introduces new approach to a session initiation that assumes participation of both calling and called users regardless of their different roles in a session initiation procedure. Each user accessing a network introduces a “message about the person” as well as a network access type: a call to other user or a readiness to receive a call (Fig. 15). This “message about the person” is a public SI address (public name) of the called user.

In this case, the basic functionality of a telecommunication system for a session initiation consists of:

1. Identification of the technological (network-specific) address assigned to a user terminal or the specific number handling proxy application that controls a call procedure.

2. Determination of message type (a call request or readiness to receive a call) and comparison of messages entered by calling and called user.

3. Establishment of a data transmission channel between respective calling and called user terminals in case that compared messages are identical.

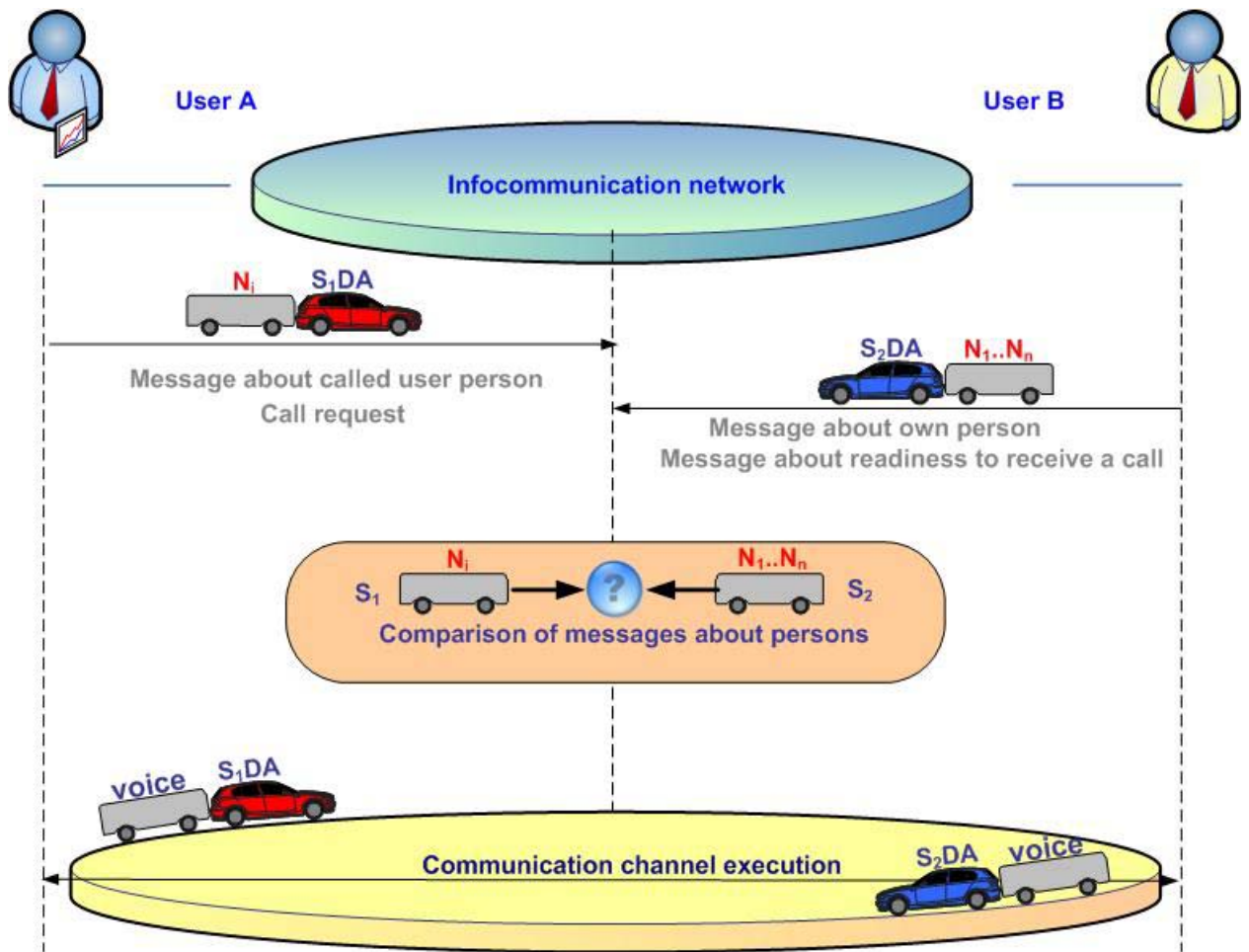


Fig. 15. SI approach to the session initiation.

- S_1 – technological (network-specific) address of User A,
- S_2 – technological (network-specific) address of User B;
- $N_{1..n}$ – personal names defined by called user B;
- N_k – personal name of called user B specified by calling user A.

Under the SI conception, a transport network considers a technological address of the called user B as a source address (S_2) of transmitted messages, not as a destination address (D). Both terminals of user A and B use an address of transport control equipment as a destination address (D). Thus in some cases of network organization a technological address of a terminal (D) may be just not needed for its configuration.

Following this approach to a session initiation, content, purpose and internal sense of messages entered by the user have no meaning to a telecommunication system (Fig. 16). Its main task is a comparison of digital signals received from users in search of identical one. These signals are public addresses and may result from digital transformation of any text, numbers, pictures, sounds and other information.

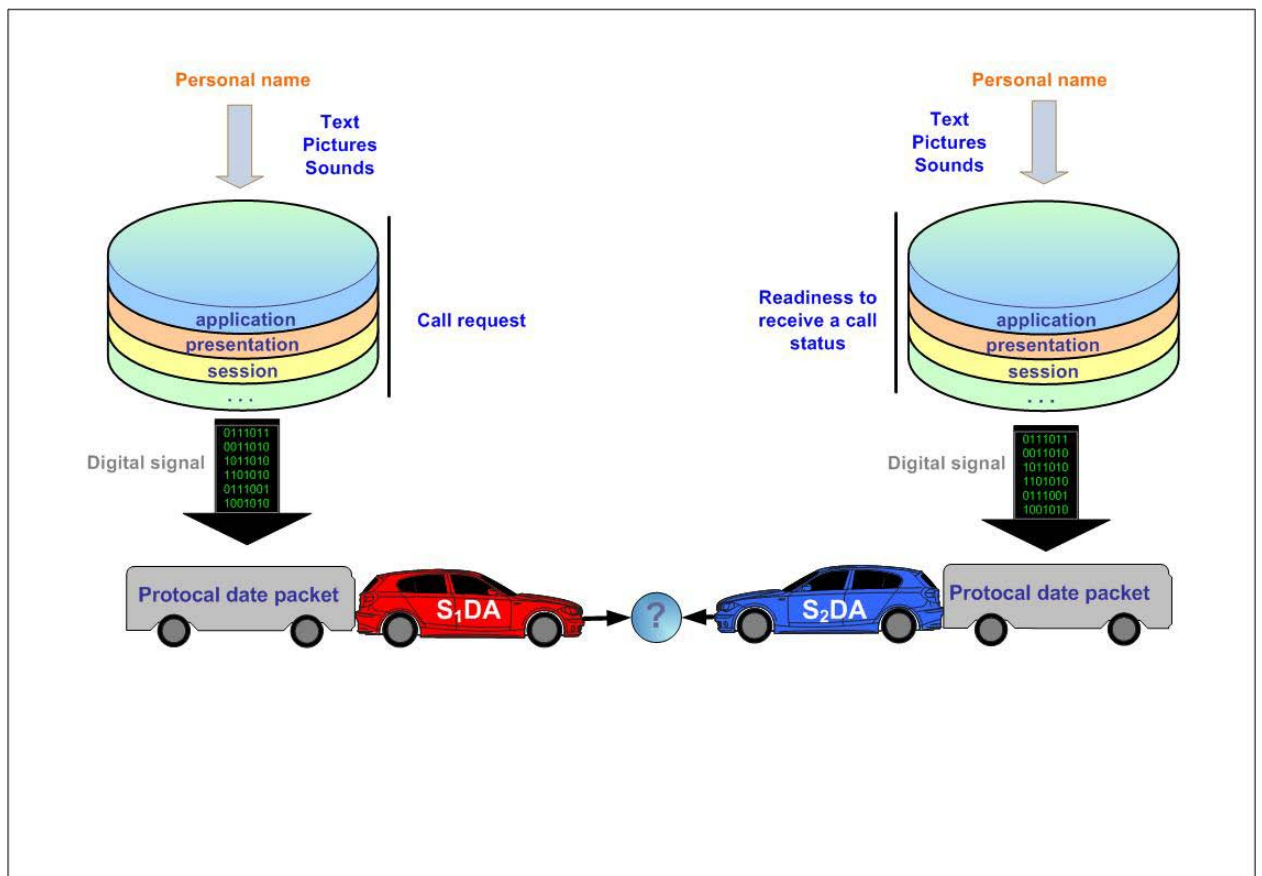


Fig. 16. Input of a call request and the message about readiness to receive a call into an infocommunication system.

Natural addressing is completely independent from addressing of network elements, their topology and even dynamically changing relationships. Thanks to this fact, a network may use any technological addressing that is suitable for machine processing and programmatic routing between network elements.

A telecommunication network uses its conventional means and technological addressing system to carry out the second stage of session execution that consists in connection establishment and traffic routing between terminals. There is no need for the user to have any idea about specification and meaning of network addressing used by a communication system.

More information about message forming and transmission rules of SI protocols you can find in a number of invention descriptions (Russia Patent #2257681, Bull. #21 iss. on 07/.27/2005; Ukraine Patent #72976, Bull. #5 iss. on 05/16/2005, International patent application WO 2006/112758, European patent application EP 1892937 A1 iss. on 02/27/2008, Bull. 2008/08).

4. Software Components

The free infocommunications (SI) technology is intended mostly for application in already existing telecommunication networks. Its advantages result from implementation of innovative software interacting with infocommunication systems, not from expansive replacement or upgrade of those networks.

Two basic software components of the SI technology are responsible for carrying out communication between customers (users, organizations, information resources and systems). They are:

- [SI Server](#), providing a customer addressing, an initiation of communication sessions between client applications and customer search capabilities for various criteria;
- [SI Client](#), providing a user interface, a data encoding, decoding and transmission during communication sessions.

The client application is running at the side of a user terminal such as PC, mobile phone or any other communication device. This application plays the role of all-purpose user access means for using telecommunication services, browsing information resources and interacting with remote information systems.

The SI server can operate on various levels of a telecommunication network topology. In case of the [distributed SI architecture](#), multiple SI servers are distributed geographically and form multiple hierarchical levels. Client and server applications can interact with each other via various telecommunication networks using corresponding transport protocols and technological addressing.

4.1. Software Components Interaction Model

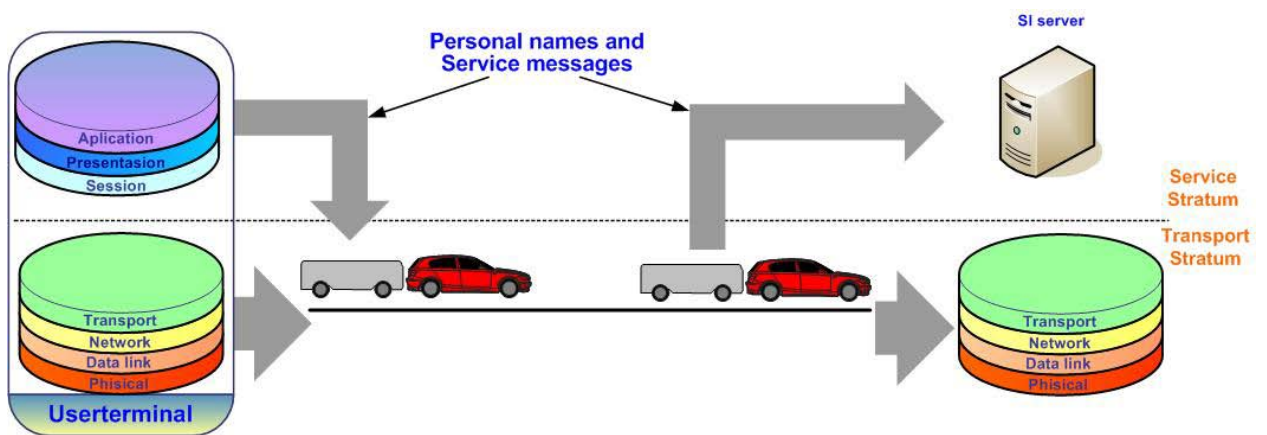


Fig. 17. SI client-server interaction model.

The special feature of the SI client-server interaction model (Fig. 17) is the ability to use technological addresses defined at any network protocol layer (transport, network, data link or even physical layer) as an address of a data source (client) and destination (server).

SI software components insert these technological addresses into headers of outgoing data packages automatically. These addresses do not contain a technological address of the object requested by the user.

As we can see, this approach completely separates the service stratum managing access to communication services and information resources from the transport stratum managing data transmission.

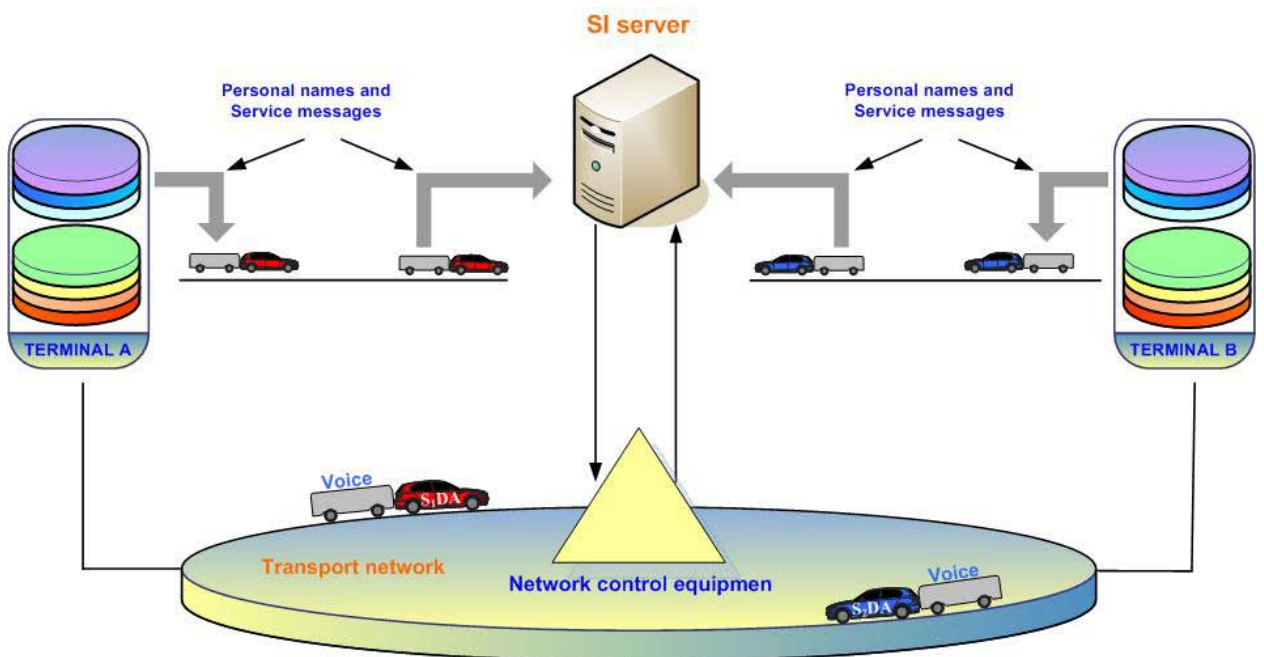


Fig. 18. SI software components interaction model for a user-to-user session initiation.

To initiate a user-to-user communication session (Fig. 18) a calling user does not need to know the technological address of a called user. In this case, the service stratum is independent from the transport management stratum.

In case of an access to value-added services and information resources, their addresses have clear meaning for a calling user. SI server receives such an address from the software managing an information resource.

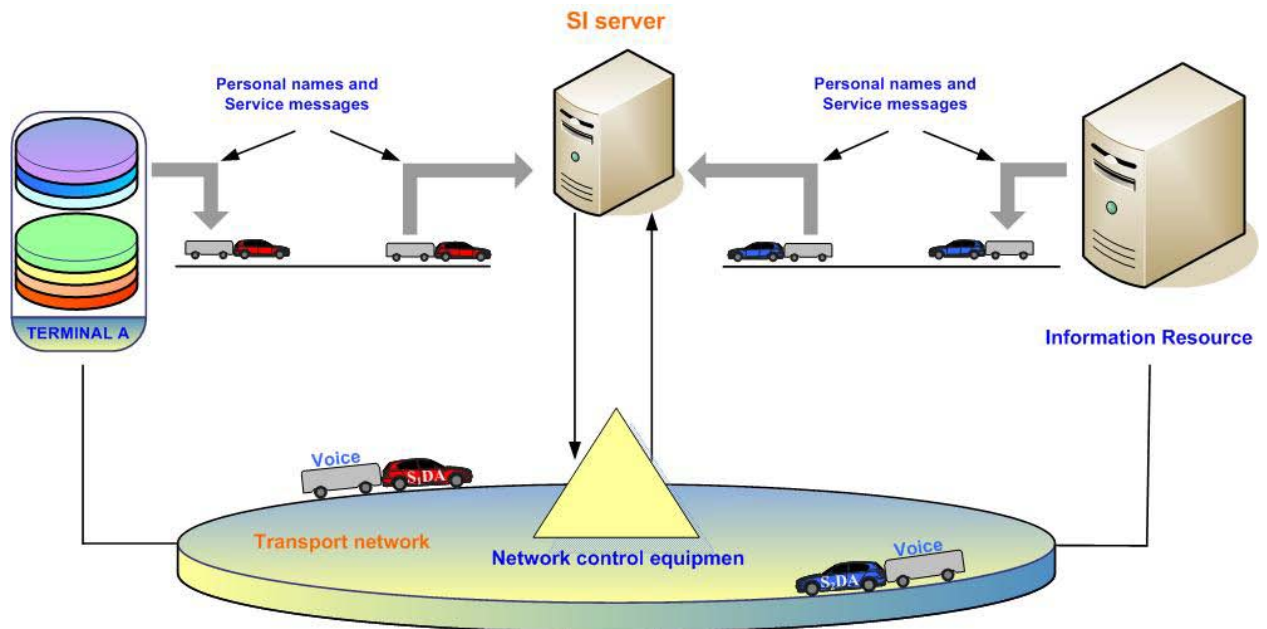


Fig. 19. Interaction model for session initiation between the user and an information resource.

A communication between the user and an information resource (Fig. 19) may be a simplex or duplex (interactive) data transmission process. As in the previous case, the user does not know technological (network-specific) addresses of the requested resource. The service stratum is also independent from the underlying transport stratum.

4.2. SI Server

SI server (Fig. 20) functionality includes a protocol message reception and processing; storage, a search and comparison of public addresses; a management of communication and information access sessions.

SI server interfaces with local and distributed database servers managing data about customer public addresses and provisioning conditions of base and value-added services. At the same time, SI server interacts with network control equipment, accepts and gives back technological addresses as well as yields communication session parameters.

SI server provides end-users with functionality very similar to functionality of search engines well known to most Internet users. Thanks to this similarity, the user can quickly acquire appropriate and usual habits of using SI software components to search public addresses and information resources.

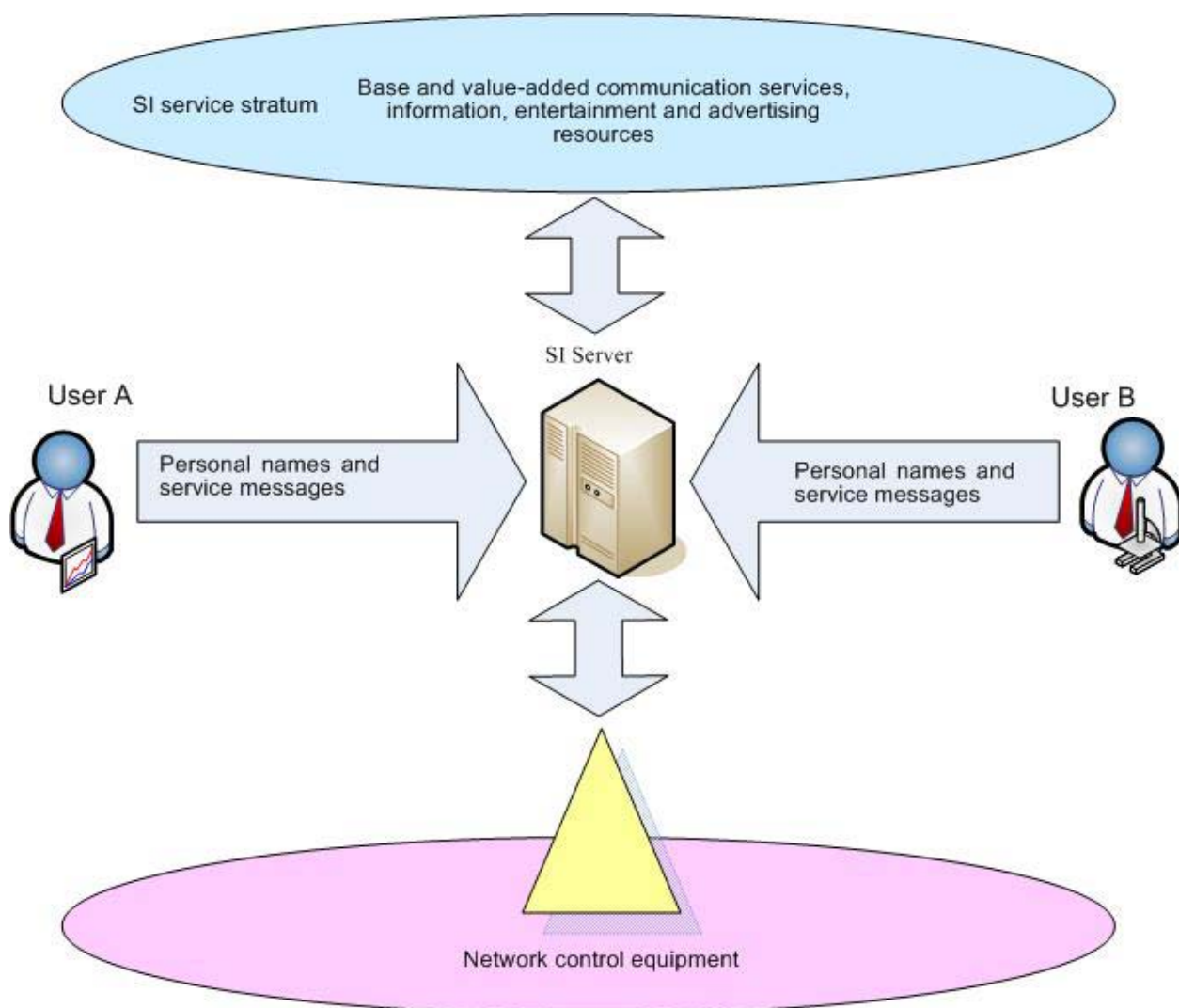


Fig. 20. SI Server.

4.3. SI Client

The main purpose of SI client is sending and receiving SI protocol messages as well as executing of user interface functions.

At the session initiation stage, these messages may contain public addresses, service data, user group names, a preferred regional SI server name, a name of information resource requested by the user, etc.

The user enters SI addresses to a client application directly using HID-device like keyboard or using controls of an application user interface. Following the Open System Interconnection model (OSI) standard (Fig. 21) all messages generated by a client application at presentation, application and session layers undergo transformation into the format suitable for encapsulation into specific transport, network or lower layer protocols.

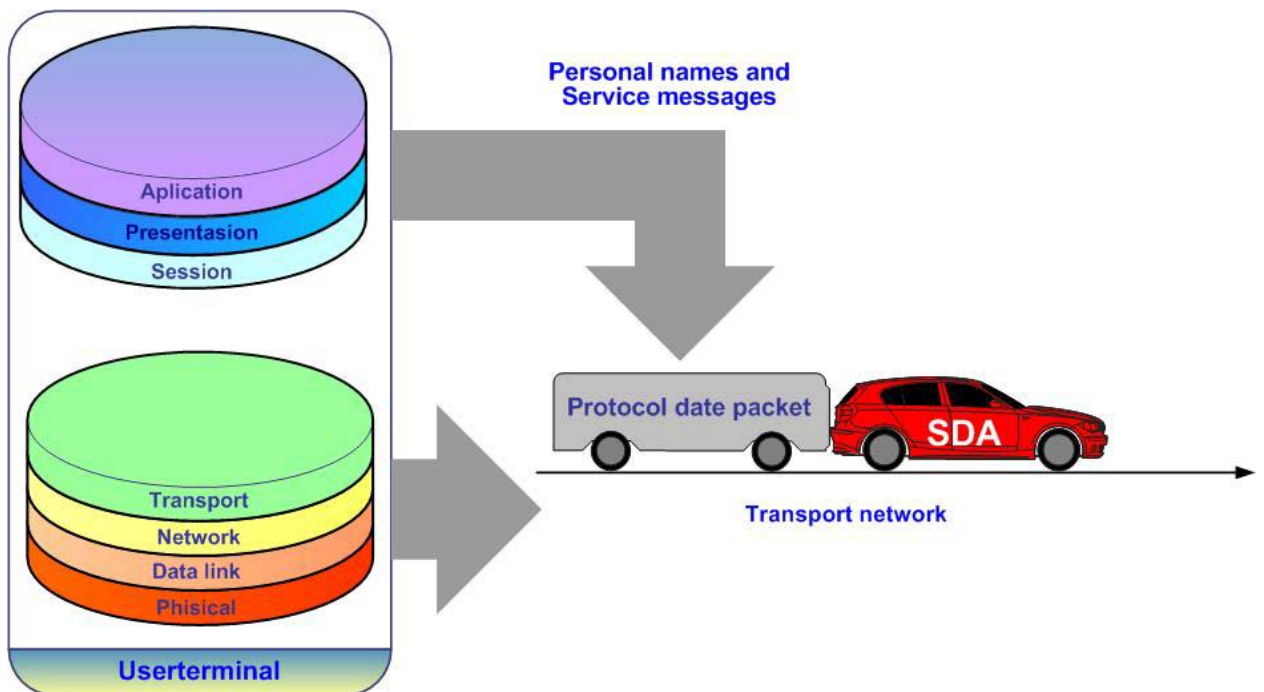


Fig. 21. Open System Interconnection model.

Built under the SI conception the user interface of SI client (Fig. 22, Fig. 23) is simple, intuitive and extremely easy to use.

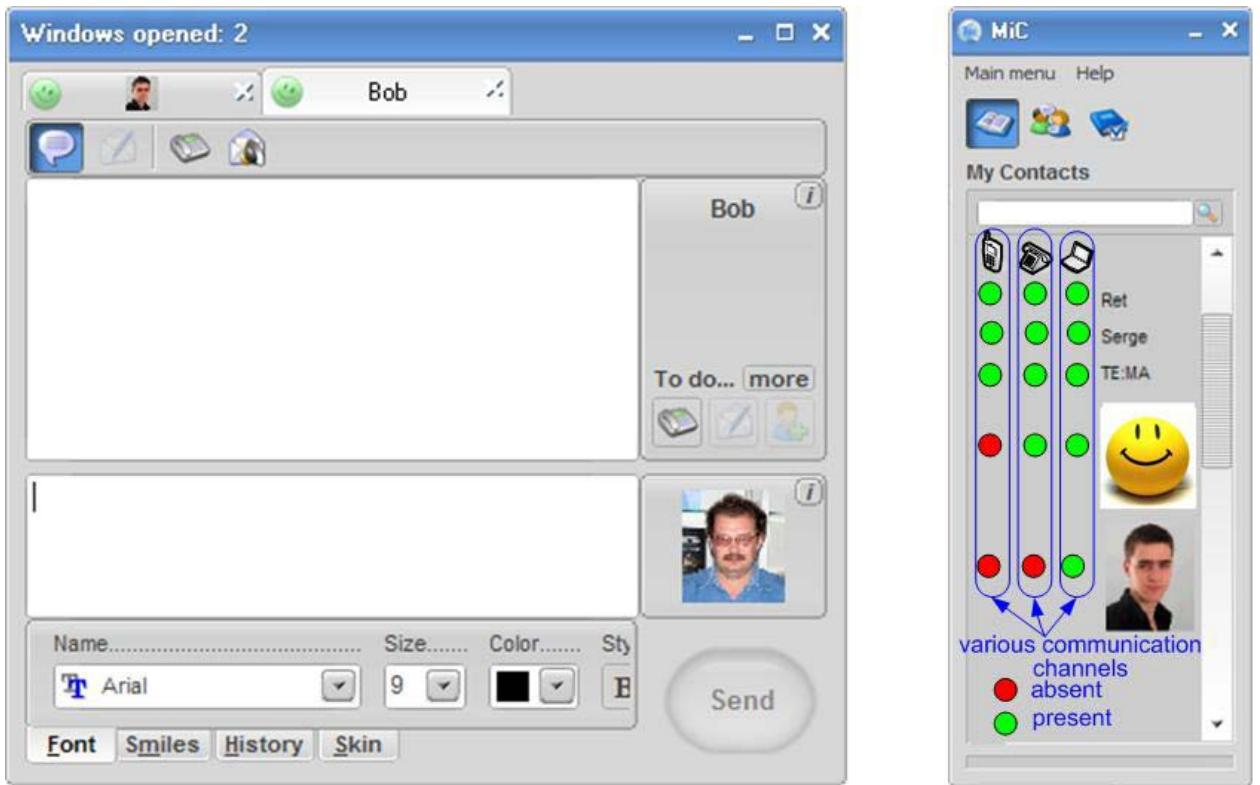


Fig. 22. SI client user interface for user-to-user communication.

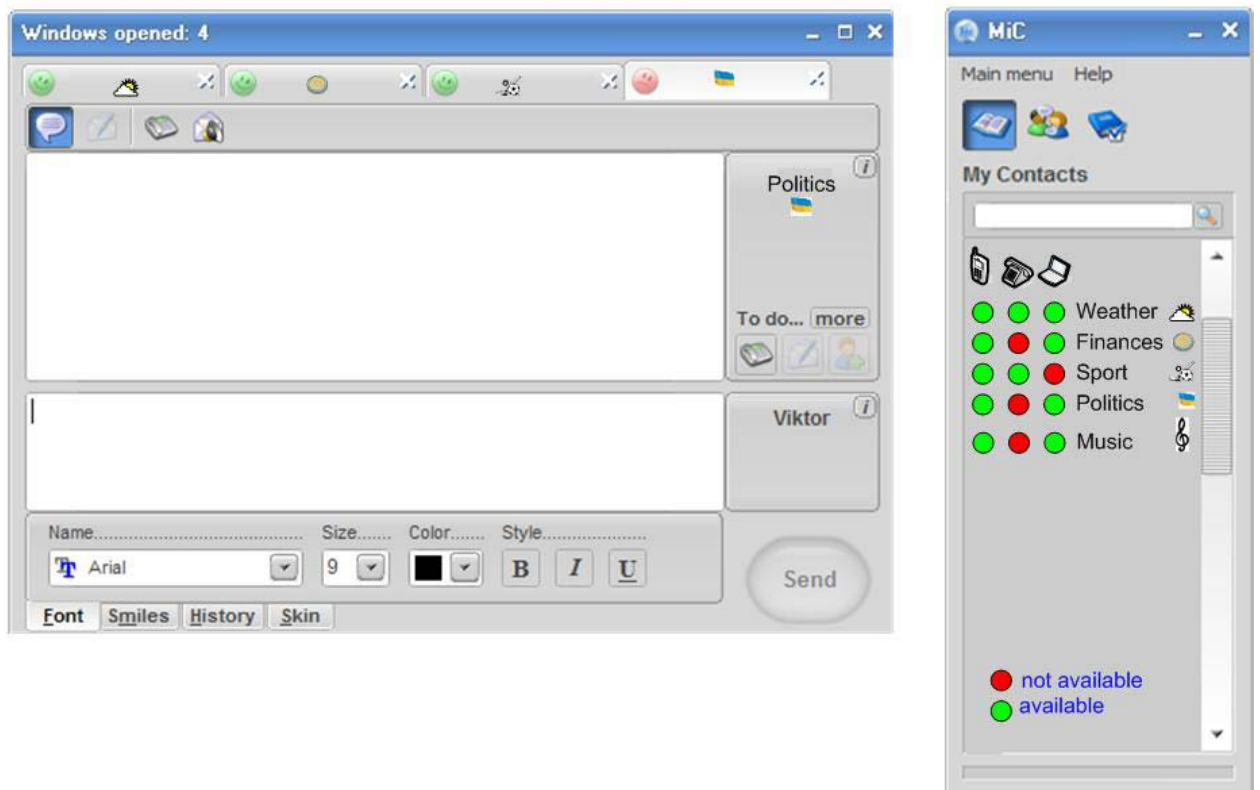


Fig. 23. SI client user interface for browsing information resources.

SI client acts as an all-purpose means for accessing base and value-added communication services as well as for browsing information resources and interacting with information systems. Thanks to the features of SI client, its user has the same experience accessing various

infocommunication services and information resources either available online or stored locally for offline access regardless of their type and physical location.

4.4. Advantages of MIC

More than just a communicator. MIC is a revolutionary software product that combines functionality of a communicator and a browser of internet information resources. It is not just a junction of these different functions in single application. Their harmonic synthesis based on the [natural addressing](#) allows the user to jump by a single mouse click from viewing information to a direct communication with the contact person responsible for the information resource (for example, an enterprise reception, a support service, a page or blog author, etc) and vice versa. Meanwhile, this does not need any searching and entering contact data of the called customer because only single address is suitable for accessing the customer's information resource as well as for various direct communications with the customer.

Infinite set of supported communication services. The open architecture of MIC that is currently developing will allow third-party developers and enthusiasts to create their own plug-in modules that will supplement MIC with the functionality of special communication services like a handwritten message exchange, online games, electronic payments and many others. At the same time, the install-on-demand technology will save your time providing automatic download and installation of new modules when you have received an incoming connection or tried to use a service, which needs the missing module. The integration with MIC allows you to learn new communication services with ease while on the other hand significantly simplifies development of software required for their implementation.

Convenient, memorable, natural addresses. The user of MIC independently defines a public name that serves the purpose of his or her own address for various communication services. Usually such an address is a textual string that is not restricted in terms of length and character used including national alphabets. This allows defining most suitable, easy-to-remember, natural addresses like a user name, job position, organization label, trademark and so on. The probability of the conflict with another user, which already received the address desired by you, is significantly low because of the implementation of address contexts indicating a belonging of the user to some area, organization or interest group.

Simultaneous usage of multiple user names. The user of MIC is not limited to a single own address and can be available simultaneously at multiple addresses intended for communication with various groups of interlocutors: friends, mates, co-workers, business partners, etc. This allows you to introduce yourself to each of interlocutor groups in the most suitable manner such as using your name, nickname, job position within an enterprise or a name of the activity type you are managing and so on. This also allows you to publish various fragments of your profile data to each interlocutor group. Moreover, a simultaneous publication

of your address translated to various languages significantly simplifies a communication with users from various countries of the World.

It definitely does not need you to do something like registering few user accounts and switching between simultaneously running copies of the application because an owner of a single MIC account is practically not limited in a number of own addresses used simultaneously. At the same time, you can separately indicate your presence status and allowed communication types for each of your own addresses. This allows you to manage your communication flexibly by inviting various groups of interlocutors to intercourse with you depending on where are you, what are you doing and how busy are you now.

Security and official communications. The SI technology and MIC are developed with a special care about a user security and protection against unwanted correspondence and contacts like spam, phishing, etc. The security techniques applied make it impossible to implement most malicious tricks and provide an early recognition and blocking of unwanted traffic by communication servers.

In addition to ordinary addresses, you can also officially register a personalized address like an official name of the person, company, organization or registered trademark. Usage of such confirmed address allows imparting of an official and juridical status to your information and documents passed via electronic communication channels of the Internet.

Creation of social and virtual private networks without locking by service provider, usage of special hardware and software. MIC users can create user groups united by a common residence, interests, membership in the same organization, enterprise, etc. Doing so, they are not locked to a particular service provider like the owner of a social networking site. You may also partially or completely enclose your group from an outer access and thus easily build a virtual private network without any need in special hardware, software and configuration of operational systems and network adapters.

5. Building Unified Service Space over Existing Telecommunication Networks

With a development of the Internet and mobile communications, the problem of a unified service space creation becomes more and more urgent. Today, users does not want just to receive wired and mobile services but they want to receive the same services in the same manner while moving between fixed location and mobile access points and switching between various terminal types.

The SI technology has its goal rather in a high-level, human-oriented integration of telecommunication networks, systems and services (Fig. 24) than in their expansive replacement or upgrade. This technology does not only provide building of unified user service space but also provides unification of usage guidelines for various services regardless of various types of user terminals, access points and telecommunication networks used.

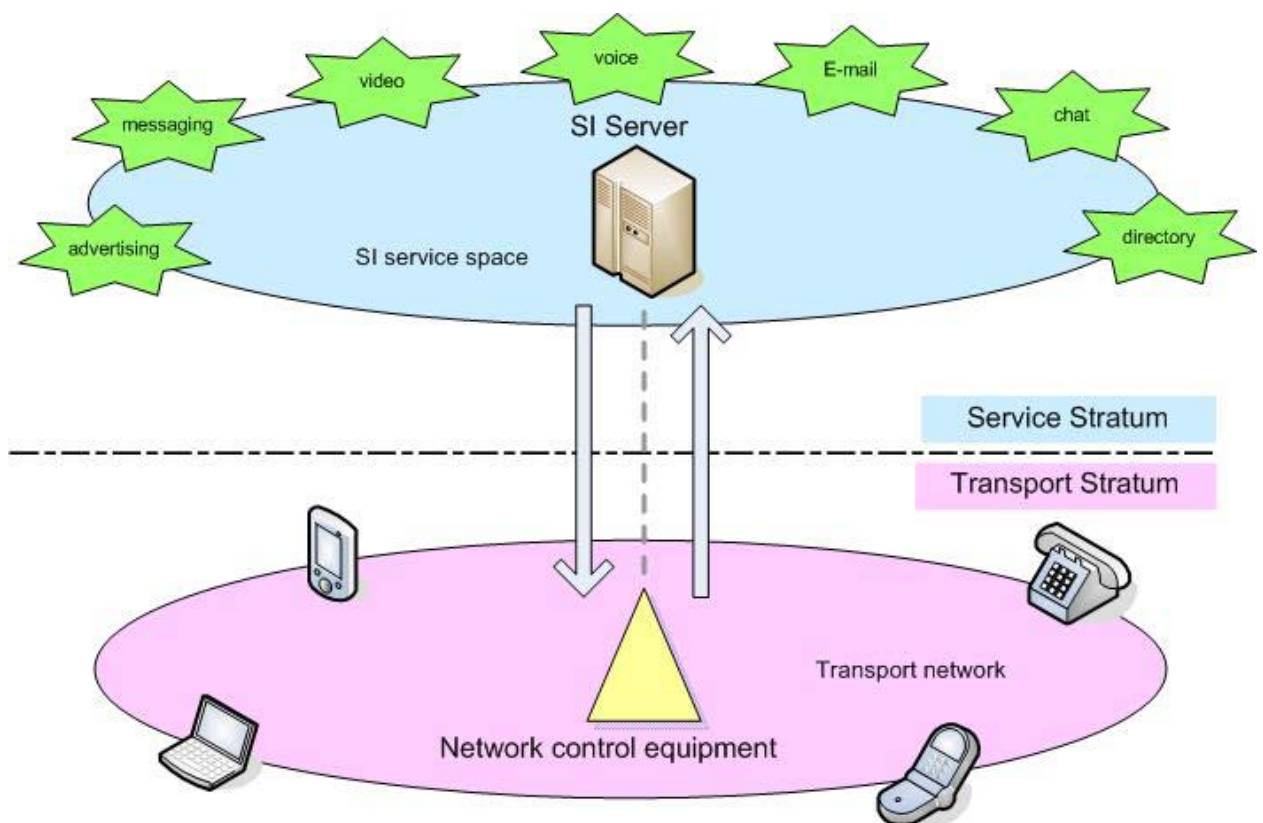


Fig. 24. SI functional architecture.

The SI technology is suitable for [packet-switched networks](#) like the Internet as well as for [circuit-switched networks](#) like the phone network. It also allows the [seamless integration](#) of these diverse networks. There is also the [distributed multilevel architecture](#) for supporting a great number of customers (users, organizations, base and value-added services, information resource

and systems) on a wide area. This technology provides interaction of multiple distributed servers operating as a single information system.

One of the most important advantages of the SI technology is absolutely new, [high-level approach to providing mobility](#) that allows users to preserve their own [natural addresses](#) while switching between various communication devices and moving between various fixed location and wireless access points, telecommunication networks and service operators.

5.1. Using Packet-Switched Networks

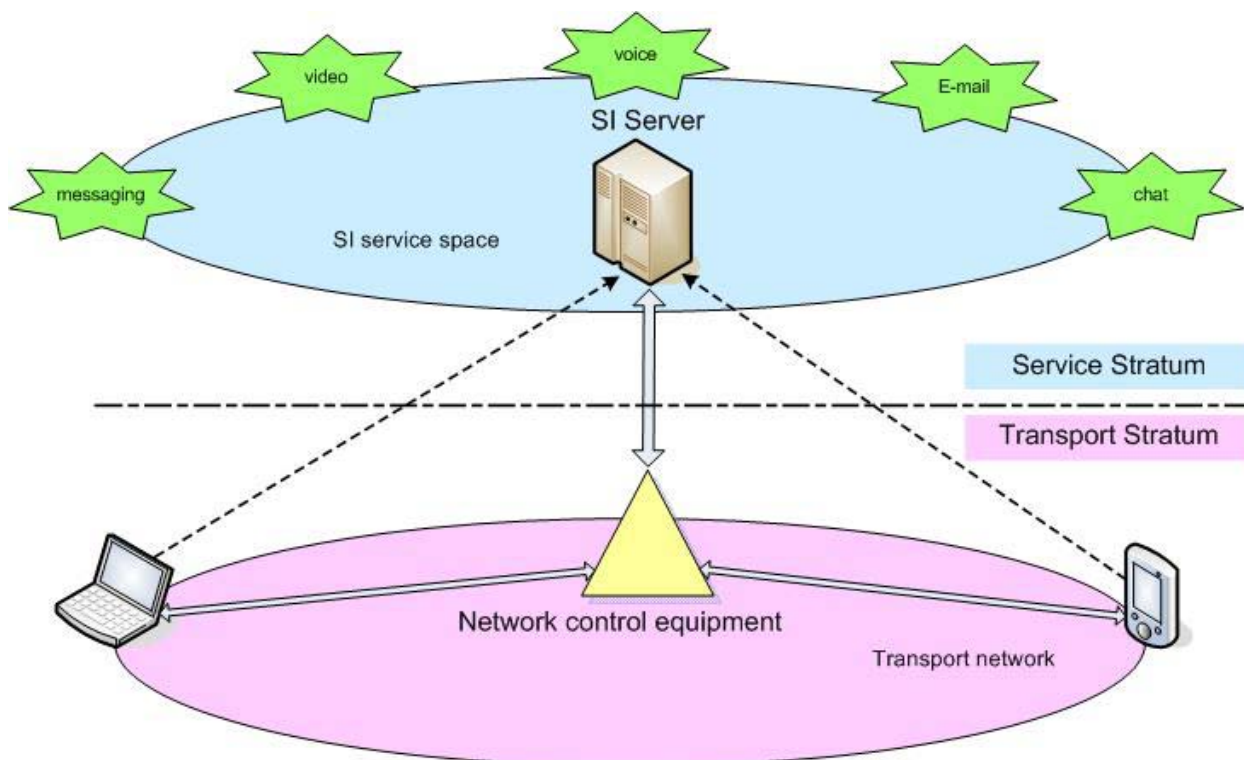


Fig. 25. Centralized session initiation scheme.

To complete a centralized session initiation process over a packet-switched network (Fig. 25) SI server identifies technological addresses of interacting devices using results of protocol message comparison, creates a communication session identifier and sends it to client applications running on user terminals. Then, during a communication session, SI server manages a centralized packet switching.

The specific feature of this switching type is the fact that the softswitch exchanges both source and destination technological addresses of switched packets.

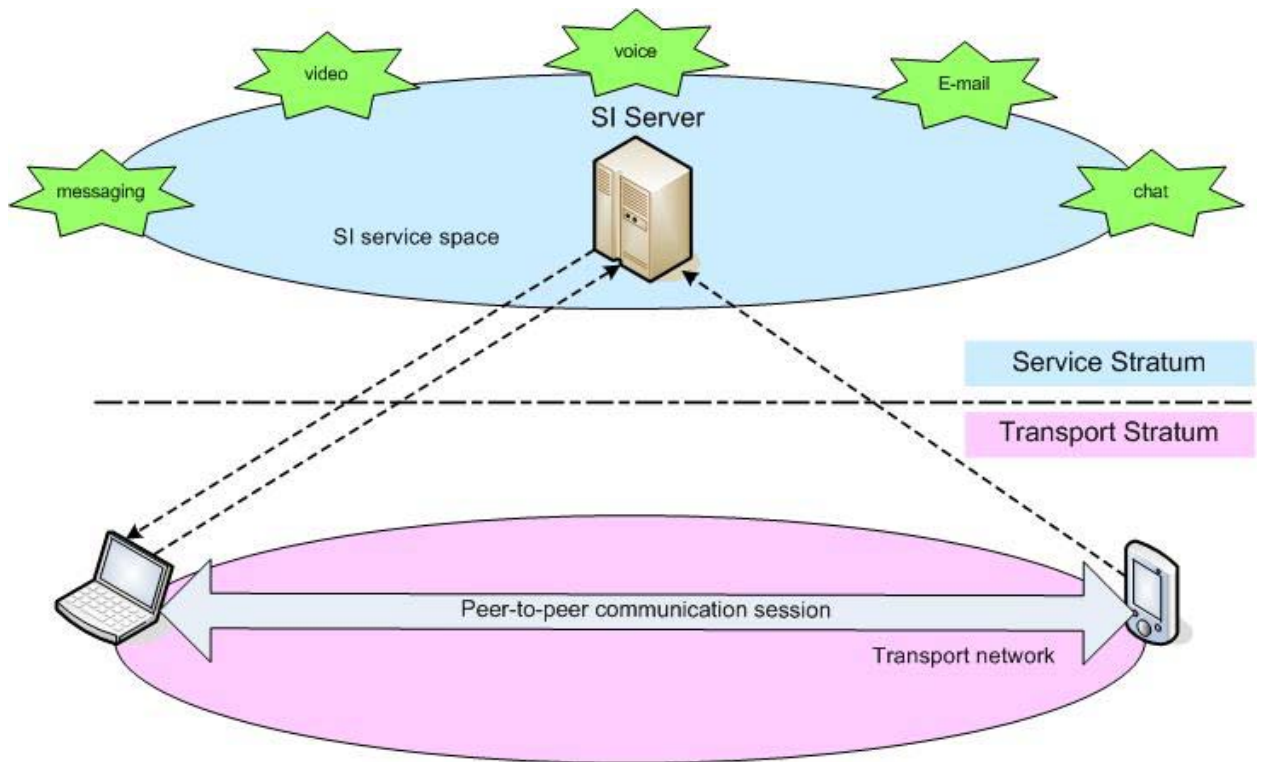


Fig. 26. Peer-to-peer session initiation scheme.

To complete a peer-to-peer session initiation process over a packet-switched network (Fig. 26), as in previous case, SI server identifies technological addresses of interacting devices and then sends a technological address of the destination device to the calling one.

Fig. 27 and Fig. 28 illustrate centralized and peer-to-peer session initiation schemes for accessing information resources.

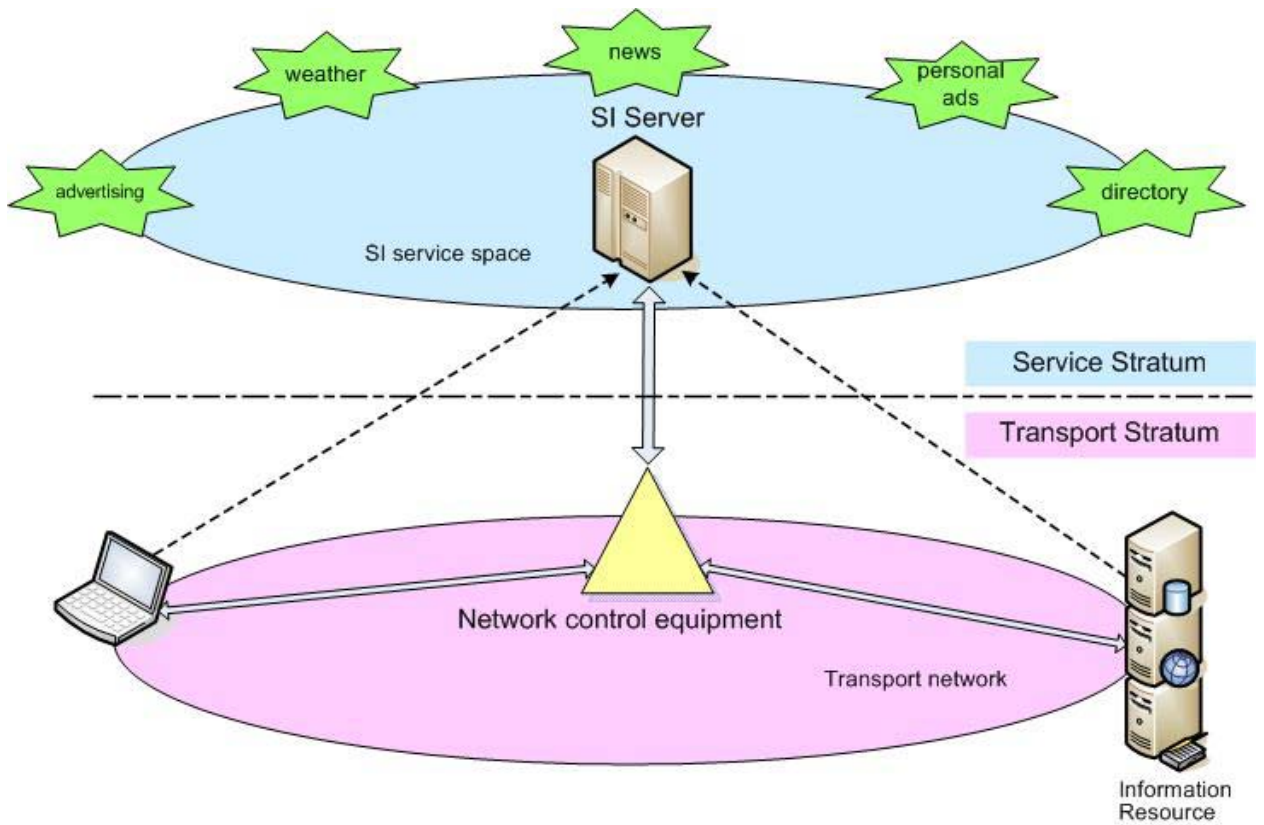


Fig. 27. Centralized session initiation scheme for accessing an information resource.

A choice between centralized and peer-to-peer schemes depends on many various factors including a business model, network topology, performance and security issues, etc.

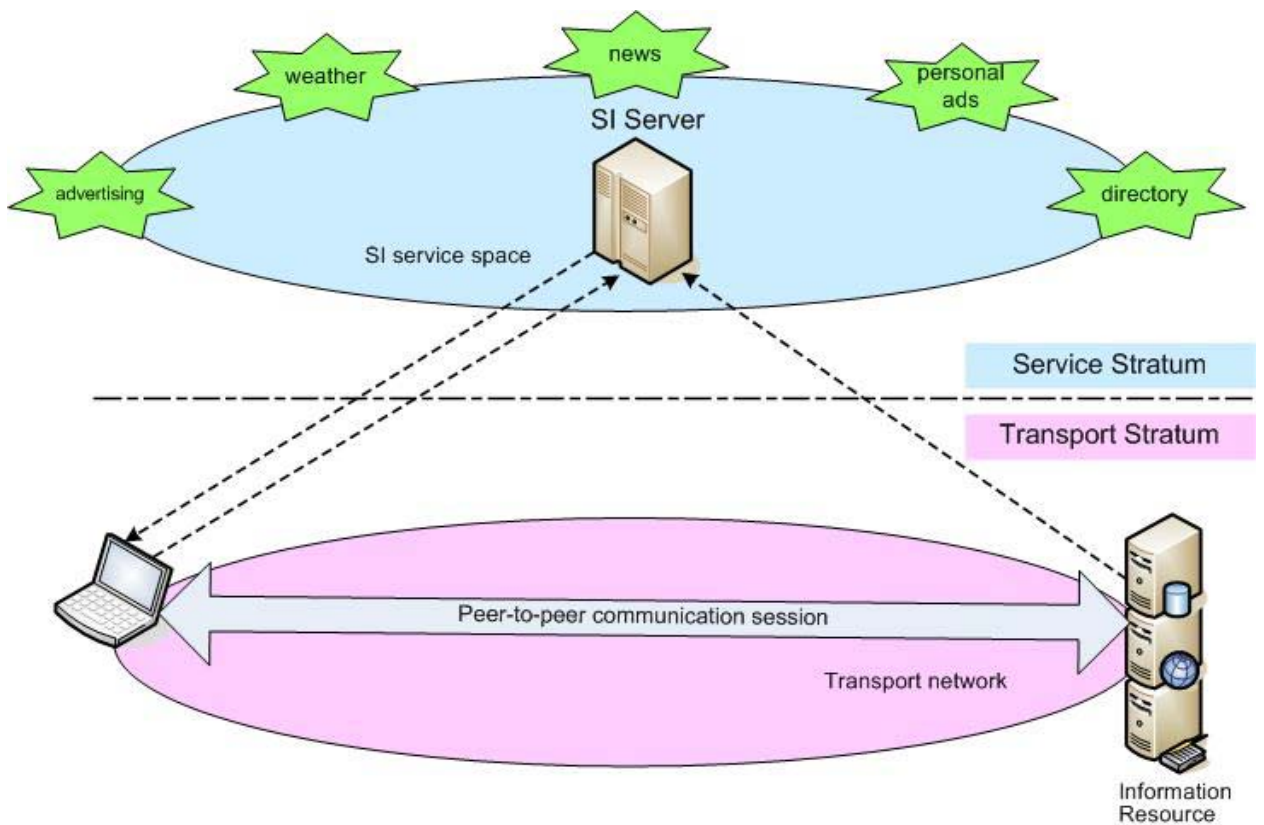


Fig. 28. Peer-to-peer session initiation scheme for accessing an information resource.

In both cases of a session initiation scheme for an information resource access, SI server practically replaces a DNS server and a domain network resource addressing.

5.2. Using Circuit-Switched Networks

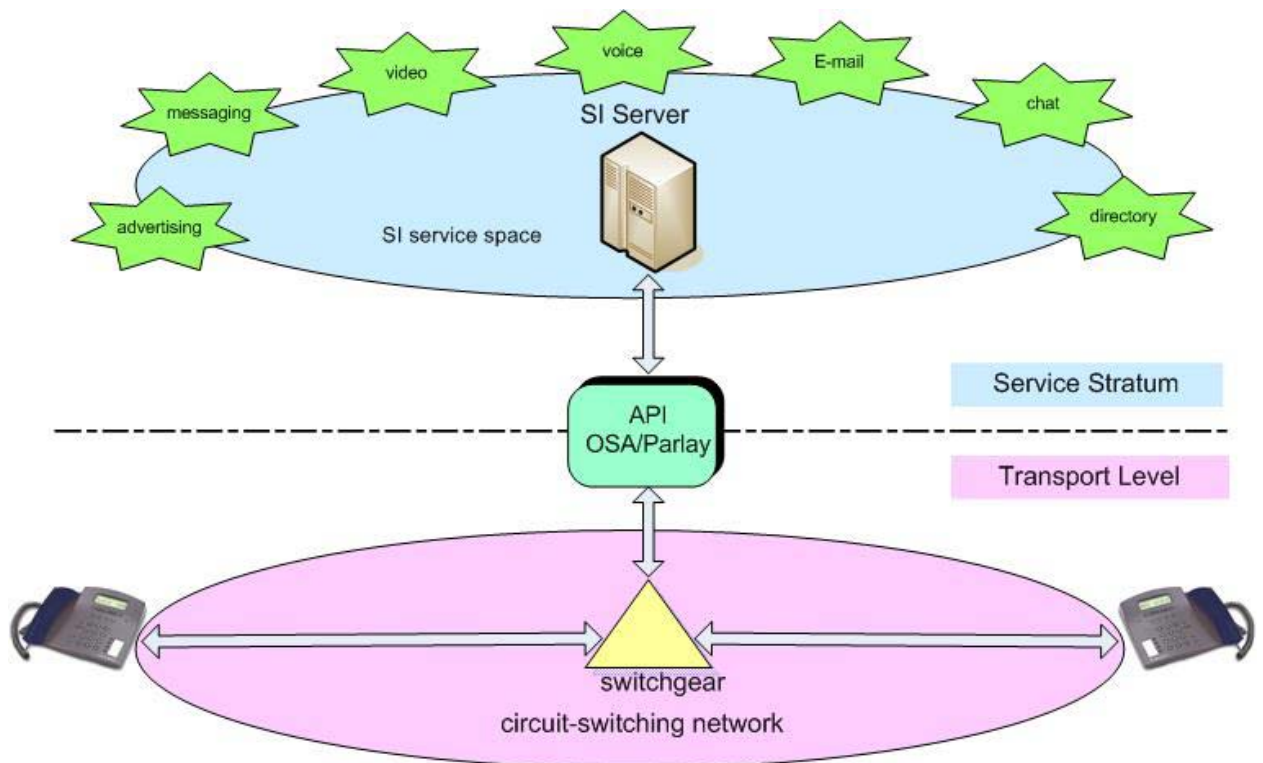


Fig. 29. SI functional architecture for a circuit-switched network.

Fig. 29 illustrates the SI functional architecture for a circuit-switching network that does not support packet data transmission. In this case, SI server interacts with network control equipment via an open interface of OSA/Parlay type.

This makes the SI service space available for circuit-switched network nearly the same as for packet-switched one. Thus, the SI technology allows a significant raise of the service level available in circuit-switched networks.

5.3. Diverse Networks Integration

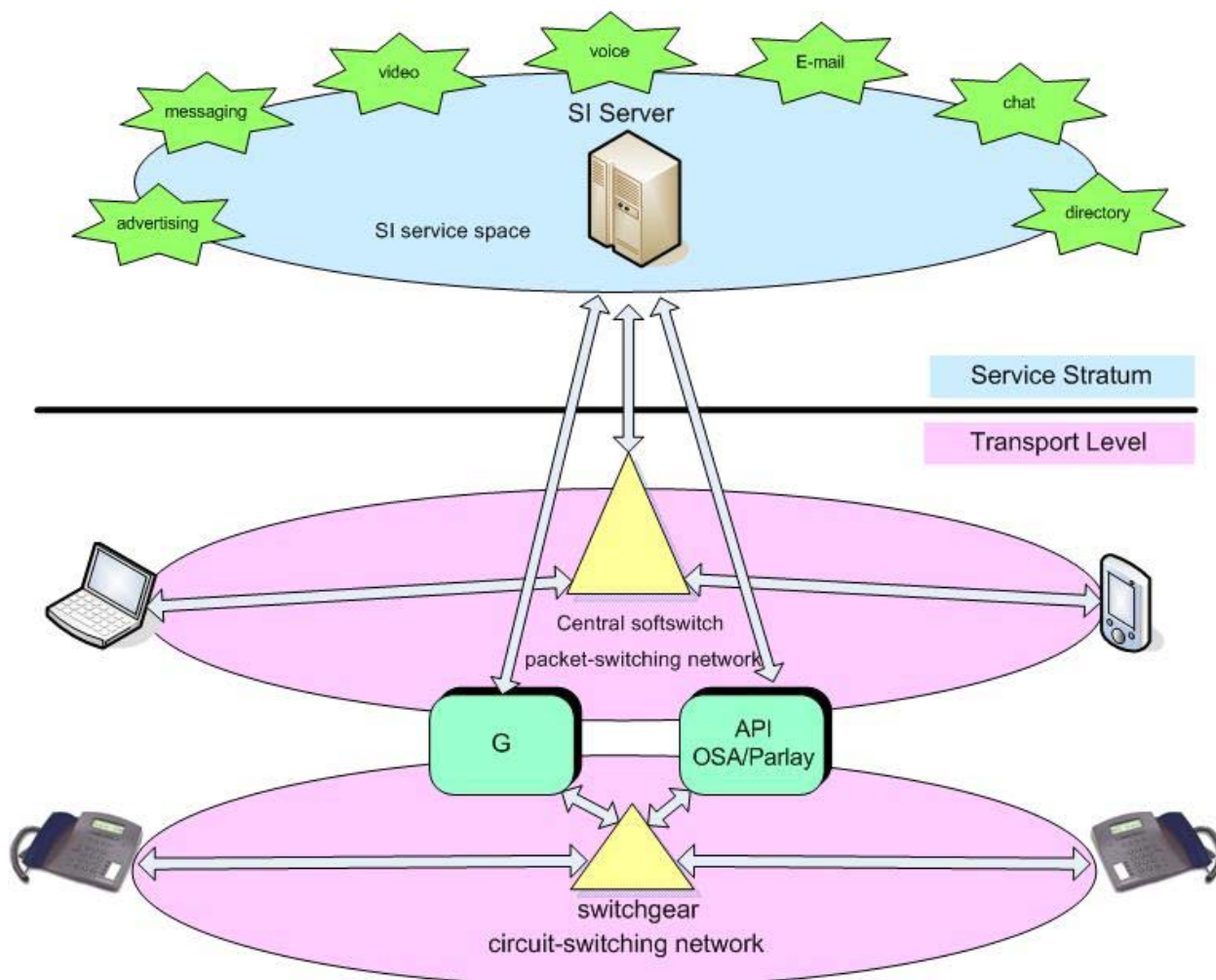


Fig. 30. SI approach to integration of diverse networks.

G – gateway between diverse networks.

API OSA/Parlay – programming interface for access to circuit-switching network equipment.

Thanks to the features of the SI session initiation approach, terminals of calling and called users connected to diverse networks interact with SI server using different protocols supported by networks they are connected to. Because of this, the network integration under the SI approach (Fig. 30) does not need user address transformation in gateways between diverse networks.

5.4. Distributed Architecture

Fig. 31 illustrates the SI distributed architecture.

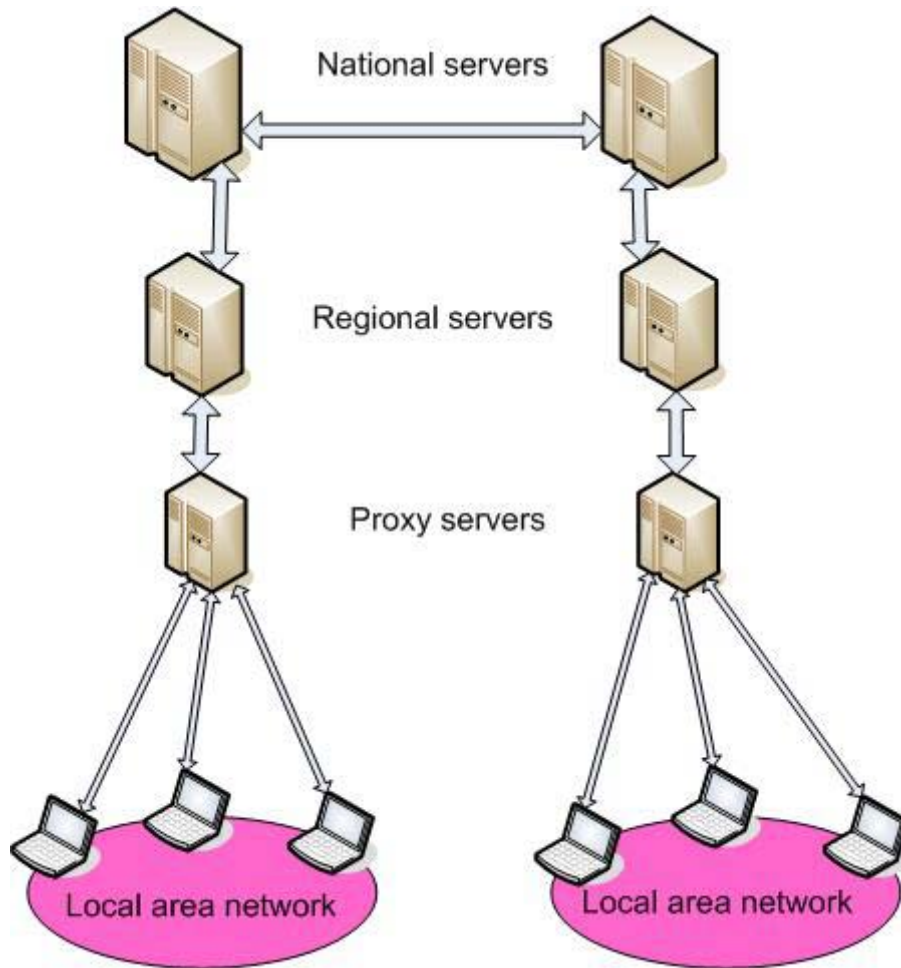


Fig. 31. SI distributed architecture.

By a local area network, we will mean any integration of computers and communication devices using the same transport protocol and technological (network-specific) addressing system that may differ from those applied to an outer network. SI proxy (border) server acts as a border and bridge between a local and outer network. National and regional servers are elements of an outer network like the Internet.

Every SI server provides all the [functionality specified for an SI server](#) regardless of its topological level and location.

Additionally, every server in the SI distributed architecture has its own address that is also the name of a public contact group joining users living in the same area. For the user convenience, such a server name must be the same as usual name of a country, a city or region, a local area or network segment for a national, regional and proxy servers respectively.

The functionality of any SI proxy server includes:

- In case the user, service or resource indicates his, her or its readiness, SI proxy server not only records the SI address indicated in association with corresponding technological address but also propagates this information to an upper regional (national) SI server with messages about public name and technological address of the proxy server.
- In case of a call request with indication of outer server name received, SI proxy server does not search the called address in its internal database but delivers the request to the indicated SI server or to an upper SI server. (For example, in case a proxy server does not know a call transmission path for a public contact group specified).
- SI proxy server delivers quality-of-service parameters requested by the user to an upper server.
- SI proxy server switches data transmission for a communication session.

The functionality of any SI regional server includes:

- In case the user (service or resource) indicates his, her or its readiness directly or via a proxy server, SI regional server records the SI address indicated with a corresponding technological address of the user or the proxy server.
- In case of a call request with indication of outer name received, SI regional server does not search the called address in its internal database but delivers the request to the indicated SI server or to another SI server or rejects a request. (For example, in case a regional server does not know a call transmission path for a public contact group specified).
- In case an SI address of the called user (service, resource) found in internal database, SI regional server generates a message about communication session start and sends it to technological addresses of servers and terminals contributing in communication session with messages about corresponding servers and terminals technological addresses.
- SI regional server delivers to corresponding SI servers and directly provides quality-of-service parameters requested by the user.
- If needed, SI regional server switches data transmission for a communication session initiated with help of this server.

Fig. 32 illustrates possible data transmission schemes for a communication session between the user and another user or an information resource in case of the distributed SI architecture.

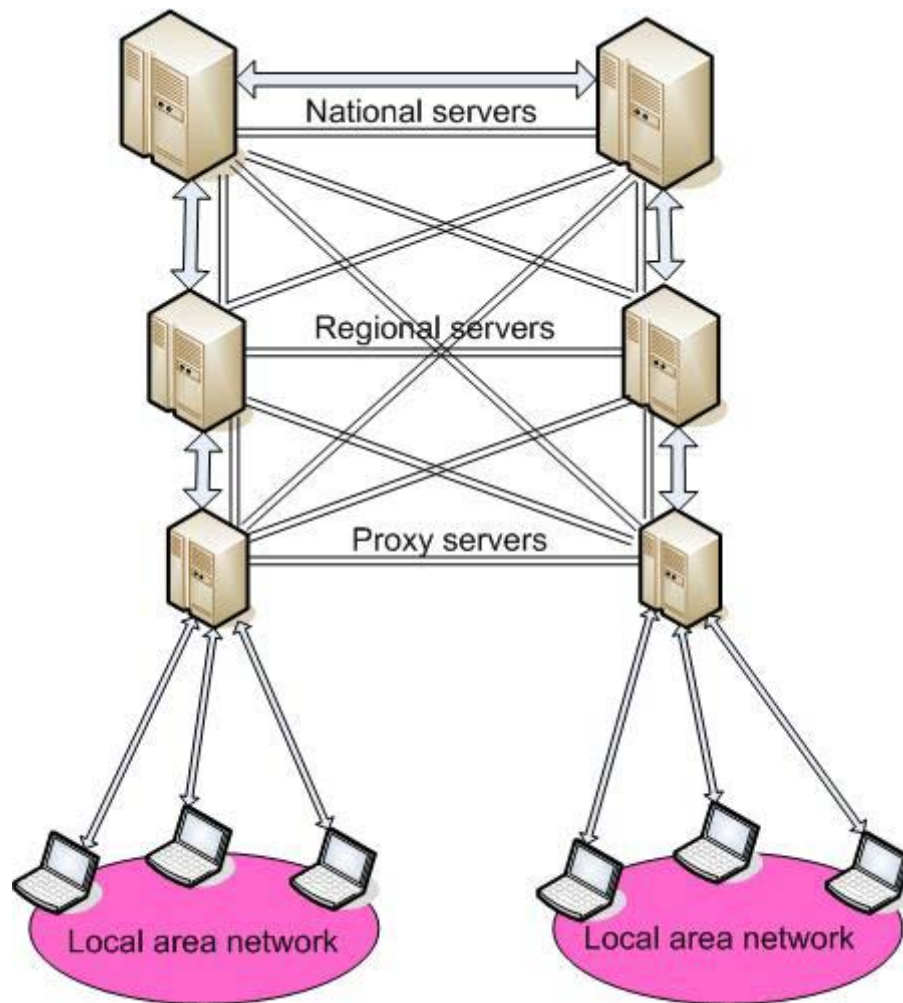


Fig. 32. Possible data transmission schemes for the distributed SI architecture. Double lines indicate traffic paths for a data transmission during communication sessions.

The actual choice of a data transmission scheme depends on the user's option, the transport provider's option, the requested quality of service, the business model of collaboration between various SI service providers, etc. It is also possible to use two or more data transmission schemes simultaneously for the same communication session to provide a higher level of transport reliability and quality, for example.

5.5. The New Dimension of Mobility

The International Telecommunication Union (ITU) recommends following definitions for the concepts of personal mobility, terminal mobility and nomadism:

- **Personal mobility:** This is the mobility for those scenarios where the user changes the terminal used for network access at different locations. Ability of a user to access telecommunication services at any terminal on the basis of a personal identifier, and the capability of the network to provide those services delineated in the user's service profile.
- **Terminal Mobility:** This is the mobility for those scenarios where the same terminal equipment is moving or is used at different locations. Ability of a terminal to access telecommunication services from different locations or while in motion, and the capability of the network to identify and locate that terminal.
- **Nomadism:** The ability of the user to change his network access point on moving. When changing the network access point, the user's service session is completely stopped and then started again, i.e., there is no service continuity or hand-over used. It is assumed that normal usage pattern is that users shutdown their service session before moving to another access point.

Following features of the SI technology provide support for listed mobility types (Fig. 33):

- Independence of user, service and resource address set from technological addressing used by an infocommunication transport network.
- Independence of fixed location and wireless local area network protocols and addressing from a united infocommunication transport network.

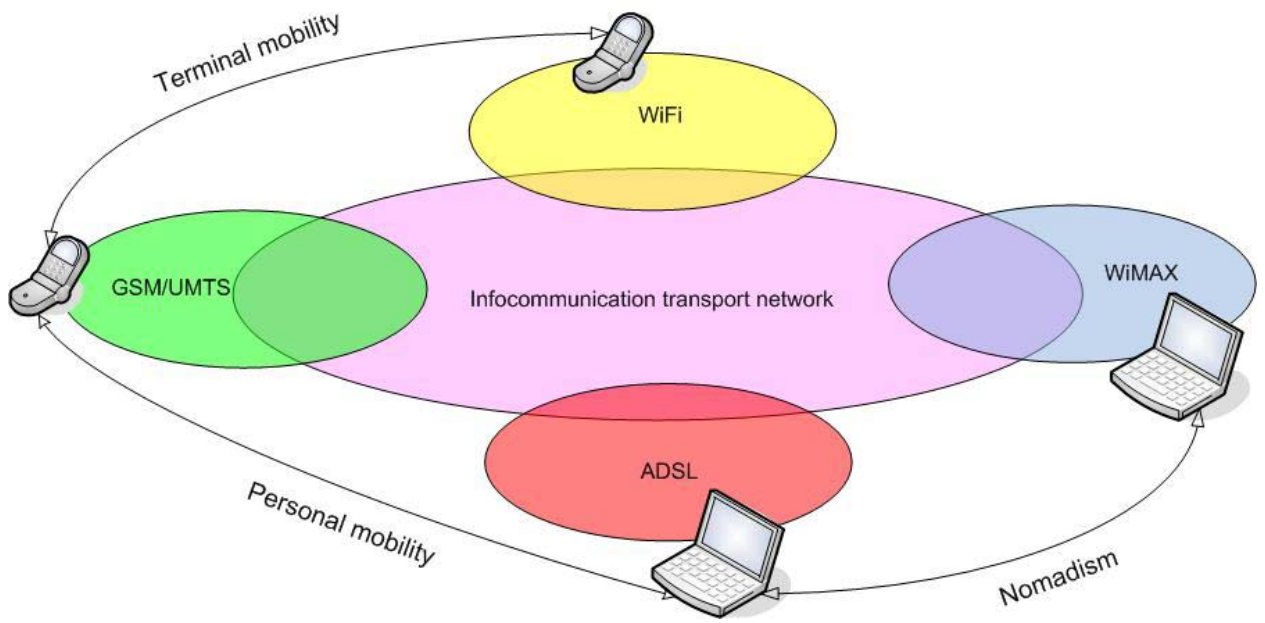


Fig. 33. SI approach to mobility.

6. Advanced Infocommunication Technologies

Besides their main goal of building a unified user service space, various aspects of the natural addressing and SI technology also could be used for overcoming inherent drawbacks of existing telecommunications and information technology (infocommunications) that allows significant raising of their usability and value while opens new, earlier unknown ways to implement infocommunications.

Think how many times you dial a phone number or send an e-mail asking yourself: “Does anybody ready to answer at the other side?” How much time you spent trying to get on the phone a called party that actually was not available or busy answering another call? With appearance of the SI technology these problems becomes obsolete because this technology provides [full presence capability support](#) for any communication service.

The development of the Internet and telecommunications does not only bring benefits but also brings risks and a harm of malicious attacks and unwanted correspondence. Unfortunately, modern infocommunication systems are practically completely vulnerable leaving a user protection to user’s own cares. The SI technology contains the set of cardinal solutions making most malicious tricks impossible, providing an early recognition and blocking of unwanted traffic by communication servers. This allows infocommunication systems to enter the significantly [higher level of security and spam protection](#).

The implementation of such SI technology feature as personalized, official addresses those are officially warranted and falsification protected transforms digital communication facilities and the Internet into suitable channels for [official documents circulation](#).

The virtual private network (VPN) technology in the last years became a usual way to provide secure communications with remote subdivisions and workers of the same enterprise. However, a VPN construction needs expensive installation. The SI technology solves this problem with new service of [private user groups](#). These groups are functioning similarly to virtual private networks but do not need a dedicated server and configuration of user’s software and hardware.

Currently, users of local area networks (LAN) connected to the Internet via network address translation (NAT) servers still need to lease outer IP-addresses to make their computers able to receive incoming TCP connections. Thus, the NAT technology does not completely solves the problem of fast IP address space occupation. We proposed own [solution to this problem](#) that allows LAN computers to receive incoming connections despite of sharing only single outer IP address. This technology also allows seamless integration to the Internet of outdated or even advanced networks, which use non-TCP/IP addressing and transport protocols.

Our developers and engineers are working hard in searching and implementing ideas, which will bring future communication capabilities to the present time.

6.1. Presence Capability Support for Any Communication Service

Bruce Morse, IBM Software Group vice-president believes that the ability of a telecommunication network to display a presence of users “in the next decade will become so widespread and usual that it practically becomes our second nature”.

Up to date, one can use presence capability in a phone network only as a value-added service. However, under the SI conception, it is an integral part of the communication protocol.

Following the SI protocol, a contribution of the called user to a session initiation consists in a declaration of readiness to receive a call. SI server records this status allowing other users, which have an access to public names of the user.

As the user can selectively indicate readiness to receive a call for one or more public addresses then only users, which has the address with readiness set on will see the user “present” in a network.

The user can easily indicate a readiness to receive a call for every address in his or her address space. On the other hand, the user may do not indicate a readiness on any of his or her SI address. In this case, the user will be hidden from other users but still able to communicate.

Another special feature of SI approach to a presence capability is the ability to indicate communication type and facilities for which the user is available now. The user may indicate a readiness status for all available communication types or choose appropriate ones. At the same time, a calling user may choose the most suitable communication type from the indicated set of available to the called user.

SI client may also provide the user with information about exact location of other users, which are connected to fixed access points or using GPS-enabled terminals.

With the SI technology and multiplicity of own public addresses, the user has much more abilities for flexible management of his or her presence indication than only the ability to set invisible (offline) status for single account available in most communication systems.

6.2. Strong Security, Spam Protection and Official Communications via the Internet

The SI technology establishes a strong user protection against spam and undesired contacts:

At first, the user can easily manage his or her public address, being not limited to a single public address. This is done by means of adding and removing addresses or changing their status.

At second, a SI public address has no strict formatting so there is no ability to extract such an address automatically from a web page of other source by malicious programs.

At third, in addition to ordinary public addresses, the user has the ability to register a personalized official SI address that is not anonymous. For example, an officially registered data as name, surname, family name or photo can be used as such an address. A call to a official address may be possible only if a calling user initiated the call procedure under own official address. SI server may apply similar rules for official addresses corresponding to registered officials, organizations and companies. In this case, SI technology completely removes any anonymity of a network communication and therefore any risk of a spam and phishing attack.

The user may also apply additional rules restricting incoming calls like allowed call time and allowed callers or use a combination of those settings. While the user defines these rules via his or her terminal, they are stored and applied at the server side not at the user terminal side in opposition to many existing telecommunication systems. This allows an early blocking of undesired traffic before it hits a customer connection channel, a service provider or corporate local network.

6.3. Building Virtual Private Networks with Ease

Under the SI conception, any user or content provider has the ability to create public contact groups with special access and quality-of-service rules (Fig. 34). Thus, we can consider any of such a group as a separate virtual network.

Basic purpose:

It is implementation of the protected virtual Communication Network in enterprises with territory-distributed subdivisions or complicated management structure. The virtual Network combines company's employees, structural subdivisions and information resources by means of a single both for telephony and Internet Addressing System.

Distinctive features:

The Addresses System reproduces employees' photos, surnames and position names, as well as the titles of structural subdivisions and any information resources in any national language.

Advantages:

- The Network enhances efficiency of communication and data access due to application of real and easy-to-remember subscribers' and data resources' addresses
- It enables to indicate employee's on-site status and call-in availability
- It supports on server bases of employees' addresses; has a built-in system of address data search; enables to review, save and sort the addresses at subscribers' handsets
- Implementation of the offered Network doesn't require essential time and resources, because it overlays the existing telephony and Internet networks
- It applies Unified Addresses System for subscribers' information and their contact details
- The system is reliably protected against unauthorized access to the information
- It applies a single client program both for communication sessions and data processing
- Installation of the Network requires no dismounting or replacement of the existing communication equipment
- It is quick and easy to scale, easy to maintain

Finance advantages of implementation:

The Network enables to save money spent on design and implementation of corporate VPN, which is based on the traditional firmware.

6.4. Effective Shrinkage of Total IP Address Space Required for Operation of Global Infocommunication Network

The special feature and advantage of the SI session initiation protocol is the ability to access a user terminal or information resource without specifying its technological address. Proxy and regional SI servers store technological addresses of connected user terminals. Thanks to this fact, local area networks may carry out a communication session initiation and protocol message transmission on any transport level using any network addressing rules.

During a communication session, proxy and regional servers use the communication session identifier to manage data transmission between users or between the user and an information resource. Meanwhile, in opposition to NAT server, SI server exchanges both source and destination addresses at once.

Fig. 35 illustrates the scheme of interaction between SI client running at a user terminal and a proxy SI server explaining independence of transport stratum protocols and respective addressing systems of local and outer infocommunication networks.

Thus, the SI technology provides independence of a local network addressing from the addressing of united infocommunication network. Meanwhile, SI proxy server may be combined with NAT server or completely carry out its functions.

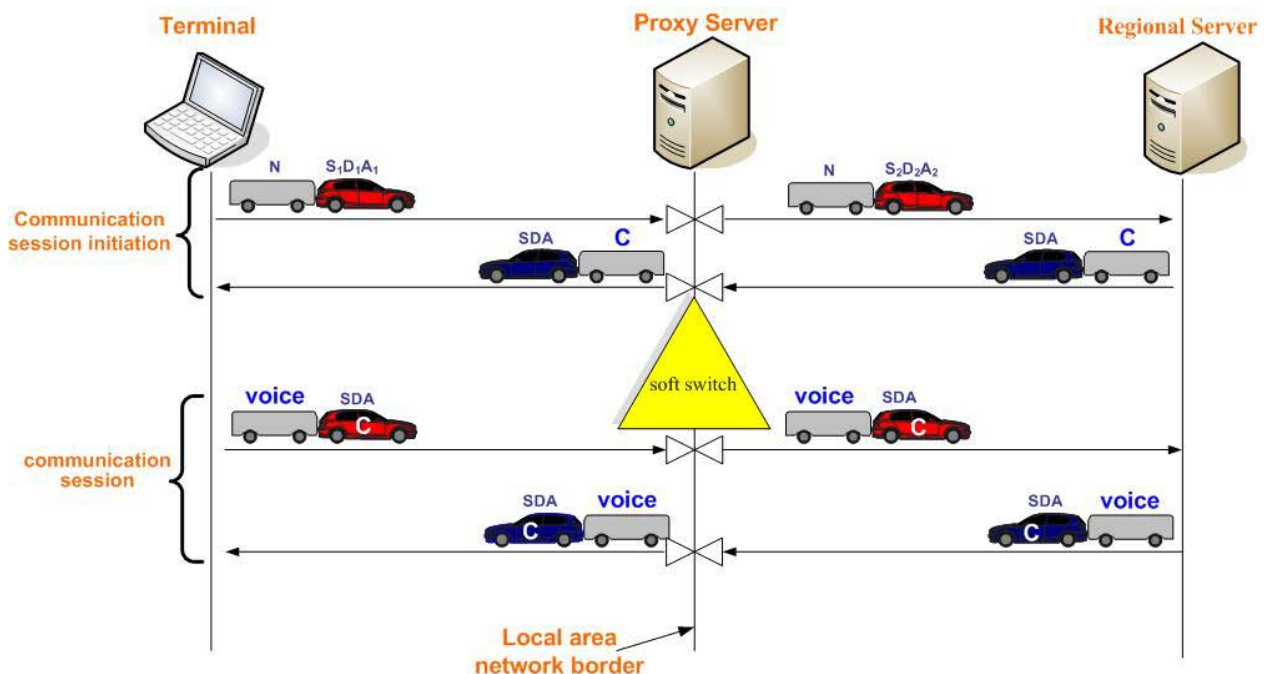


Fig. 34. Scheme of interaction between a SI client and a proxy SI server.

SDA – source address plus destination address, while S_1 - technological address of the terminal, D_1 - technological address of the proxy server, S_2 – source address (proxy server

address) for interaction with the regional server, D_2 – technological address of the regional server, "c" – communication session ID.

Independence of a fixed location and wireless local area network addressing from the outer transport network is an effective way to shrink IP address space required by the united infocommunication transport network.

The potential advantage of the SI technology is the ability to provide communication session initiation via a united transport network that does not use IP addressing of its technological components (for example, SI servers and routers). (High-priority invention application #2007131316RU ÷ #2007131322RU, #2007131337RU ÷ #2007131343RU).