

Enhanced Services with INTELLIGENT NETWORKS

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The advent of intelligent networks has added a new chapter to the existing call services. Customers can enjoy high-quality services with data consistency—and that too at cost-effective rates

While setting up calls, reliability and intelligence are vital for storage and access of customer data in a network. Intelligent network is based on the concept that services can be broken down into elemental capabilities called functional components or service independent building blocks (SIBBs). If a network provides two types of calling services, with some of the functional components overlapping the two, a comprehensive set of these SIBBs could be implemented at every point (or exchange) called service switching point (SSP). This implementation is done by means of controlling the exchange from a powerful and remote computer called service control point (SCP). The whole process results in a powerful service that could be implemented simply by writing software for the SCP. This will enable it to manipulate the SSP.

Architecture

Earlier, exchanges had a small amount of 'intelligence', with software programs and related data for call routing and control of basic telephone services. Present intelligent networks are equipped with a larger data reference store and software capable of controlling more powerful services. Intelligence can be added to the existing network in distributed or centralised manner, according to the situations dictated by new network, equipment used, and service to be provided by the new network.

In a distributed intelligence network,

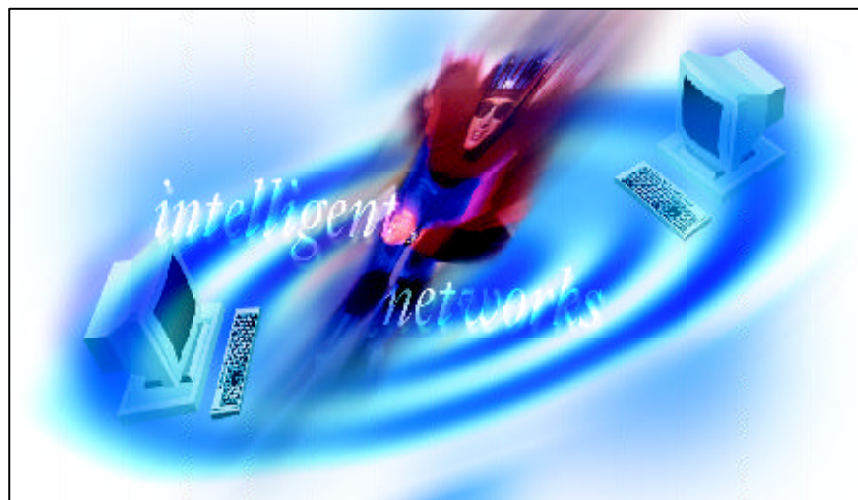
call routing and service control is spread over many sites or exchanges. Each exchange stores large data which is necessary for setup and control of a wide range of services offered. This sort of intelligence can be created by continually enhancing the present exchanges, and progressively adding software and hardware to cope with new service needed. Software implementation is a very complex process. To maintain exchange software up-to-date is also difficult.

Fig. 1 illustrates the standard 'centralised' intelligent network (IN) architecture. In this network, SSPs in the lower tier contain service switching functions (SSFs). To control the advanced services call to the SCP, improved exchanges have an intelligent network interface. SCP manipulates subsequent actions of the exchange.

SCP

Service control point (SCP) is a specialised computer, which is often remote from the exchange. It is connected by a signaling system number 7 (SS7) signaling link. Service control function (SCF) requires the knowledge of how a service works with customer-specific data required. In response to the request for an 'advanced service' call attempt, the SCP sends a sequence of primitive commands to the exchange, using SS7 signaling. The command directs the exchange to perform a sequence of switching actions.

Call control is carried out by the SCP. During call set-up, call processing is suspended so that SSP may refer to SCP for determining whether a call is permitted to connect to the given number, or some other 'intelligent' action may be taken.



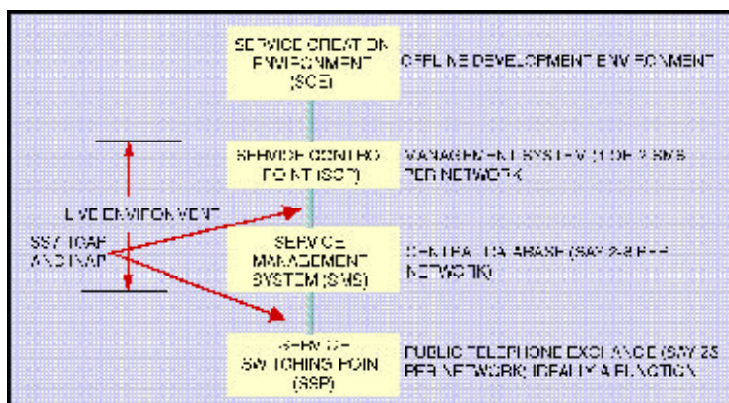


Fig. 1: Intelligent network architecture

The SSP sends a SS7 message to the SCP containing the dialed number and some other known information about the called or calling party. The SCP interprets the call and then returns the command sequence to SSP. This is done by means of signal connection and control port (SCCP), transaction capability application part (TCAP), and intelligent network application part (INAP). SCCP, TCAP, and INAP form part of the signaling system.

The number of SCPs in an intelligent network depends upon the complexity of the service logic required to support the advanced services and traffic demand. Advanced SCPs are capable of handling a large number of different services. So the number of SCPs in an intelligent network can be kept to the minimum required.

SSP

Service switching point (SSP) or service switching function (SSF) is a modified telephone exchange. Over and above the normal function of a telephone exchange, it contains an 'intelligent network' functionality consisting of several components. Every exchange has a number of look-up tables to enable it to switch calls to correct destinations.

In SSP trigger table, the data needed to complete the setting up of calls is not contained in the table itself. Instead, there

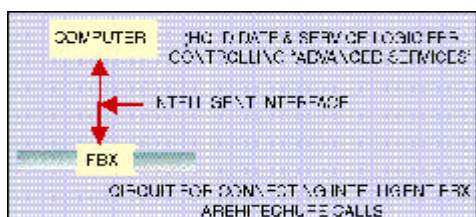


Fig. 2: Intelligent PBX architecture

is a trigger which gets activated by the called number to commence a transaction with SCP. SCP collects necessary call data like caller's number, class of ser-

vice, dialed number, etc. This data is forwarded to request further control information.

The data dialogue between SSP and SCP is called transaction. These two are connected using SS7 TACP signaling. During the dialogue, the SCP returns a number of control commands to SSP for controlling its switching and charging functions, and also activating necessary intelligent peripherals.

An intelligent peripheral could be any number of different types of devices providing advanced services. At the simplest, an IP might be a recorded announcement machine and, at the complex level, it might be a voice interaction unit.

SMS

Service management system (SMS) or services management point (SMP) appears above the SCP, and is used to control the SCPs in a network. SMS is an offline computer system used to prepare database and configuration table of network and customer-specific data before downloading it to live SCPs. SMS is only an updating machine and ensures that the data held in all SCPs is comprehensive and consistent.

The service availability is mainly affected by the reliability of SCPs and SSPs. Service creation environment (SCE) is the tool with which new intelligent services can be developed. Software debugging tools are capable of stepping through the programmed commands with a new software service script.

Advantages

An intelligent network can easily manage complex, network-wide ser-

vices as compared to public telephone networks. A higher level of data consistency with the network ensures service reliability. It has a minimal impact on existing network and switching equipment during the introduction of new services. Cost of introducing and enhancing services is reduced. To meet the changing market needs, high-quality service is provided with ability for rapid reconfiguration of services. Intelligent network offers limited customer control and management facilities, if required, by providing special customer terminals connected to the SMS.

Services offered

Certain types of telephone services are best realised using an intelligent network. This applies to those services where either the charging requirements of the services are complicated; for example, there is a need to charge the person called and not the caller. Another application is when the handling is complicated; for example, caller authorisation is necessary or complicated translation of the dialed number is necessary.

Virtual private network. It is a network specific to a company (a telephone closed user group with a specific telephone numbering plan) which is created for individual corporate customers of the public network. The public network thus appears to the corporate customer much as a private network with a 'tailored' company numbering plan.

Freephone. The intelligent network converts dialed freephone number to standard telephone number, allowing the SSP to complete the call set-up, while simultaneously creating a call-charge record of the call receiver's account.

Premium rate service. The ability to charge a premium rate for calls besides the normal telephone charges enables charging the caller for services such as weather information, traffic information, etc. The extra charges collected are forwarded to the information service provider.

Calling card service. This service enables card holders to make calls from any telephone in the public network, invoicing call charges to their personal calling card account. At the call set-up, intelligent network verifies the card's account number and requests caller's authorisation by means of his personal

identification number (PIN).

Televoting. This service is conceived to complement television games shows in which viewers are invited to call different telephone numbers to register their vote for the best participant.

Universal number service. This service enables customers of the public telephone network to roam anywhere in the country using the same telephone number. As the user moves to a new location, he registers with the SCP. Calls to his number are forwarded to him. The ability for a customer to change his telephone network provider without being forced to change his telephone number is the basis of the number portability service. The problems posed by changing number, otherwise dissuade change of telephone network provider. Number portability is increasingly viewed as an essential of competition among public telephone service providers.

Universal personal telephone service. It is an extension of the universal number service, allowing the customer not only to roam within the fixed telephone network, but also connect to mobile telephones and other networks.

Line information database (LIDB). SCP stores information about each line. This enables the network to set up call to a particular service. LIDB holds the current status of a particular piece of information, whether customer is at home or wishes an incoming call to be re-directed to an alternative number.

Cellular radio telephone service (CRTS). Intelligent network in cellular radio networks keeps an eye on the location of mobile user by continual polling (or registration) process. Same area code and directory number for calls can be used by the mobile user.

Adding intelligence to a PBX offers a host of new services (Fig. 2). Customer can request for the wake-up call by dialing a service selection code plus the time. The 'intelligence' stores this information and initiates the PBX to make the wake-up call at the right time.

In a country where the public telephone service has been deregulated, sometimes a PBX gets connected to network carriers. At a particular time of day, one of the carriers may be the 'preferred carrier,' considering the cost or network congestion. At a different time, circumstances may favour the other carrier. By giving the PBX some appropriate intelligence, the preferred public network carrier can be adjusted according to the time of day.

To store the information contained in incoming calls, computer can be linked to the telephone equipment. Computer will give a signal to the telephone equipment when the last form has been completed, making it ready to receive the next caller.

The future

Intelligent networks enable a sophisticated service. Their implementation on a network-wide basis will require extensive programs of signaling and switch enhancements. There is a need to set appropriate standards for inter-networking of intelligent networks around the world with different equipment in the same network. This will enable the network providers to offer cost-effective services. Surely, these enhancements will give birth to many powerful and flexible services for future networks. □