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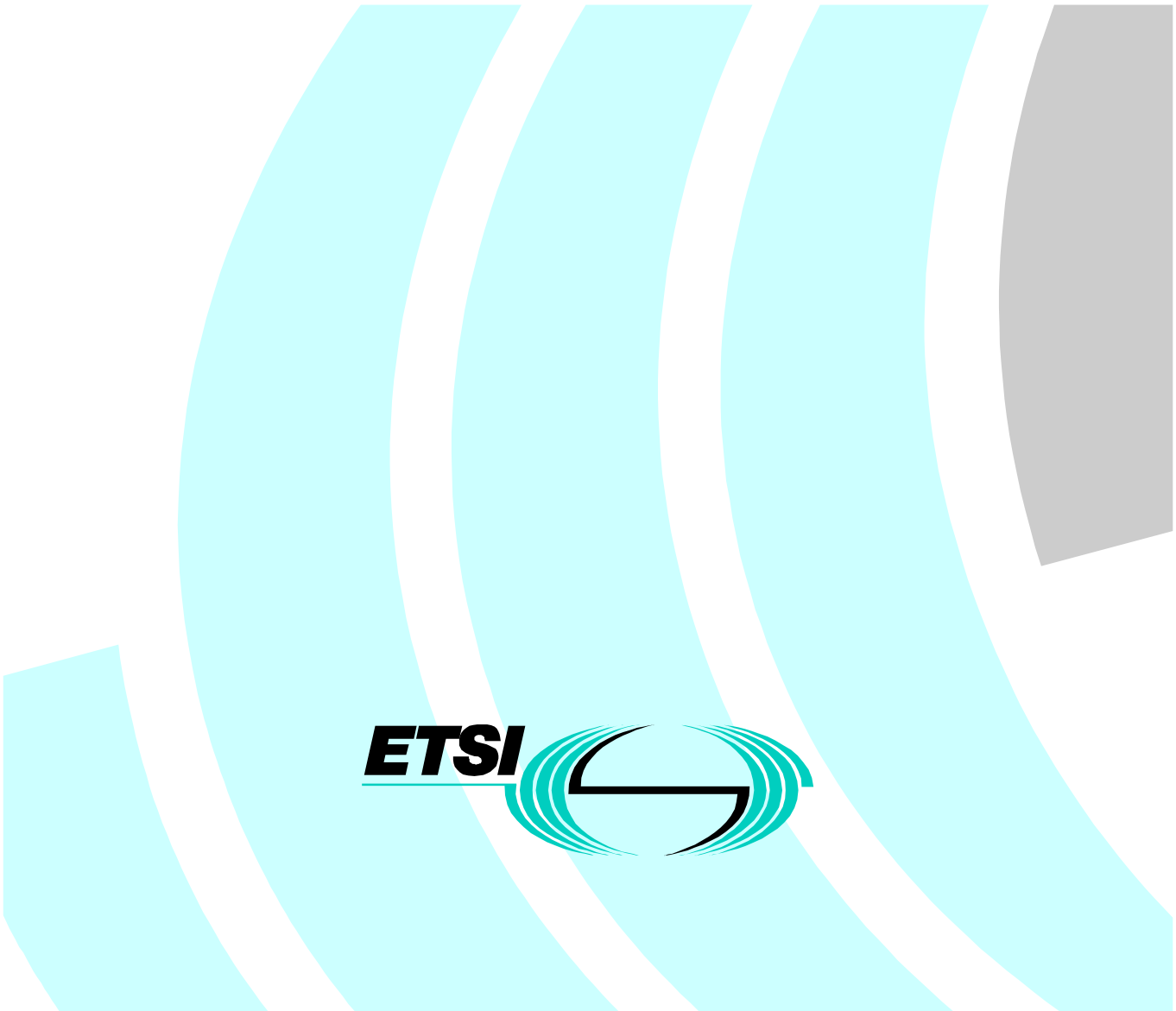
Technical Report

Enhanced SRF phase 2;
Enhancement to the modelling and capabilities of the SRF phase 2



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Postal address
F-06921 Sophia Antipolis Cedex - FRANCE

Office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet
secretariat@etsi.fr
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Contents

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Signalling and Protocols for Advanced Networks (SPAN).

The present document is based on ITU-T Q-series Intelligent Network Recommendations, ITU-T Recommendation Q.123X [1].

Intelligent Network (IN) Capabilities Set 4 (CS-4) is the fourth standardized stage of the IN as an architectural concept for the creation and provision of services, including telecommunications services, management services and service creation.

1 Scope

The scope of the present document will be the definition of enhancement to the modelling and the capabilities of the Specialized Resource Function (SRF).

Reference services capabilities for the enhancement of the SRF are the targeted telecommunications services that should be supported by CS-3.

These services are for reference purpose only: other services could be considered in identifying the SRF enhancement as work on CS-3 progresses.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ITU-T Recommendation Q.123X: "Intelligent Networks".

NOTE: Not yet published.

[2] ETSI TCRTR 027: "Intelligent Network (IN); Vocabulary of terms and abbreviations".

[3] ETSI ETR 199: "Network Aspects (NA); Enhancement to the modelling and capabilities of the Specialised Resource Function (SRF)".

[4] ITU-T Recommendation I.375: "Network Capabilities to support Multimedia Services".

[5] ITU-T Recommendation Q.1204: "Intelligent network distributed functional plane architecture".

[6] ITU-T Recommendation I.211: "B-ISDN service aspects".

3 Abbreviations

For the purposes of the present document, the symbols and abbreviations given in TCRTR 027 [2] and the following apply:

B-ISDN	Broadband - Integrated Services Digital Network
BVC	Broadband Video Conference
GUI	Graphical User Interface
SCIE	Service Creation Environment
SCF	Service Control Function (IN term)
SRF	Specialized Resource Function
STB	Set Top Box
VCC	Voice Calling Card
VCR	Video Cassette Recorder
VOD	Video On Demand

4 Introduction

The enhancement to the capabilities of the SRF will be driven by new services that need complex voice-processing. These services grew outside of the SSF in the form of interactive voice response systems, voice mail systems and automated operators. These systems embraced new technologies including facsimile, speaker-dependent and speaker-independent voice recognition, text-to-speech and voice identification. These processes do not involve any call routing, so it is logical to manage these parts of the application on the SRF.

These services need many complex resources, in some cases at the same time, or the same sequential actions to provide specific procedures. The SRF could provide a part of the service logic using Mini-Scripts [3]. These "dialogues" contain the sequential actions, already defined, necessary to execute a part of the procedures.

The SCF manages database functions and performs tasks such as call routing; the SRF performs intensive resource processing, providing local intelligence and processing power to interpret user requirements.

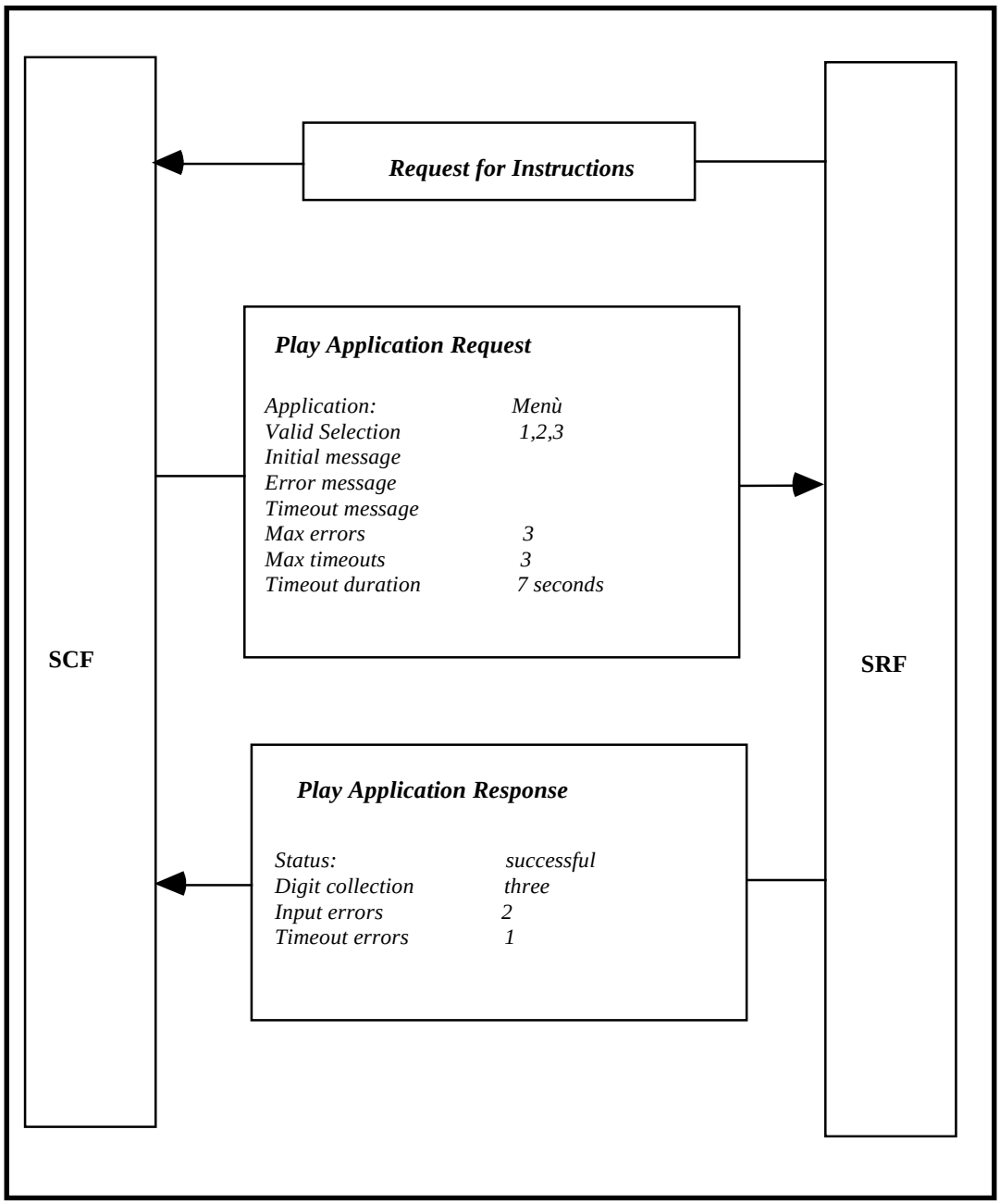

Figure 1: An example of transaction between SCF and SRF

The use of Mini-Scripts defined in [3] can reduce the number of messages sent between the SCF and SRF, for example: complex error-processing logic and a variety of messages are set in place on the SCF to handle a simple menu; instead, a PlayApplicationRequest (a type of Mini-Scripts) could be used in conjunction with the menu-handling facilities on the SRF to reduce the complexity of the transaction.

5 Services

This section lists the proposed CS-4 targeted services/service features in broad outline. Note that the definitions for targeted telecommunications services are only preliminary descriptions in the initial phase of the study. They are a useful reference for the description of the general CS-4 services/service features capabilities, which, in turn, are fundamental to the scope of this draft, proposed CS-4 SRF enhancement. As such, the services/service features definitions are for this purpose only and should not be considered as standardized definitions.

Moreover, it should be noted that these services are for reference purpose only: other services could be considered in identifying the SRF enhancement as work on CS-4 progresses.

The CS-3 targeted telecommunications services which represent a reference for the SRF enhancement, are as follows:

- broadband Multimedia services;
- internet based services;
- personal mobility;
- terminal mobility.

New service features are as follows:

- Message Waiting Indication;
- B-ISDN Multiple connections point to point;
- B-ISDN Multi-casting;
- B-ISDN Conferencing;
- data communication between different protocol terminals;
- charge Card Validation;
- call Disposition;
- enhanced Charge Card Validation.

5.1 Broadband Multimedia Services

For multimedia services the SRF should be able to interact with image and vocal signals, which means that the SRF should contain commands to go backwards and forwards (both also in fast mode), pause and so on. These procedures could be executed as defined Mini-Scripts. At the end of the Mini-Scripts running, the SRF should return information to the SCF on the results of the interaction with the user.

In multimedia communications, the resource hunting process deals with both a large volume of resources and many types of resources. The many resource types result in the occurrence of a great many combinations when the time axis and the location axis are considered in parallel.

Transmission of multimedia documents over networks will constitute, in the near future, an attractive Value Added Service.

Multimedia services are characterized by Multimedia Session, which is generically defined here as composed of three different entities:

- *Multimedia Controller*: which is the entity responsible for the control of the session;
- *Control Connection*: which is the connection established between each user and the Multimedia Controller to exchange session control information;
- *Media Connection*: which is the connection between the users to exchange Media information.

The most important constraints identified are:

- *Dynamic Resource Allocation*: the Multimedia information exchanges, during a Multimedia session, may be of very different types, each one requiring different resources to be transmitted. There is no sense in allocating the maximum resources needed for the entire duration of the session, because they might not be in use most of the time. This implies the need for Dynamic Resource Allocation. The control of this dynamism could be managed by the SRF without the direct control of the SCF.

- *Events During Session*: these applications are, by nature, highly interactive. This implies the existence of events during the Multimedia session. These events can be automatically generated by the application (like Mini-Scripts) or can represent explicit requests from the users.

- *Multiparty*: some Multimedia Applications will certainly require several users interconnected in an impracticable way. This implies the possibility to connect/disconnect a user, with specific resources allocated, during all the session.

To model the Control Connection, SRF is used as an interface between the user and the SCF. This capability is predicted in ITU-T Recommendation Q.1204 [5], using SRF_report_to_SCF in one way and Prompt_and_collect_user_information in the other. This will virtually connect SCF and the user in a bi-directional way.

Some cases of Multimedia Session are: Multimedia conferencing, Access to a Multimedia Database and Multimedia Interactive Games.

According to ITU-T Recommendation I.211 [6] multimedia services can be classified into five categories:

- Conversational Services;
- Messaging Services;
- Retrieval Services;
- Distribution services without user control;
- Distribution services with user control.

5.1.1 Video On demand

The service Video On Demand (VOD) gives the user the capability of using the telephone network to-access audio-visual databases for a variety of applications. The VOD service provides users with the capability of choosing a movie, in a more generic approach, a program, among many and interact controlling the presentation of the video by functions similar to those of a VCR.

Business applications can be designed to access information about products. Home users fall typically into entertainment. A user may wish to view a movie at his convenience. Typical characteristics for this service are that the user would be able to access the audio-visual information when desired and to watch it in the way they like; full control is given over the playback in playing, stopping, pausing, fast-forwarding or rewinding, as well as forward and reverse searching.

The services could include multilingual education services, access to citizenship and social services, video library database access, audio conferencing between students, parents and teachers.

The SRF acts as the communication partner to the STB during user-interactive dialogue (Level 1 Gateway) for the selection of the service provider. It receives and sends control information and could also send audio-visual information. It could also serve the downloading of the STB with base application software, configuration parameters and initial menus, if necessary. It offers, to the user, interactive menus listing the available service providers, and optionally updated copies of content lists and additional information.

5.1.2 Broad Band TV

The distributive Broadband TV service provides the distribution of TV (including HDTV) program channels to a customer premises utilizing a switched broadband network. The user can select among different flows of information; the flows themselves can not be manipulated by the users.

According to ITU-T Recommendation I.211 [6], the B-TV distributive service can be provided with or without user control (i. e. signalling channel available/not available). The supplementary services are only relevant when the user has the possibility to control the service.

The SRF acts as a provider of system information.

5.1.3 Video Conference

The Broadband Video Conference is a multimedia, multi-party teleservice which allows end-to-end information transfer between two or more service subscribers.

The service provides the necessary arrangements for a real-time conferencing in which both audio, video, and other media types (e.g. video scanned images, data documents, etc.) can be exchanged among single individuals or group of individuals at two or more locations via the B-ISDN.

Users can be either multiple users, grouped in conference rooms with their equipment (audio and video systems, PC, etc.), or single users with multimedia workstations.

During the BVC service it is possible to re-configure the communication between point-to-point or multipoint communication configuration; this, and other capabilities, make the BVC one of the more complex services offered by the B-ISDN.

The SRF acts as a server to merge and to distribute flows to the users in the conference.

5.1.3.1 Communication configuration

The Broadband Video Conference service requires, in general, multipoint-to-multipoint communication configuration to support the real-time audio and video components of the conference. The conference service could also require point-to-multipoint, multipoint-to-point communication configuration for the exchange of non-visual and non-audio media components. Multicast communications may be required for sending information to a selected number of participants within the conference.

Problems arising due to switching from one communication configuration to another (e.g. service interruption) are not covered by the present document.

5.1.3.2 Examples of Applications

Because of the integrated audio, video, and data communication, this service provides the means for face-to-face business meetings (which would otherwise be hindered due to the actual geographical displacement of the participants) and a basis for co-operative working. Using these communication means, this service may be used for the following applications:

- "workstation" conference providing head-and-shoulder images (one participant at each service end point);
- studio-studio conferences (group of participants at each service end point);
- tele-education (remote education and training, unidirectional video from the teacher to the students, bidirectional audio and data).

This is not an exhaustive list; other possible applications may emerge in the future. The examples of applications described above represent how the user can use this service and do not refer to "software applications".

5.2 Internet based services

The identified internet based services are as follows:

- Voice over IP type services;
- Web-based services:
  - click to dial;
  - click to fax;
  - click to fax back;
  - Voice access to content.

5.2.1 Web based services

This clause analyses IN and Internet interworking. The benchmark services considered are: Click to Fax, Click to Fax Back and Voice Access to Content. These services are carried over the PSTN but are requested from the Internet. The scenarios under consideration are as follows:

- *Click to Fax*: a user connected to the internet has some data/information to be sent in a fax format to telefax machine. The user supplies the destination fax number and the information to be sent to the internet server he is connected to. This in turn, sends a request and the data to the IN systems, which are responsible for conversion of the data in a suitable format, for placing out a call to the destination number and for sending the facsimile to it.

- *Click to Fax Back*: a user connected to the internet generates a request to the IN to retrieve some information in a fax format. The user supplies the fax number and an indication of the information he is interested in. The IN uses the information reference passed in the request to select a particular document, converts it into a form suitable to be sent as a fax and sends it to destination.

- *Voice Access to Content*: this service allows a customer to have some content of a Web page delivered in a speech form, via his telephone set. This service is similar to the Click to Fax Service, i.e. some information has to be passed from the internet to the IN systems, and converted in a suitable format.

The service Click to Dial, which enables an internet connected user to place a call on the PSTN, is not considered in this analysis because it does not involves the use of SRF capabilities.

This set of services require the following protocol conversion capabilities:

- text to fax;
- text to speech;
- voice recognition.

5.3 Other Services

- Voice Calling Card Service.
- Unified Messaging.
- CSN access to E-mail servers (access to voice-converted e-mail headings).

5.3.1 Voice Calling Card service

This service allows the users to place an outgoing call from anywhere, using their calling card. The user dials an access code and after the identification procedure, by a keyword or general word, the user will be able to speak the desired number or name, via procedures like VAD. Identification procedures are based on the Speaker Verification function used by the SRF.

6 Resources

This clause describes the SRF resources requested by the proposed CS-4 targeted services/service features. SRF resources identified for CS-2 and CS-3 are included, but not described in detail hereafter, except in the case where enhancements to them are requested.

The exchange multimedia information, during a multimedia session, may be of very different types, each one requiring different resources to be transmitted. It makes no sense that the maximum resources needed are allocated for the entire duration of the session, because they might not be needed most of the time. This implies the need for Dynamic Resource Allocation.

These applications are, by nature, highly interactive, this implies the existence of events during the multimedia session. These events can be automatically generated by the application or can represent explicit requests from the users.

Some multimedia applications will certainly require several users interconnected in an impracticable way. This implies the possibility to connect/disconnect a user, with specific resources allocated, for the entire duration of the session.

SRF resources for the proposed CS-4 targeted services/service features are:

1) Speaker Verification;

2) Storage and downloading of software to a STB;

3) Dynamic Resource Allocation.

6.1 Speaker Verification

Speaker Verification is the process of verifying a person's claimed identity by analysing a sample of that person's speech. This form of security is based on the premise that humans can, to some degree of confidence, be identified by their speech. Before, however, the caller is required to have enrolled in a reference database. This enrolment is typically accomplished by repeating a multidigit password several times.

7 The SRF model

The intelligence, within the SRF, could be distributed among multiple elements. It could have a modular design, with multiple components that handle distinct tasks, for example:

- managing the interaction with the switch and the caller;
- providing the primary service control;
- managing the multiple resources available in the SRF;
- controlling the distribution of the service logic and announcements;
- performing real-time monitoring for fault conditions.

Service introduction and update is made more complex by the presence of service logic and subscriber data at the SRF, but this could be managed by developing a functional element management system to provide service distribution facilities.

7.1 Data Manipulation in the SRF

Since the SRF would be able to execute part of the service logic independently of the SCF, it may also need to get access to some information/data related to the user. In this case the SCF should request to execute a particular Mini-Script and provide, in some way, the data to be modified/updated by SRF. This procedure can reduce the number of messages exchanged between the SRF and the SCF, and between the SCF and SDF. In a typical scenario, a user may place a call to get access to their service profile and execute customer control operations that do not require direct access to Service Management Function (SMF). For example, the user may need to modify his personal password or change the entries of a routing table (e.g. personal mobility services). In this context, the SRF can provide not only a service execution environment to run the Mini-Scripts, but also specialized resources such as DTMF receivers and speaker independent voice-recognition equipment. This would allow the user to use the key-pad of their terminals and/or to speak the commands and data to modify their service profile.

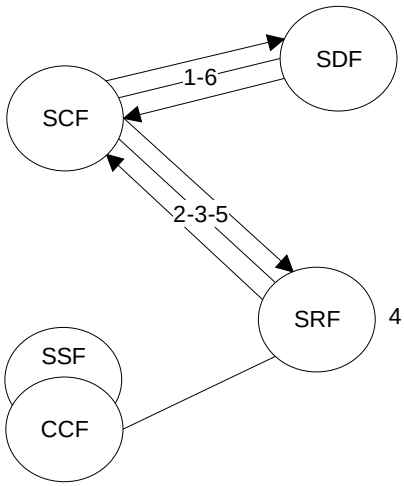

Figure 2: Data Flow

Data is passed to the SRF by the SCF. In this case the following steps are identified (step-numbers are shown in figure 2):

1) the SCF retrieves the information form the SDF;

2) the SCF instructs the SRF to execute a particular Mini-Script;

3) the SCF sends the data to be modified to the SRF;

4) the SRF executes the Mini-Script with the associated data received from the SCF and updates it on the result of the interaction with the user;

5) the SRF sends back the updated data to SCF;

6) the SCF updates the SDF and if necessary the SMF;

7) the SCF instructs the SRF to notify the user that the changes made are operational or that they will be operational after some time.

This last task may be executed by the SRF during the first phase of interaction with the user (point 5.) but no assurance could be given to the user about the success of the operation.

An important issue related to customer control operations is security. The user who gets access to service profiles shall be identified via authentication procedures before they are given access to data. This procedure may require passwords/PIN insertions or may use speaker verification capabilities, which could be provided by the SRF itself. Speaker verification is the technology to verify that the speaker uttering some words is the same as the one pre-registered. In this case, the subscriber may insert a user-id by means of the keypad and then speak some words for verification purposes.

8 The SRF Service Creation Environment

The PlayApplication transactions could permit service logic to be created for, and executed on, the appropriate portions of the SRF. The SCF could pass the SRF an arbitrary set of parameters as part of a PlayApplicationRequest for execution of SRF Service Logic. Speech, digit collection, message recording and playback, call transfer and the like, could also be coded using a SRF's service creation tool and invoked using a SRF's service logic execution tool.

The service creation and execution environment in an SRF will often provide a much more effective tool to create voice-processing service logic.

The SRF's service creation environment should include a graphical user interface (GUI) to allow the rapid definition of Mini-Scripts. The icons, or programming elements, should represent major processing functions, such as presentation of a voice menu and determination of processing flow based upon menu selection or solicitation of touch-tone input with verification and retry. The developer should be able to define, verify, generate, compile and test Mini-Scripts on a

platform independent of the SRF's service logic execution environment. New Mini-Scripts should be easy to install without disrupting services.

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- ETSI DTR/SPAN-060108: "Framework document on IN/B-ISDN integration".

History

Document history		
V1.1.1	March 2000	Publication