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ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

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Foreword

This Technical Committee Reference Technical Report (TCR-TR) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI). It was given the classification of TCR-TR by the 20th TC Chairmens' Co-ordination (TCC) meeting and approval by the 22nd Technical Assembly (TA).

A TCR-TR is a deliverable for use inside ETSI which records output results of ETSI Technical Committee (TC) or Sub-Technical Committee (STC) studies which are not appropriate for European Telecommunication Standard (ETS), Interim European Telecommunication Standard (I-ETS) or ETSI Technical Report (ETR) status. They can be used for guidelines, status reports, co-ordination documents, etc. They are to be used to manage studies inside ETSI and shall be mandatorially applied amongst the concerned TCs. They shall also be utilized by the TC with overall responsibility for a study area for co-ordination documents (e.g. models, reference diagrams, principles, structures of standards, framework and guideline documents) which constitute the agreed basis for several, if not all, TCs and STCs to pursue detailed standards.

Introduction

Broadband Integrated Services Digital Network (B-ISDN) and Intelligent Network (IN) standards have been developing in parallel for several years. The need to bring together the Broadband and IN network architecture's has been identified in strategic bodies in both ETSI and ITU-T. Harmonization of these networks may require change to the architecture, functions and protocols of one or both networks. To facilitate the co-ordination and stimulate action in ETSI on this subject a joint working group was set up under the auspices of NA6 and including expertise from SPS3 and NA5.

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1 Scope

The purpose of this Technical Committee Reference Technical Report (TCR-TR) is to identify the work necessary in any relevant technical committee in ETSI to develop the standards for the intermediate stages of the evolution towards a fully harmonised Broadband Integrated Services Digital Network (B-ISDN) and Intelligent Network (IN) network architecture. This will enable network services and functionality to gain some benefit from the combination of B-ISDN and IN. The fully integrated solution however is the target of the IN Long Term Architecture (LTA) studies and is outside the scope of this TCR-TR.

Two further limitations on scope have been assumed:

a) Open Network Provision (ONP) issues are not considered;

b) the interworking issues between B-ISDN network and IN structured networks are the main subject of this report, however it does not consider the situation of inter networking where the B-ISDN and IN are in different network operator domains.

2 References

[1] TCR-TR 027: “Intelligent Network (IN); Vocabulary of terms and abbreviations”.

[2] ITU-T Recommendation Q.1200: “Q-series intelligent network Recommendation structure”.

[3] DTR/NA-060108: “Intelligent Network (IN); Broadband Integrated Services Digital Network (B-ISDN); Framework document on IN/B-ISDN integration” (draft TC-TR).

[4] ITU-T /PMG 1-2: “Harmonisation of B-ISDN and IN Activities” (meeting report PMG1 Appendix 2 - May 1993).

[5] TCR-TR 043: “Network Aspects (NA); Recommendations towards the harmonisation of architecture and service descriptions".

[6] ETSI STC SPS3/WP2: "Proposals on functional models" (meeting report 29-30 March 1993).

[7] MI/SPS-03039: "Intelligent Network (IN); Integration of IN Capability Set 3 (CS3) and Broadband Integrated Services Digital Services (B-ISDN); Basic Call State Model (BCSM) and requirements for IN Application Protocol (INAP)".

[8] DTR/NA-052109: "Network Aspects (NA); Video on demand; Network aspects".

[9] DTR/SMG-050301: "Framework of network requirements, interworking and integration for the Universal Mobile Telecommunication System (UMTS)".

[10] TCR-TR 026: "Terminal Equipment (TE); Multimedia Project Plan".

[11] DTR/TE-10012: "Terminal Equipment (TE); Multimedia; Standardization areas to be covered by the multimedia project" (draft TCR-TR).

[12] ITU-T Recommendation I.374: "Framework Recommendation on "network capabilities to support multimedia services".

[13] ITU-T Recommendation Q.1214: "Distributed functional plane for intelligent network CS-1".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TCR-TR, the definitions given in TCR-TR 027 [1] apply.

3.2 Abbreviations

For the purposes of this TCR-TR, the following abbreviations apply.

ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Digital Network
BCSM	Basic Call State Model
BVPN	Broadband Virtual Private Network
CS	Capability Set
DFP	Distributed Functional Plane
EII	European Information Infrastructure
IN	Intelligent Network
INAP	IN Application Protocol
INCM	Intelligent Network Conceptual Model
ISDN	Integrated Service Digital Network
ISUP	ISDN User Part
JWG	Joint Working Group
LTA	Long Term Architecture
SCF	Service Control Function
SSF	Service Switching Function
ToR	Terms of Reference
UMTS	Universal Mobile Telecommunication System
UNI	User Network Interface
UPT	Universal Personal Telecommunication
VoD	Video on Demand

4 Role of the Joint Working Group (JWG)

The Terms of Reference (ToR) of the JWG are given in annex A.

4.1 Stages of alignment work

The work plan for alignment of IN and B-ISDN can be divided into three phases as shown in figure 1. The co-ordination role is performed by the JWG for stages A and B.

Stage A is concerned with the production of a framework for the basic architecture. All relevant information concerning the development of IN and B-ISDN is gathered and a detailed workplan for the capability sets developed. Technical input is required from NA4 (TMN), NA5 (B-ISDN), NA6 (IN), SPS3 (B-ISDN) and also other groups for services. It should be noted that it is possible for Stage B to commence before Stage A is finalised.

Stage B produces a more detailed model and the main participants for this stage are NA6 (IN) and SPS3 (B-ISDN). This stage should be completed by 12/95 - 03/96.

Stage C should be under the control of SPS1/3/5 and should concentrate on the development of technical solutions for producing a combined protocol.

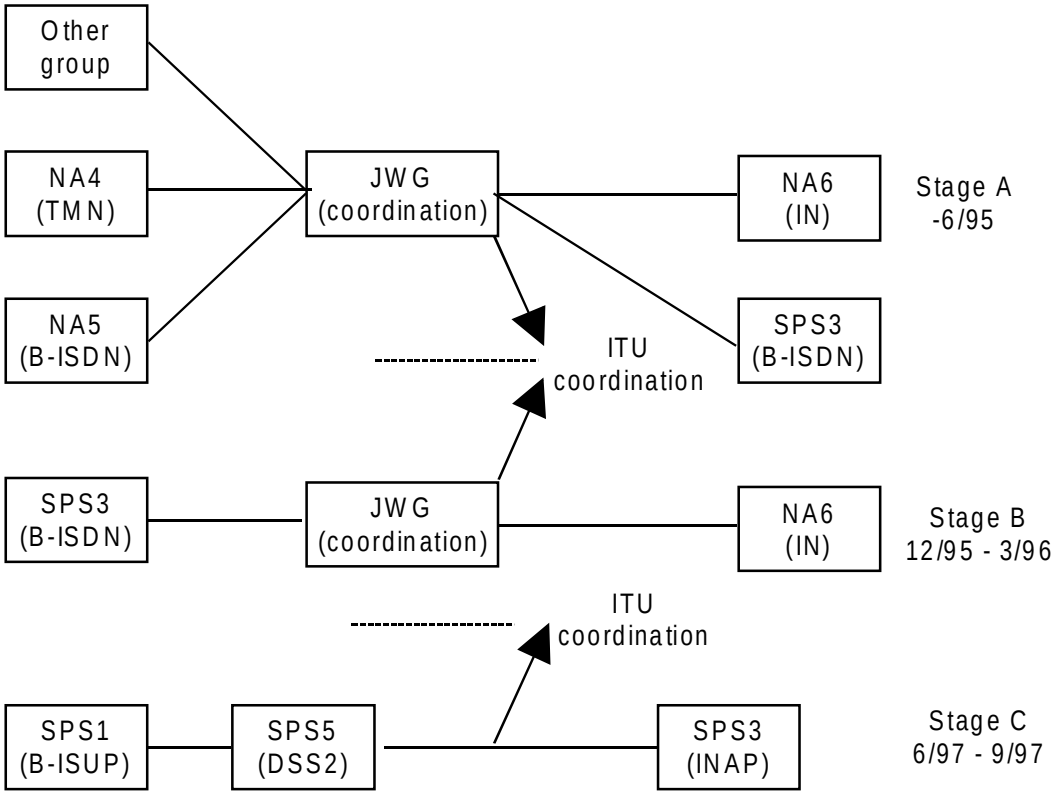


Figure 1

4.2 Method of working for JWG

Procedure for capturing new service requirements:

1) request to NA and SPS STCs and SMG5 for Identification of users:
   - target services;
   - target networks;
   - (e.g. Universal Mobile Telecommunication System (UMTS));

2) consolidate user requirements:
   - services;
   - networks;

3) distribute requirements (12/94);

4) identification of technical issues.

   This information will be detailed in DTR/NA-060108 [3];

   - architecture:
     - define scenarios;
     - impacts to IN architecture;
     - impacts to B-ISDN architecture;
     - consideration of options (extent of integration);
   - modelling;
   - other implications (e.g. TMN);

5) assessment of options achievable for Capability Set 3 (CS3) timescale:

   if achievable - Pass requirements to protocol groups (12/95);
   Else reassess user requirements and iterate step 4);
   Else transfer to long term evolution studies.

5 Background- rationale for this work

The motivation for this work comes from a number of sources, including:

- ETSI SRC4 and task group DASH recommendations to harmonise the architecture's of the different types of public network technologies;
- a requirement by operators to have added value services within their B-ISDN networks;
- application of the flexible and rapid service introduction inherent in IN to the B-ISDN network services;
- to provide European consensus for input to ITU SG11 on the same subject;
- to provide open interfaces to broadband service providers and embedded multimedia servers;
- third generation mobile networks requiring a combination of the bandwidth flexibility of Asynchronous Transfer Mode (ATM) and mobility support of IN;
- actual network operators' plans to utilise a combination of existing IN and ATM infrastructure to support new services rapidly.

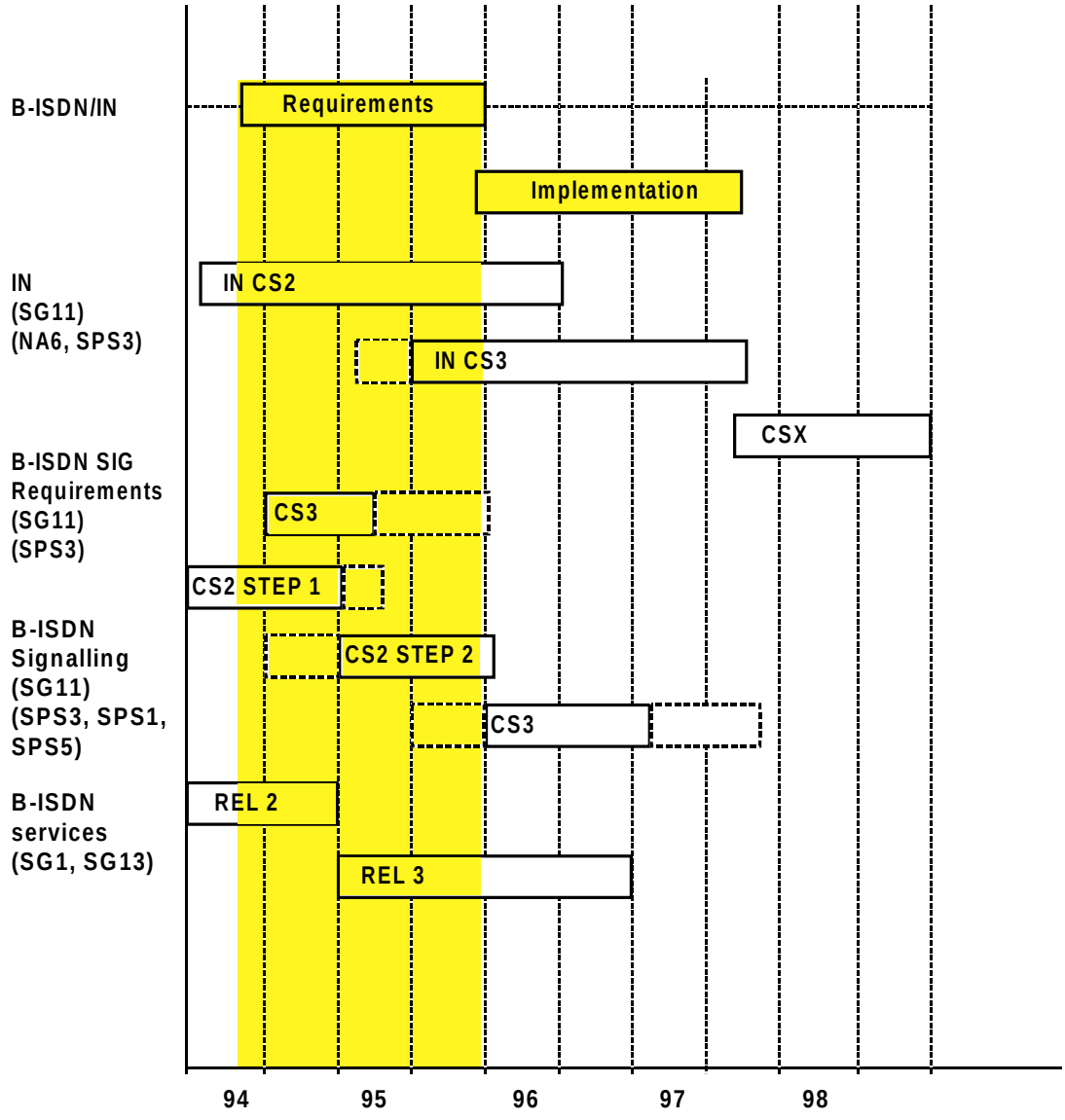
There are however many constraints which need to be accommodated and existing limitations which need to be extended, including:

- the benefit of using network intelligence is only applicable to network based broadband services and does not apply to terminal based services;
- the resultant impact to all manufacturers switching equipment due to changes to the IN call model;
- the existing IN standards support only enhanced voice services and only one point of control;
- cross-technology understanding required in relevant standards groups.

6 Schedules for IN and B-ISDN

The timing for the introduction of any changes will need to be co-ordinated in the release schedules for the standards of the two networks.

ITU-T Study groups and related ETSI STCs are shown in figure 2.



IN and B-ISDN standards development schedule

Figure 2

6.1 Current activity in ETSI

6.1.1 NA1

The following work items are possible target services to utilise IN/B-ISDN integration.

Table 1

	Target date for STC approval
DE/NA 10030 Broadband video conference service	3/96
DTR/NA 12409 Base document on Multimedia services	3/95
DTR/NA 10035 Video on Demand service	3/96

6.1.2 NA6

The following work item for IN Capability Set 2 (IN CS2) may be impacted by requirements for B-ISDN and IN harmonisation:

- MI/NA 60003 NA6 Baseline document (includes impacts to global functional plane, distributed functional plane and call model).

Relevant work items defined for CS3 currently only include DTR/NA-060108 [3].

NA6 is the responsible group in ETSI for developing the Intelligent Network Conceptual Model (INCM) and for the IN Basic Call State Model (BCSM)

6.1.3 SPS3

SPS3 together with ITU-T SG11 has developed a baseline document on the signalling requirements for the B-ISDN Capability Set 2 (B-ISDN CS2).

Simple "hooks" have been identified in the signalling functional architecture to link to IN. Currently, IN is only being considered to provide special resource control functions. However B-ISDN CS2 signalling has no specific requirements for the special resource control functions. The separation of call and connection control to achieve simpler support of multiple bearer connections is a key aspect of B-ISDN CS2 signalling. The B-ISDN call model is basis of this work.

Joint meetings are being held between the B-ISDN and IN working parties of SPS3 (WP2 and WP4) to consider the signalling impacts of the harmonisation of these networks. A new work item MI/SPS-03039 [7] is intended to capture the progress on harmonisation, in particular the call modelling.

6.1.4 NA5

The NA5 ANA group (Advanced Network Architecture's) has a work item on Video on Demand (VoD) (DTR/NA-052109 [8]), which identifies an IN connected to the broadband network.

This group has also agreed to consider the requirements of UMTS on B-ISDN, although there is no official work item assigned yet due to unfamiliarity with mobility issues.

The TCR group (Traffic Control and Resource control) is considering the support of Broadband Virtual Private Network (BVPN) capability on a semi-permanent ATM network (i.e. Asynchronous Transfer Mode (ATM) cross-connects) by use of the fast resource management procedures to allocate bandwidth on demand. This approach provides only limited features and does not utilise IN capabilities.

6.1.5 SMG5

DE/SMG-050301 [9], expected 6/95.

The concepts identified in this document may impose new requirements on IN/B-ISDN.

6.1.6 TE10

TCR-TR 026 [10].

DTR/TE-10012 [11].

6.1.7 SRC 6

ETSI Strategic Review Committee 6 held a first meeting in November 1994. It is considering the standardisation work necessary to support a European Information Infrastructure (EII). The report is due 6/95.

The recommendations from this group may alter the current focus of broadband standards work and the ETSI organisation needed to achieve them.

6.2 Current activity in ITU-T

6.2.1 SG 11 - PMG1

Co-ordinating the work programme for all Broadband signalling - has proposed areas of co-operation between B-ISDN and IN

6.2.2 SG 11 - WP1

Has defined broadband signalling requirements (identifies a connection point to IN) but has discounted any further changes to include IN in B-ISDN CS2.

6.2.3 SG 11 - WP4

Has identified that work on IN/B-ISDN functional integration can commence during IN CS2 timeframe but is not targeted for CS2. Broadband services however have been classified as medium/low priority and should be addressed in IN CS3. At the September 94 meeting the necessity for co-operation between IN and B-ISDN working parties was recognised and may result in joint meetings of WG2 and WG4 in the future. The target is to achieve integration in the IN CS3 and B-ISDN CS3.

6.2.4 SG 13

SG 13 is responsible for defining the broadband signalling requirements - ITU-T Recommendation I.sigr. A multimedia reference model is defined in ITU-T Recommendation I.374 [12].

6.3 Activity in other bodies

6.3.1 ANSI T1S1.1

IN/B-ISDN integration is being discussed although only "type B" text has been proposed (i.e. useful but not normative text). Currently there is no joint activity between IN and B-ISDN groups in T1S1 but contributions are being made directly into the ITU.

6.3.2 RACE

MONET project (Mobile Networks). For UMTS, it is being considered to use a broadband network as the core network to support mobility - for the ability to support variable bit rate services such as encoded video, multimedia calls, multimedia document transfer and interactive data services.

6.3.3 EURESCOM

A new project is planned to start in 1995 supported by several operators on the integration of IN and B-ISDN. The project duration is two years and it is expected to provide contributions into the relevant standards bodies such as ETSI.

7 Considerations for IN CS1 and CS2

7.1 Implications of supporting IN CS1 on B-ISDN

The general assumption has been that there should be no impact to existing standards when existing IN capabilities (IN CS1) are used in conjunction with a B-ISDN network.

Analysis by SPS3 has identified changes required to interwork IN Application Protocol (INAP) with ISDN User Part (ISUP), therefore, a similar analysis is required for the interaction between INAP and B-ISUP.

This issue requires further investigation.

7.2 Implications of supporting IN CS2 on B-ISDN

The principal additional capabilities in IN CS2 are to support interworking of IN networks (e.g. Service Control Function (SCF) to SCF procedures) and to support mobility functions, mainly Universal Personal Telecommunication (UPT).

This issue requires further investigation.

8 ETSI workplan recommendations for IN CS3, B-ISDN CS3

8.1 Candidate services

8.1.1 ETSI planned services

Based on current or planned work items in ETSI NA1, the following services may be supported by network intelligence on a broadband network:

- broadband videoconference service;
- multimedia services;
- video on demand.

Based on current or planned work items in ETSI SMG, the following services may be supported by network intelligence on a broadband network:

- UMTS services.

8.1.2 ITU planned services

ITU SG11 target services for IN CS3 include:

- B-ISDN multiple connections point to point;
- B-ISDN multicasting;
- B-ISDN conferencing.

8.1.3 General service aspects which could be supported

- Services requiring centralised knowledge of the network(s), e.g. registration, BVPN.
- Services requiring common physical resources, e.g. conference bridges, protocol converters, user plane compatibility functions.
- Services requiring allocation of network wide resources, e.g. multiple distribution points.

8.2 Networks

8.2.1 Example network scenarios

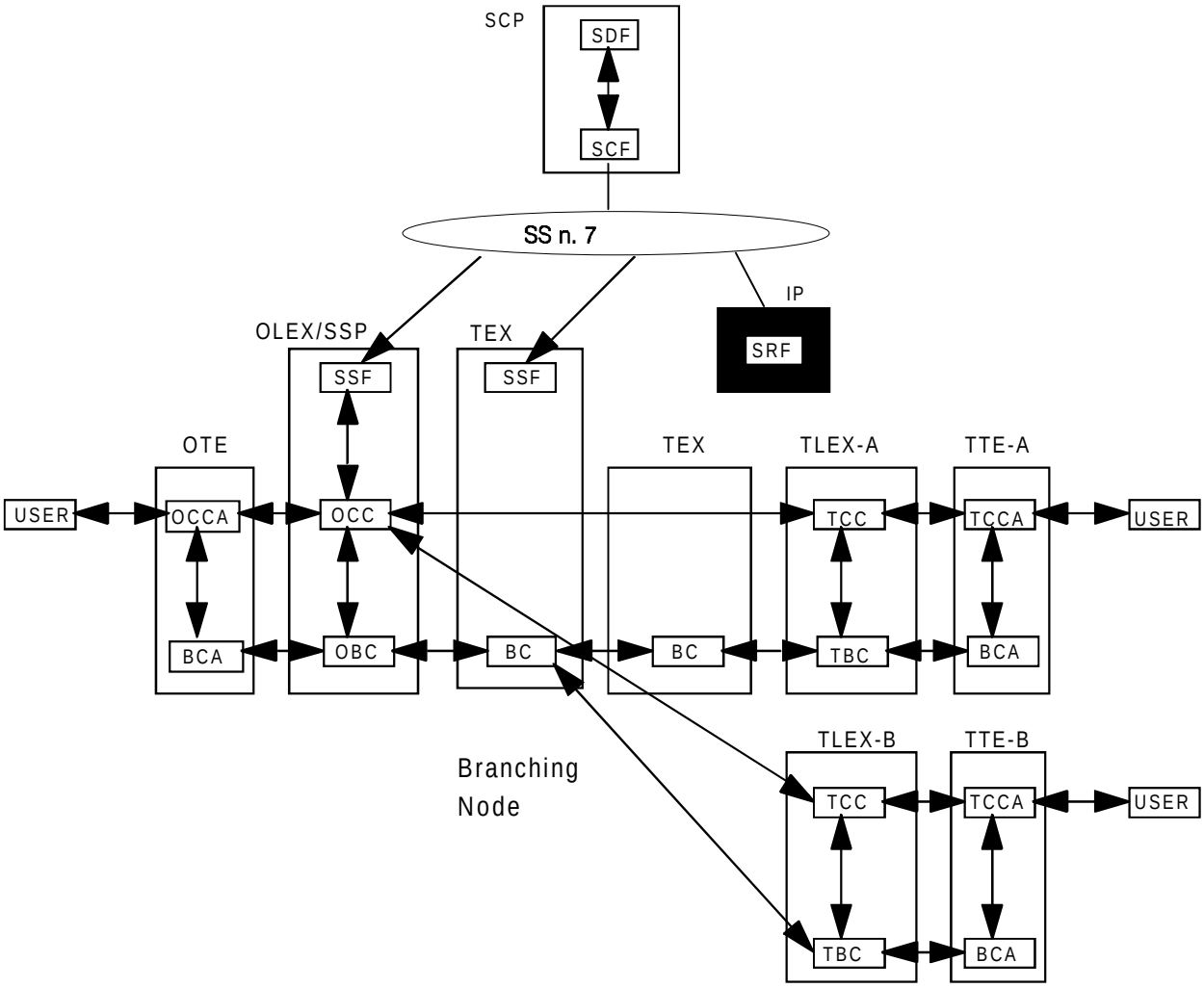


Figure 3: Multiparty call control using IN

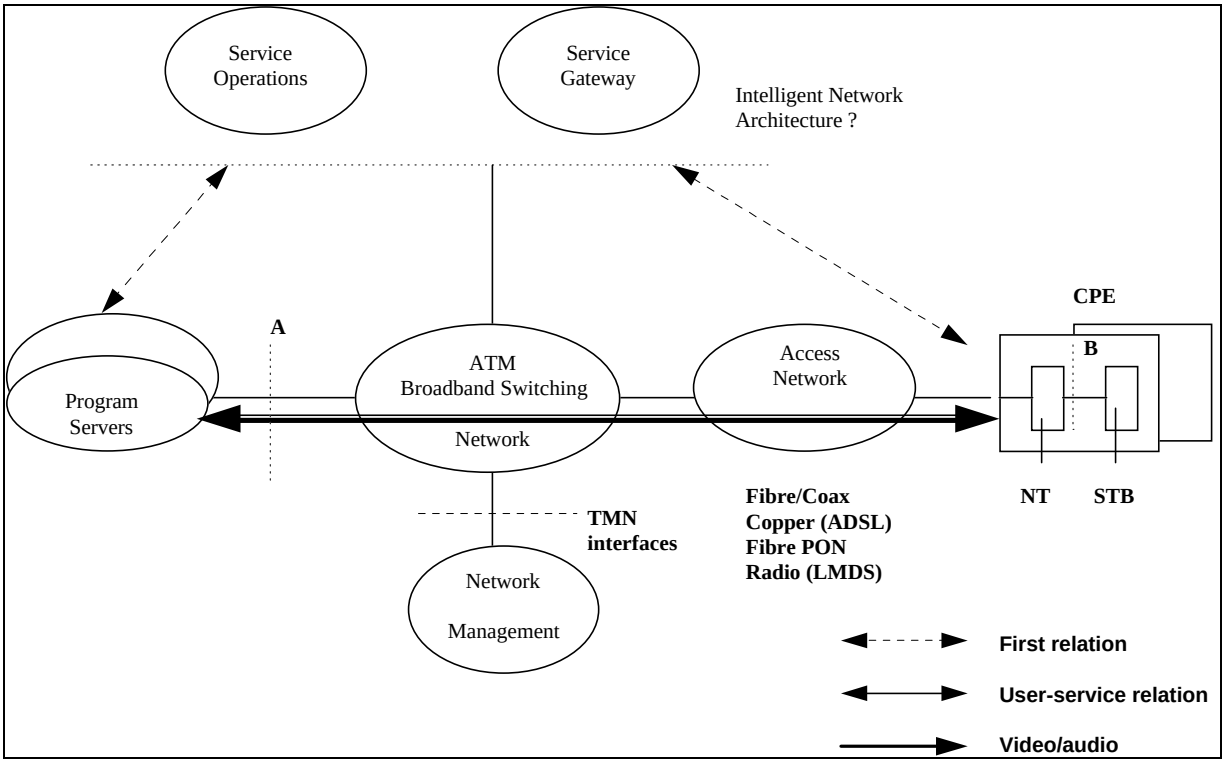


Figure 4: An example of a VoD network architecture

8.2.2 UMTS

The target service is the ability of a mobile, wireless UMTS user to have access to all the same features and capabilities (either as originating or terminating party) as are available to a fixed user. These include:

- multiparty calls;
- multimedia calls;
- supplementary services.

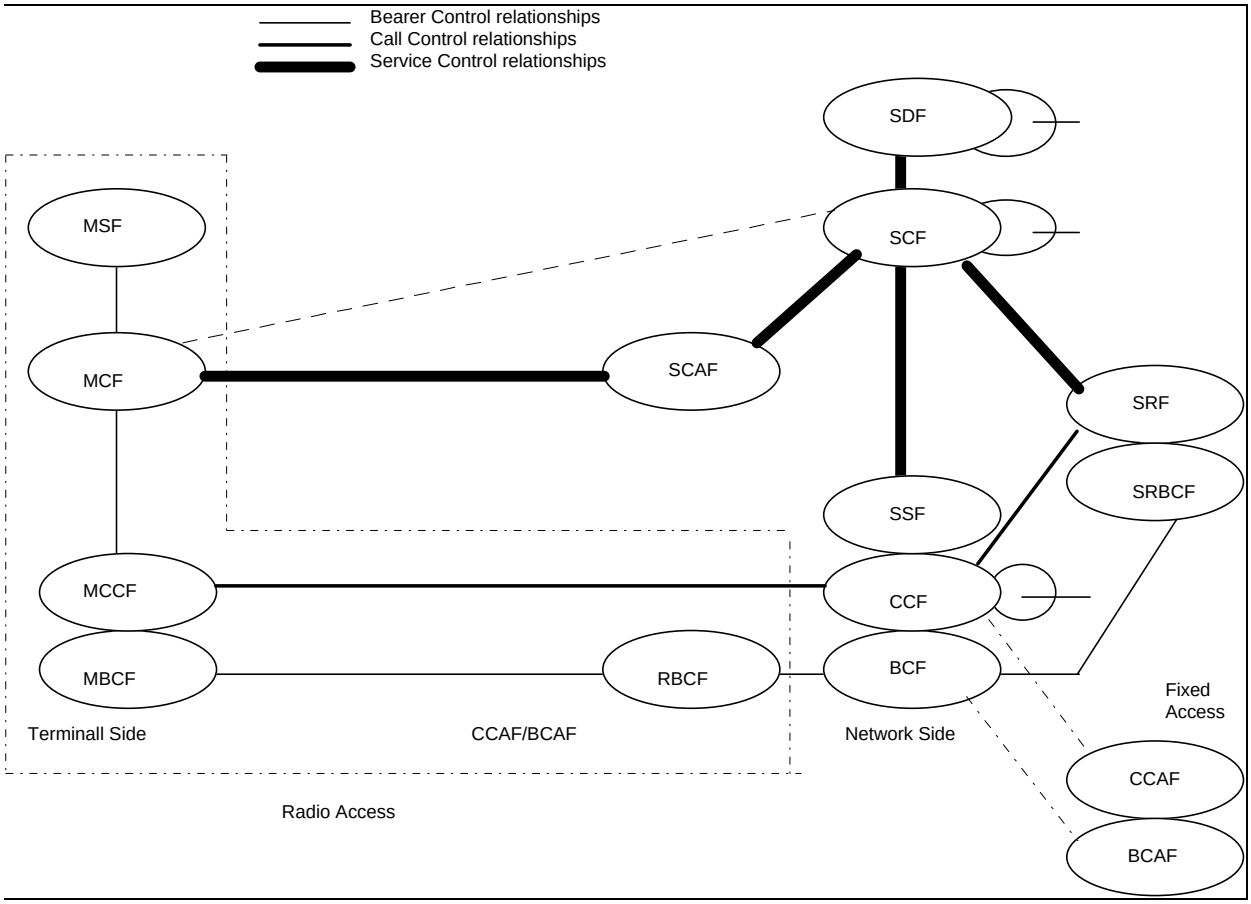


Figure 5

Basic architecture of UMTS.

Service features:

- it should be possible for a UMTS user to place and receive calls in any location covered by the users subscription. The integrated IN/B-ISDN network should be capable of locating the user and directing the call to the point of attachment where the user is currently located;

· it should be possible for a UMTS user to move while being engaged in an active call. The movement of the user may result in the point of attachment changing to a different User Network Interface (UNI) in a B-ISDN switch or to a UNI in a different switch (i.e. handover);

· the UMTS user may use special source codings that are optimised for use over the UMTS radio interface. When communicating to fixed users, the UMTS source coding may need to be transcoded to the coding used by the fixed party. When communicating to another UMTS user double transcoding should be avoided;

· in a mobile system the probability of an initial call set-up failing due to the user being unreachable or limited resources (e.g. radio) being unavailable is much higher than for fixed communication. Therefore look-ahead procedures may be required to ensure that the call can succeed before resources are reserved for the call. Look ahead in UMTS may involve IN-controlled matters (e.g. reachability of subscriber, paging) and call control related matters (e.g. Resource availability, transcoding).

8.2.3 Network service creation capability

Provide a mechanism for service creation from standard building blocks and the customisation of services for rapid deployment.

8.3 Areas of focus for standardisation:-

8.3.1 Architecture's

Development of the IN Distributed Functional Plane (DFP) to support:

- multiple points of control;
- multiparty, multiconnection services.

This should be addressed by NA6, WG1 as part of the studies for CS3.

8.3.2 Call models

Two possible approaches have been identified for the development of a suitable integrated call model:

a) based on the existing IN call model;

b) based on the B-ISDN call model.

Both NA6 and SPS3 should investigate these two approaches further.

1) enhancement of the IN BCSM from ITU-T Recommendation Q.1214 [13]:
   - to accommodate multiparty configurations;
   - to support a separated call and connection control.

2) enhancement of the B-ISDN call model from CS2 step 1:
   - to support new call configurations and connection types;
   - to support the mobility requirements.

A decision will have to be made to select one of these approaches when the implications have been fully explored.

The IN requirements on the call model and consideration of the information flows between Service Switching Function (SSF) and SCF should be captured in DTR/NA-060108 [3].

8.3.3 Protocols

For IN CS1 and IN CS2, SPS3 should consider the interactions with B-ISDN signalling CS2 step 1.

For IN CS3 and B-ISDN CS3 it is currently too early to identify the workplan for protocol changes. This will be included in the second edition of this TCR-TR. All SPS groups will be kept informed of progress in the evaluation of the call models.

9 Conclusion

All requirements available to date have been taken into account in this first edition of the workplan. Any further requirements or results from the evaluation of technical approaches will be taken into account in the second edition, due by the end of 1995.

Annex A: Terms of reference for IN/B-ISDN joint working group

A.1 Original mandate

(Approved at TC NA October 1994).

NA6 proposed the formation of a joint NA5/NA6/SPS3 Task Force with a brief to manage the future co-ordination and integration of the IN & B-ISDN activities. It is anticipated that IN Capability Set 3 - due 1997 - will be the first opportunity for convergence.

The task of the joint NA5/NA6/SPS3 group would include the:

- development of a single detailed workplan for the production of unified IN / B-ISDN capability sets. The workplan to be completed by the end of 1994;

- study & identification of a common technical framework for the development of future standards;

- identification of the technical issues for resolution by NA5/NA6 & SPS3;

- harmonisation of the IN & B-ISDN capability set scope & timescales;

- results of the DASH group;

- focus of the work on prioritised objectives.

In addition the first meeting of the JWG has refined this with the following points:

a) to produce two ETSI deliverables:

   1) technical report identifying the ETSI wide workplan;
   2) technical report elaborating issues for "near term" integration.

   Although the joint working group will encompass NA5, NA6 and SPS3 who are directly responsible for the standards which may be affected, it is anticipated there will be a need to take into account requirements from other groups with relevant expertise e.g.:

   - NA1 for services;

   - DASH for service harmonisation;

   - NA4 (NA4/NA6) for TMN;

   - SMG5 (NA6/SMG5) for UMTS;

   - Other organisations - RACE, EURESCOM, EC.

   However, to meet realistic timescales for the near term integration the scope of the work should be limited:

   - contributions should be focused on near term scenarios;

   - target services should be the driver for this work;

b) to meet the timescales of IN CS3 and B-ISDN CS3;

c) to consider evolution of the networks but not fundamental architectural changes.

The JWG will meet within each of the associated STCs and will report to the STC chairmen. This group will encourage contributions to the ITU from the responsible STCs.

A.2 Schedule

- Technical report on ETSI workplan - due 12/94.

- Acceptance of workplan - 4/95.

- Technical report on issues for near term integration - final version 12/95.

NOTE: Exclusions due to the above limitations are expected to be covered by the technical report on IN long term evolution.

History

Document history			
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