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Technical Report

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN);
NGN Generic capabilities and their use to develop services

ETSI

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

1 Scope

The present document presents an analysis of existing and new NGN generic capabilities required for the support of services identified in TR 181 003 [1]. The NGN generic capabilities for NGN release 1 (TR 180 001 [2]) and beyond are identified.

The purpose of the analysis is to enable ETSI to identify further areas of standardization for NGN generic capabilities. Priority is given to capabilities that enable service interoperability in heterogeneous environments.

2 References

For the purposes of this Technical Report (TR) the following references apply:

[1]	ETSI TR 181 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Services Capabilities, Requirements and strategic direction for NGN services".
[2]	ETSI TR 180 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Release 1; Release definition".
[3]	ETSI TS 181 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Videotelephony over NGN; Stage 1 Service Description".
[4]	ETSI TS 181 002: " Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Multimedia Telephony with PSTN/ISDN simulation services".
[5]	ETSI TS 181 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Services and Capabilities Requirements".
[6]	ETSI TS 181 010: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service requirements for end-to-end session control in multimedia networks (Release 1)".
[7]	ETSI TS 102 165-2: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Methods and Protocols for Security; Part 2: Counter Measures".
[8]	ETSI EG 202 325: "Human Factors (HF); User Profile Management".
[9]	ITU-T Recommendation Y.1311: "Network-based VPNs - Generic architecture and service requirements".
[10]	ETSI TR 101 329-7 (V2.1.1): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; End-to-end Quality of Service in TIPHON systems; Part 7: Design guide for elements of a TIPHON connection from an end-to-end speech transmission performance point of view".
[11]	ETSI TS 123 107: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Quality of Service (QoS) concept and architecture (3GPP TS 23.107)".
[12]	ETSI TS 122 340: "Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS) messaging; Stage 1 (3GPP TS 22.340)".
[13]	ETSI TR 181 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Messaging Services; Messaging Overview".
[14]	ETSI EN 301 140 (series): "Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2)".
[15]	ETSI EN 301 931 (series): "Intelligent Network (IN); Intelligent Network Capability Set 3 (CS3); Intelligent Network Application Protocol (INAP); Protocol specification".

[16]   ETSI ES 201 915 (series): "Open Service Access (OSA); Application Programming Interface (API)".

[17]   ETSI TS 129 078: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); customized Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification".

[18]   ETSI EN 302 039: "Intelligent Network (IN); Intelligent Network Capability Set 4 (CS4); Intelligent Network Application Protocol (INAP); Protocol specification; Part 1: Common aspects".

3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

3G	3rd Generation
3GPP	3rd Generation Partnership Project
AAA	Authentication, Authorization and Accounting
ACR	Anonymous Communication Rejection
AOC	Advice of Charge Services
AOC-E	Advice of Charge: charging information at the end of the call
AOC-S	Advice of Charge: charging information at communication set-up time
AR	Augmented Reality
ATM	Asynchronous Transfer Mode
CAC	Connection Admission Control
CAMEL	Customised Application Mobile Enhanced Logic
CAP	Camel Application Part
CB	Communication session Barring
CCBS	Completion of Communications to Busy Subscriber
CD	Communication Deflection
CDIV	Communication DIVersion
CE	Customer Equipment
CFB	Communication Forwarding on Busy user
CFNL	Communication Forwarding on Not Logged-in
CFNR	Call Forwarding on No Reply
CFU	Communication Forwarding Unconditional
CHAT	CHAT room service
CONF	CONFerence
CS2-4	Capability Set 2-4
CW	Communication Waiting
DiffServ	Differentiated Services
DLCI	Data Link Connection Identifier
DLMSs	Digital Library Management Systems
DSL	Digital Subscriber Loop
DUS	Device Unify Service
ECT	Explicit Communication Transfer
EPG	Electronic Programming Guide
GPRS	General Packet Radio Service
GPS	Global Positioning System
GUP	3GPP Generic User Profile
HOLD	Call Hold
ICB	Incoming Communications Barring
IM	Instant Messaging
IMS	IP Multimedia Core Network Subsystem
IN	Intelligent Network
INAP	Intelligent Network Access Protocol
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network

IST	Information Society Technology
J2EE	Java 2 Platform, Enterprise Edition
J2ME	Java 2 Micro Edition
LAN	Local Area Network
MCID	Malicious Communication IDentification
MExE	Mobile Station Application Execution Environment
MGF	Media Gateway Function
MM	Multimedia Message
MMS	Multimedia Message Service
MPLS PW	Multi-Protocol Label Switching Pseudo Wires
MPLS	Multi-Protocol Label Switching
MWI	Message Waiting Indication
NB VPN	Network based Virtual Private Network
NGN	Next Generation Networks
NGS	Next Generation Services
OCB	Outgoing Communications Barring
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
OSA	Open Services Architecture
PA	Personal Assistance
PDA	Personal Digital Assistant
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
PVR	Personal Video Recorder
QoS	Quality of Service
SIP	Session Initiation Protocol
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction
TV	Television
UMTS	Universal Mobile Telecommunications System
UNI	User Network Interface
VHE	Virtual Home Environment
VLAN	Virtual Local Area Network
VoIP	Voice over IP
VPN	Virtual Private Network
WAN	Wide Area Network
WOL	Web Ontology Language

4   Introduction

The present document introduces the notion of re-usable elements, called Service Capabilities, that can be used to create next-generation services.

TISPAN considers a broad range of complex networking technologies and the inter-working of those technologies to provide capabilities that may be used to provide public services. TISPAN WG1 has adopted the model of Service Capabilities to determine which aspects need standardization for Release 2. The present document draws upon and modifies related procedures developed for the production of ISDN and UMTS specifications and declares a process to be used within TISPAN.

The Service Capability approach allows TISPAN to approach the complex task of managing the complexities of modern telecommunication. In that way Service Capabilities provide a handle for a clear internal management process by which it can identify, quantify, schedule and deliver its work in a timely and organized manner.

4.1 Service Capabilities Service Applications and Service Capabilities

4.1.1 Introducing terminology

As the term service is heavily overused we introduce specific terminology for specific uses of the word.

The view of services considers an end service to comprise one or more **Service Applications** set in a commercial context. A Service Application is considered to represent the technical functionality that is the essence of and realizes the functionality of a specific communications proposition. TISPAN does not standardize this commercial context only the technical aspects relevant for Interworking.

The reusable constituent elements of a Service Application - which are known as **Service Capabilities** - are the core of the approach. Service Capabilities are, from a specification point of view, statements of self-contained functionality that can be reused across a number of service applications. A Service Capability definition comprises:

- an identifier or label for the capability;

- a declaration of any attributes essential to the capability;

- a declaration of the set of normal behaviours essential to the capability; and

- a declaration of the set of behaviours pertinent to error conditions;

- interactions with other Service Capabilities, if any.

This approach enables innovation through allowing specified Service Capability declarations to be further specialized by the addition of further attributes or behaviour declarations. This feature is predicated upon the inheritance principles of object-orientated design and enables service designers to manage the creation of service applications.

4.1.2 Service Application Creation

Recognizing that TISPAN considers services to be created from Service Applications comprised of sets of Service Capabilities, the TISPAN approach to developing service applications enables services to be described in terms of their constituent Service Capabilities. As has been mentioned, this enables Service Capabilities to be used as a language for describing the behaviour of service applications at points of inter-working between different networks. For example, figure 1 shows how a base Service Application can be extended through the inclusion of further Service Capabilities. New Service Applications are created by adding Service Capabilities.

It is this feature that renders Service Capabilities rather than Service Applications the basis for inter-working and contrasts this approach with the traditional approach to service based standardization.

Base Service Application
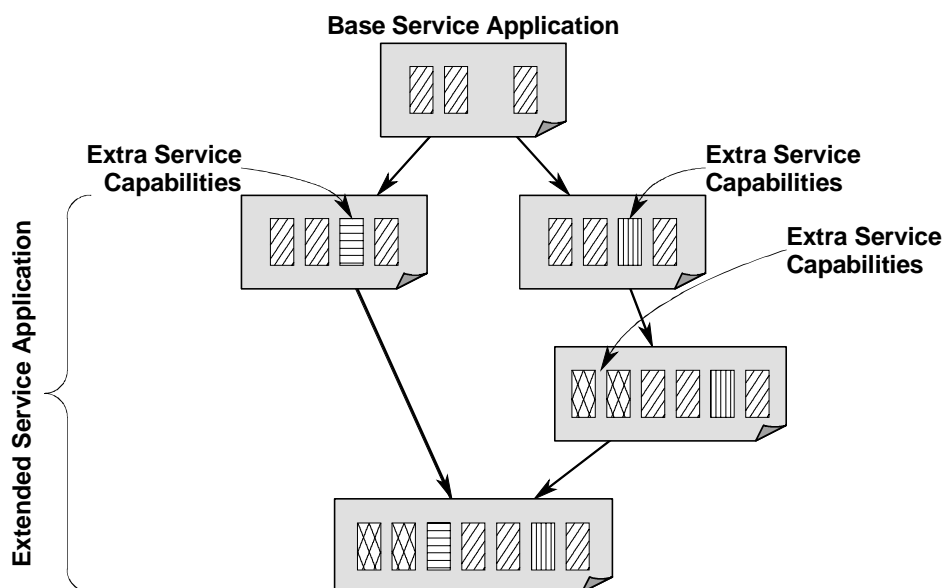
Figure 1: Deriving new Service Applications by adding Service Capabilities

4.1.3   Service Inter-working

TISPAN enables service-level inter-working by taking a set of Service Capabilities and defining the set of information flows required to support them. These are then subsequently mapped onto individual network technologies, such as a particular flavour of SIP. Since the information flows supported by the profile of an individual network technology originates from a common set, any resulting interconnection between such networks should exhibit a high degree of inter-working. Service Capabilities therefore emerge as a language for describing the interconnection of disparate network technologies.

Service Offering 1
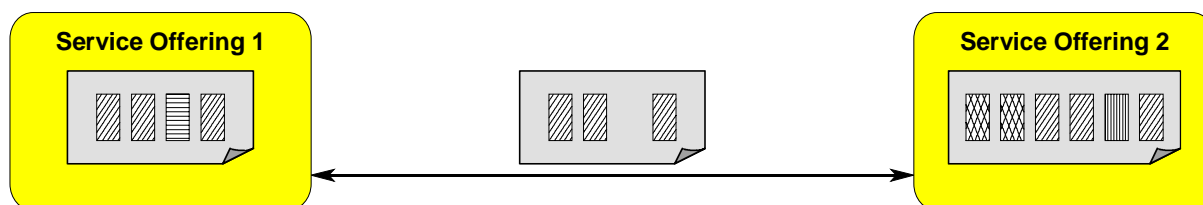
Service Offering 2

Figure 2: Service inter-working through service capabilities

Consider the case shown in figure 2, which shows two service offerings, 1 and 2, comprised of Service Applications A and B, then the common set of functionality that can be delivered when these services inter-work should be the common subset of Service Capabilities between A and B.

4.1.4   Terminal vs. Server capabilities

The Service Capability concept extends to the terminal. In creating services some Service Capabilities will typically be placed in the terminal (i.e., display of A/V data) while others may be hosted on servers operated by professional service providers (i.e., conference call floor control).

4.1.5 Impact on Nomadicity and Roaming

Mobility is an integral feature of any NGN solution. The support of differentiated service applications implies that only the home service provider can fully understand and therefore execute a given customized service application. When considering this feature in the context of a multiplicity of network domains, it is apparent that a number of approaches could be taken. In the case where a visited network does not understand the service application involved, there are three possibilities:

- Internet model: all users contact their home directly.

- Entire service is known to the visited network.

- HomeService model: the Visited Network supports a base set of Service Capabilities to cope with standard functionality including security, QoS and media events. Any additional signalling is relayed to the Home.

In the first case, there are a number of issues concerning security and QoS. Both of which are difficult to achieve reliably at scale. In the second case, exposing the entire service to the visited network tends to reduce the ability for achieving differentiated services at scale. The third option therefore aims to provide a meaningful balance between these extremes and seems to be the most pragmatic for the long term NGN.

4.2 Service Capability creation

Service Capabilities are derived as re-usable components from several known services. When derived properly these capabilities may be re-combined to create new services. In deriving the Service Capabilities a black-box approach is used:

1) Describe the network and service interfaces as seen by the terminal (UNI-interfaces). What is needed to deliver service (application)s to end-users?

2) Describe the inter-service provider interfaces (horizontal NNI-interfaces). What is needed to allow services between service providers to work?

3) Describe the interfaces between service providers and network operators (vertical NNI interfaces/APIs). What is needed to allow the service to run properly on a/any network?

4) Describe the Interfaces relevant for roaming. What is needed for a user to use a unique service application delivered on a geographically remote network?

Each of these interfaces will be delivered by one or more capabilities.

4.3 Advantages of Service Capability approach

4.3.1 Advantages to service providers

Service providers may use this concept to combine service applications into novel services that differentiate their offering to that of their competitors and thus may compete on quality and not on price.

4.3.2 Advantages to equipment vendors

Equipment vendors may create equipment that supports a certain set of Service Capabilities, possibly with their own differentiating extensions.

4.3.3 Advantages to network operators

Network operators may choose which network capabilities to offer to allow a sufficiently large set of services.

4.3.4   Advantages to regulators

Regulators may demand that service providers and network operators support a minimum standardized set of Service Capabilities in their networks in order to allow fair access to service providers and to allow users to use their terminals with different service providers and on different networks. Beyond this minimum, the regulator can leave the innovation to the market.

5   Service Capabilities Identified for TISPAN R2

5.1   Introduction

Service Capabilities are defined as to the most practical level of re-use, too coarse would yield many very similar Service Capabilities while a too detailed definition would yield many small Service Capabilities that would need to be aggregated before a useful entity could be described.

Service Capabilities are define using a black-box approach; it is contemplated how a capability would appear from the outside, not how it might be implemented.

The remainder of this clause names the Service Capabilities identified and groups them. The following Service Capabilities have been identified:

5.1.1   Control plane

- Communication Control:

    - Originating telephony (single media).

    - Intermediary telephony (single media).

    - Terminating telephony (single media).

    - Originating multimedia.

    - Intermediary multimedia.

    - Terminating multimedia.

- MMS-session control.

- CHAT - session control.

- IM - session control.

5.1.2   Back-end services

- User Profile:

    - For communication service.

    - For MMS service.

    - For CHAT service.

    - For Presence service.

    - For IM service.

    - User presence storage.

    - For authentication credentials.

- For authorization rights.

- Routing database.

5.1.3   Service Application

- Communication Routing.

- Logon/Sign-on.

- Real-time charging calculation.

- User presence delivery.

- User location delivery.

- User presence delivery (watcher).

- User location delivery (watcher).

- Conference service control.

- Profile Agents.

5.1.4   Bearer Topology/Flow

- Telephony conversation Bearer Topology.

- Telephony Conference Bearer Topology.

- Multimedia conversation Bearer Topology.

- Multimedia Conference Bearer Topology.

- MMS Bearer Topology.

5.1.5   Media

- Bidirectional Narrowband conversational voice streaming.

- Bidirectional Broadband conversational audio streaming.

- In-call/session events.

- Unidirectional audio streaming (e.g. radio).

- Unidirectional video streaming (VoD).

- Bidirectional conversational video streaming.

- Conference bridge:

    - 3way audio bridge (for 3 bidirectional narrowband audio streams);

    - narrowband audio bridge (for any number of bidirectional narrowband audio streams);

    - video conferencing bridge (for any number of correlated bidirectional audio and video streams).

- Narrowband audio stream transcoder.

- Media gateway (e.g., to PSTN).

- Media forwarder.

- Media encryption.

- broadband audio stream transcoder.

- video stream transcoder.

- MMS transcoder.

- MMS-submission.

- MMS-storage.

- MMS-type conversion.

- MMS-format conversion.

- MMS-forwarding.

- MMS mass delivery.

- MMS-notification.

- IM-forwarder.

- IM-storage.

- IM-delivery.

- IM message filtering (based on receiving user profile).

- IM user profile.

- MMS-delivery (push).

- MMS-delivery (pull).

- MMS-delivery (streaming).

- CHAT messaging.

- CHAT private messaging.

- CHAT storage.

5.1.6   Transport capabilities

- Best effort transport.

- QoS enabled media transport - third party controlled.

5.1.7   End-point capabilities identified

The following terminal capabilities have been identified.

- Audio (narrowband) media presentation.

- Bearer Topology end-point.

- Communication initiation.

- Communication termination.

- Video Media presentation.

- Video Communication initiation.

- Video Communication termination.

- IM session client.

- MMS session client.

- CHAT session client.

- Terminal/USIM storage:

  - Communication profile.

  - MMS profile.

  - IM profile.

  - CHAT.

  - User profile.

- MMS-Delivery control.

- MMS-creation.

- MMS-presentation.

- MMS-storage.

- MMS-notification presentation.

- IM-creation.

- IM-presentation.

- IM-storage.

- IM-notification presentation.

- Stored message manipulation (retrieval/deletion/forwarding/etc.):

  - MMS.

  - IM.

  - CHAT.

- CHAT session establishment/joining/leaving.

- CHAT session presentation.

- CHAT message creation.

- CHAT invitation creation.

- CHAT group creation.

- CHAT stored message manipulation (retrieval/deletion/forwarding/etc).

- User profile editing:

  - Presence.

  - Location.

  - Communication.

  - MMS.

- IM.

- CHAT.

- User profile.

- User sign-on.

- User presence setting.

- User location setting.

- Media transport.

- Media encryption.

- Transport QoS tagging.

- Transport encryption.

5.2   Control plane

All control plane Service Capabilities enable users to have communication sessions of any TISPAN relevant type. They share the following functions:

- Maintains user communication session state.

- Implements policy control to enable/disable communication origination/delivery based on data from communication user profile.

- Implements session accounting.

- Optionally implements a third-party control interface for the establishment and manipulation of sessions by third-party service providers or service provider services deployed like 3rd party services.

5.2.1   Communication Control Service Capability

The Communication Control Service Capability provides the basic means to establish, maintain and tear-down a communication session and performs accounting.

May also perform 3way service control.

This Service Capability exists in several flavours:

- Originating telephony (single media).

- Terminating telephony (single media).

- Intermediary telephony (single media).

- Originating multimedia.

- Terminating multimedia.

- Intermediary multimedia.

These flavours share the basic behaviour described in clause 5.2.1.1 whilst each of the specialization are described in clause 5.2.1.2.

5.2.1.1   Basic behaviour

The basic behaviour is described in TS 181 010 [6], TS 181 002 [4], and TS 181 005 [5].

5.2.1.2   Specialized behaviour

Service Capabilities have a base behaviour descriptions which may be specialized by the use supplementary services that effect a specialized behaviour. This Service Capability These supplementary services are listed in table 1.

Table 1: Supplementary services identified in TS 181 002 [4]

Service name (as defined in TS 181 002 [4])	Originating Network	Intermediate Network	Terminating Network
Originating Identification Presentation (OIP)	√ needs to generate it		
Originating Identification Restriction (OIR)	√ needs to withhold Originating Identification when sending to an untrusted network	√ needs to withhold Originating Identification when sending to an untrusted network	√ needs to withhold Originating Identification
Terminating Identification Presentation (TIP)			√ needs to present it
Terminating Identification Restriction (TIR)		√ needs to withhold it when sending to an untrusted network	√ needs to withhold it on request
Malicious Communication Identification (MCID)			√
Anonymous Communication Rejection (ACR)			√
Communication Diversion (CDIV)			√
Communication Forwarding Unconditional (CFU)			√
Communication Forwarding on Busy user (CFB)			√
Communication Forwarding on no Reply (CFNR)			√
Communication Forwarding on Not Logged-in (CFNL)			√
Communication Deflection (CD)			√
Communication session Barring (CB)			
Outgoing Communications Barring (OCB)	√		
Incoming Communications Barring (ICB)			√
Communication Waiting (CW)			√
Advice of charge services (AOC)			
Advice of Charge: charging information at communication set-up time (AOC-S)	√ (usually)		
Advice of Charge: charging information during the communication (AoC-D)	√ (usually)		
Advice of Charge: charging information at the end of the communication (AOC-E)	√ (usually)		
Completion of Communications to Busy Subscriber (CCBS)			√
Communication Hold (HOLD)	√		√
Conference (CONF)	√		√
Message Waiting Indication (MWI)	√		√
Explicit Communication Transfer (ECT)	√		√
Reverse Charging	√		
User Busy (BUSY)			√

Multimedia Communication control needs to be extended from telephone-style control to drive the video Bearer Topology and control the adding and removal of Bearer Topology types. See also TS 181 001 [3] for further behaviour as well as TS 181 005 [5] for behaviour on User Busy.

5.2.2   MMS - Session Control

This Service Capability provides a Session Control for Multimedia Messaging Services, e.g., to implement services as defined in TS 122 340 [12].

This Service Capability has the following aspects:

- negotiate different terminal and network MM capabilities;

- notification and acknowledgement of MM related events (e.g., delivery, deletion, etc.);

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- MMS sender identification;

- MMS sender restriction; and

- handling of undeliverable MM.

This Service Capability appears in two flavours; originating and terminating session control.

It also implements policy control to enable/disable MMS delivery based on data from an MMS user profile.

5.2.2.1   Originating MMS session control

- validate sending user authorization;

- MMS-cancellation.

5.2.2.2   Terminating MMS session control

- Implements MMS sender identification and restriction.

- Implements MMS replacement/timeout.

5.2.3   IM - Session Control

This Service Capability provides a Session Control for Instant Messaging Services, e.g., to implement services as defined in TS 122 340 [12].

This Service Capability has the following aspects:

- negotiate different terminal and network IM capabilities; and

- notification and acknowledgement of IM related events (e.g. delivery, deletion, etc.);

- policy control to enable/disable IM delivery based on data from an IM user profile;

- controls IM storage (User Requested, Operator Requested);

- interfaces with other networks for presence information of "buddies".

This Service Capability appears in two flavours; originating and terminating session control.

5.2.3.1   Originating IM session control

- validate sending user authorization.

5.2.3.2   Terminating IM session control

- IM sender identification and restriction.

5.2.4   CHAT- Session Control

This Service Capability provides a Session Control for CHAT Services, e.g., to implement services as defined in TS 122 340 [12].

This Service Capability has the following aspects:

- negotiate different terminal and network CHAT capabilities;

- validate sending user authorization;

- implements CHAT message filtering (based on receiving user CHAT profile); and

- implements CHAT group control.

5.3 Back-end services

5.3.1 User Profile Storage Agents

Users request to have the behaviour of devices or services personalized to their requirements; this implies that a profile will be required. A profile may apply to a single simple device or service, more complex devices or services, or any combination that the user may wish to use. The entire set of this information, preferences, rules and settings a user wants to apply is the "user profile".

Profiles may be related to the various situations that a user experiences in their lives. Users view these situations in a hierarchical way; it must therefore be possible for users to have a hierarchy of profiles that reflect the relationship between these hierarchical situations.

NOTE: For example, a user may have a number of profiles related to different work situations such as "Work meeting" and "In my office". A general "At work" profile at the top of this hierarchy of work related profiles applies if none of the other more specific situations applied.

Where profiles are organized in a hierarchical way the lower level profiles can inherit profile data from the higher-level ones.

The profile storage agent is the entity that stores information about the profile data and the locations of data repositories of profile data related to users, which might be compared to 3GPP GUP server. In general, there exist multiple profile storage locations, e.g., profiles that apply to a device or service.

Users require the data to be stored in a secure manner with user agreed levels of privacy applied to the availability and distribution of that data. Ideally, profile data should always be available, over all networks, from all supported devices and services, including fixed and mobile services allowing service continuity and the optimal user experience. Changes of data at different locations must be consistent, which may be ensured by synchronization of data and transaction security.

Dependent on the complexity of the device or service there may only be a few user settable parameters or there may be a very large number. Examples of some of the very wide range of device/service parameters that may need to be set include:

- the loudness of a telephone ring tone;

- which of a number of telephone ring tones is used to indicate a call from a particular category of users;

- the frequency with which new email message delivery is checked; and

- the communication method used for mobile data services.

In the majority of cases, the range of parameters that can be set by users and the values that may be set will not be consistent between different devices or services. Where such diversity exists it is impossible to transfer the settings that have been set for one device or service to another similar device or service in a way that ensures that the same outcome will be achieved. This problem could be overcome by standardization.

See also EG 202 325 [8]. Users may update certain parts of the profile whilst the operator may update others.

5.3.1.1   User profile for communication service

- Stores communication service-related user data.

- Stores Management control data: so the operator may disable/enable communication delivery (blacklist/whitelist).

- Stores User control data: so the user may disable/enable communication delivery (blacklist/whitelist).

5.3.1.2   MMS-user profile

- Stores MMS service-related user data.

- Stores Management control data: so the operator may disable/enable MMS delivery.

- Stores User control data: so the user may disable/enable MMS delivery.

5.3.1.3   M-user profile

- Stores IM service-related user data.

- Stores Management control data: so the operator may disable/enable IM delivery.

- Stores User control data: so the user may disable/enable IM delivery.

5.3.1.4   CHAT-user profile

- Stores CHAT service-related user data.

- Stores Management control data: so the operator may disable/enable CHAT delivery.

- Stores User control data: so the user may disable/enable CHAT delivery.

5.3.1.5   User Presence profile

- Stores Presence service-related user data.

5.3.1.6   User presence storage (presentity)

- Stores presence related user data.

- For each time the user is logged on this capability stores:

  - The terminal location (address and geographic location, if available).

  - Terminal capabilities (which services may the terminal display and within those services which options may be available (e.g. codecs).

  - Terminal access bandwidth.

5.3.1.7   User presence storage

The user can express a wide range of preferences that are applicable when using a number of different devices and services. These include:

- generic service preferences (e.g., people with hearing difficulties may express a preference for receiving information and communications in a text format or have it presented in an elevated setting of the volume);

- time-dependent preferences (e.g., not accepting voice communications between 23:00 and 07:00);

- location and situation based preferences (e.g., requirements related to communications when driving a car);

- combinations of service, location and time preferences depending on the context of use (e.g., wanting text information translated to voice when driving a car to and from work); and

- affinity based preferences provided by an organization (e.g., an institution such as the Royal National Institute of the Blind lists a wide range of default preferences that have been shown to be suitable for people with visual disabilities).

5.3.1.8   User authentication data profile

This Service Capability allows user to be authenticated against secret authentication data.

5.3.1.9   User authorization data profile

This Service Capability holds the knowledge for which services the user may be authorized.

5.3.2   Routing database

Stores (rather) static routing information, necessary to perform communication routing. This database links (groups of) Names and Aliases (e.g. E.164 numbers and URIs) to addresses for signalling (SPoA).

5.4   Service Application

5.4.1   Communication Routing

Routes communication sessions (e.g. calls) based on information from routing database.

5.4.2   Logon/Sign-On

Performs the task of logging on the user. This task consists of a number of actions:

- Identity establishment (TS 102 165-2 [7]).

- Location establishment and storage in user's presence profile.

- Terminal-capabilities detection: Enables the network to detect if the terminal has a certain capability and storage in user's presence profile.

- User Authorization: establishes for which service the user is authorized.

5.4.3   Real-time charging calculation

Calculates in real-time which amount to charge a user for a particular service session. This may be based in part on:

- (Subscription) information in the user profile.

- The service(s) used.

- The distance of the remote party.

- The service provider of the remote party.

- The number of media channels.

- Etc.

5.4.4   User presence delivery

- Delivers user presence information to parties both interested and entitled to this information.

- Implements Presence accounting.

- Generates accounting records as to who received this information.

5.4.5   User location delivery

- Delivers user geographic location information to parties both interested and entitled to this information.

- Implements location accounting.

- Generates accounting records as to who received this information.

5.4.6   User presence delivery (watcher)

- Queries for user presence information on a particular user.

- generates accounting records as to who requested and received this information.

5.4.7   User location delivery (watcher)

- Queries for user geographic location information on a particular user.

- generates accounting records as to who requested and received this information.

5.4.8   Conference service control

The Conference service enables multiple users to have a common communication session.

- The Conference Service Capability may be invoked through "dialling-in", in that sense the Service Capability is present as a routable Name. This Service Capability may also be invoked from an existing communication session, should the current implementation of the communication Service Capability enable this.

- This Service Capability holds the Names of the participating users and controls the necessary Bearer Topology and media Service Capabilities.

- Performs accounting.

5.4.9   Profile Agents

User profile agents enable the user to manipulate the user profiles. The following have been identified.

5.4.9.1   Activation Agents

The activation agent is responsible for the activation and deactivation of profiles. Activation or deactivation of profiles are instigated by:

- events that trigger the evaluation of rules, the evaluation may result in activation and/or deactivation of profiles;

- events with implicit rules (e.g., power on/off of a device, logon/logoff at a service, etc); and

- user requested (i.e., the user specifically requests the activation and/or deactivation of profiles).

5.4.9.2   Viewing/editing Agents

Users will be provided with a single mechanisms to view or edit all or part of their profile. To achieve this, profile information will need to be transmitted through different networks and be used on different devices and services in a way that is transparent to the user.

NOTE: There may be components of profiles that are not accessible to the user, e.g., restrictions in the use of a device or a service.

5.5   Bearer Topology

5.5.1   Telephony Conversation Bearer Topology

This Service Capability enables a bidirectional bi-party single-media flow for narrowband audio to be established, maintained and torn down with a quality according to the telephony conversational class (TR 101 329-7 [10] and TS 123 107 [11]). This Service Capability takes care of media routing and the appropriate selection of media gateways and transcoders.

5.5.2   Telephony conference conversation Bearer Topology

This Service Capability enables a bidirectional multi-party single-media flow for narrowband audio to be established, maintained and torn down with a quality according to the telephony conversational class in TR 101 329-7 [10] and TS 123 107 [11]. This Service Capability takes care of media routing and the appropriate selection of media gateways, conference bridge, and transcoders.

This Service Capability will also enable the creation of additional media flows and their removal of any supported type to new parties.
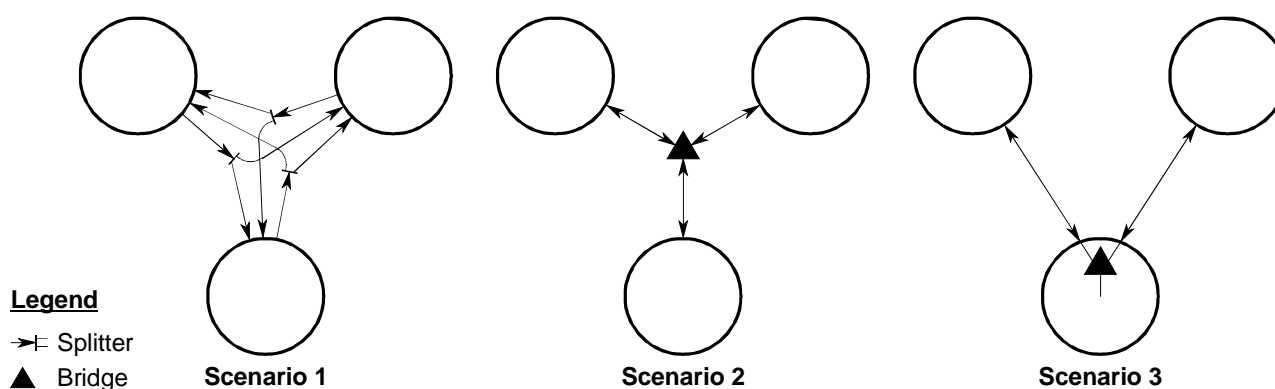
Figure 3: Conference communication scenarios

The conferencing bridge capability may be implemented in several ways, as is shown in figure 3.

- Scenario 1 shows a terminal-based conference bridge capability. This capability may use network-based multicast as a means to send media to all relevant end-points and a terminal-based merging capability. This form of conferencing causes some issues on bandwidth usage and is hence FFS.

- Scenario 2 shows a network-based central conferencing bridge under the control of an appropriate control-plane capability. The conference bridge will send the speech to all participants.

- Scenario 3 shows the same central conferencing bridge capability yet hosted in a terminal/enterprise domain. This model has some complications as to the trust, reliability and availability of the service capacity and is hence FFS.

5.5.3   Multimedia conversation Bearer Topology

This Service Capability enables a bidirectional bi-party multi-media flow of any supported type to be established, maintained and torn down with a quality according to the multimedia conversational class in TR 101 329-7 [10] and TS 123 107 [11]. This Service Capability takes care of media routing and the appropriate selection of media gateways and transcoders.

This Service Capability will also enable the creation of additional media flows of any supported type between the existing parties.

5.5.4   Multimedia conference conversation Bearer Topology

This Service Capability enables a bidirectional multi-party multi-media flow of any supported type to be established, maintained and torn down with a quality according to the multimedia conversational class in TR 101 329-7 [10] and TS 123 107 [11]. This Service Capability takes care of media routing and the appropriate selection of media gateways, conference bridge, and transcoders.

This Service Capability will also enable the creation of additional media flows and their removal of any supported type between the existing parties.

This Service Capability will also enable the creation of additional media flows and their removal of any supported type to new parties.

   NOTE: The concept of a group address instead of the bridge/splitter address is for further study.

5.5.5   MMS Bearer Topology

This Service Capability enables the delivery of MMS messages to the appropriate MMS end-points. This Service Capability takes care of message routing and the appropriate selection of message transcoders and storage.

5.6   Media

5.6.1   Bidirectional Narrowband conversational voice streaming

This Service Capability ensures bidirectional narrowband audio streaming between appointed points in the network (MPoAs) with sufficient quality as described in TR 101 329-7 [10].

5.6.2   Bidirectional Broadband conversational audio streaming

This Service Capability ensures bidirectional wideband audio streaming between appointed points in the network (MPoAs) with sufficient quality; this requires further study.

5.6.3   In-call/session events

This Service Capability enables in-call events (such as DTMF tones) to be delivered with appropriately low to an appointed end-point; this requires further study.

5.6.4   Unidirectional audio streaming (e.g. radio)

This Service Capability ensures unidirectional wideband audio streaming from appointed points in the network (MPoAs) to appointed end-user end-points with sufficient quality; this requires further study.

5.6.5   Unidirectional video streaming (VoD)

This Service Capability ensures unidirectional video streaming from appointed points in the network (MPoAs) to appointed end-user end-points with sufficient quality; this requires further study.

5.6.6   Bidirectional conversational video streaming

This Service Capability ensures bidirectional video streaming between appointed points in the network (MPoAs) with sufficient quality; this requires further study.

5.6.7 Conference bridge

This Service Capability enables multiple media streams to be appropriately mixed. This Service Capability exists in multiple flavours:

1)   3way audio bridge (for 3 bidirectional narrowband audio streams);

2)   narrowband audio bridge (for any number of bidirectional narrowband audio streams); or

3)   video conferencing bridge (for any number of correlated bidirectional audio and video streams).

The mechanisms for making incoming media available to the outgoing media streams are for future study and considered an area where vendor/operator differentiation may happen.

5.6.8 Narrowband audio stream transcoder

This Service Capability transcodes between two narrowband audio codecs.

5.6.9 Media (transport) gateway (e.g., to PSTN)

This Service Capability translates between transport mechanisms for narrowband audio, e.g. RTP/IP and PCM switched lines.

5.6.10 Media Streaming forwarder

This Service Capability forward media streams to an appropriate forwarding MPoA.

NOTE: This Service Capability is used for topology hiding and at border gateways.

5.6.11 Media encryption

This Service Capability encrypts/decrypts/transcripts media flows.

5.6.12 Broadband audio stream transcoder

This Service Capability transcodes between two broadband audio codecs.

5.6.13 Video stream transcoder

This Service Capability transcodes between two video codecs.

5.6.14 MMS - submission

This Service Capability enables the submission of MMS messages into the network.

5.6.15 MMS - storage

This Service Capability enables the storage of MMS messages in the network.

5.6.16 MMS - type conversion

This Service Capability coverts between two MMS content types.

NOTE: WG1 should enumerate the media types in MMS that needs to be supported.

5.6.17 MMS - format conversion

This Service Capability transcodes between two MMS formats while leaving the content unchanged.

5.6.18 MMS - forwarding

This service capability forwards an MMS messages message to a new destination.

5.6.19 MMS mass delivery

This Service Capability delivers MMS messages to a list of Aliases.

5.6.20 MMS - notification

This Service Capability notifies the user of new MMS messages.

5.6.21 IM - forwarding

This Service Capability enables the near-real time forwarding of IM messages in the network.

5.6.22 IM-storage

This Service Capability enables the storage of IM messages in the network.

This storage is requested by IM control.

5.6.23 IM - delivery

This Service Capability delivers Instant Messages to the recipient. It implements IM message filtering (ultimately based on receiving user profile).

5.6.24 MMS - delivery (push)

This Service Capability delivers MMS messages to the recipient's terminal.

5.6.25 MMS - delivery (pull)

This Service Capability enables the recipient's terminal to retrieve MMS messages.

5.6.26 MMS - delivery (streaming)

This Service Capability streams MMS messages to the recipient's terminal.

5.6.27 CHAT messaging

This Service Capability delivers CHAT messages to the designated chat group.

5.6.28 CHAT private messaging

This Service Capability delivers CHAT messages to the designated recipient.

5.6.29 CHAT storage

This Service Capability stores CHAT messages based on a request from chat control. This storage may be either system or user requested.

5.7 Transport capabilities

The NGN transport network has the following capabilities.

5.7.1 UNI - transport capabilities

This service capability enables best-effort transport services for signalling and media.

5.7.1.1 Best effort transport

This Service Capability enables best-effort transport services for signalling and media.

5.7.1.2 QoS tagged packet transport

This Service Capability enables QoS transport for media flows means to offer, support and maintain agreed levels of service (e.g. via Service Level Agreements). These flows may be established through network management. End-points indicate their desire to send packets (containing for instance media, signalling or VPN tunnels) with the established QoS by providing a "tag". Depending on the layer at which this tag is indicated it may take different forms:

- Layer 2-frame relay DLCI, ATM VCC, or 802.1q VLAN tag.

- Layer 2.5: MPLS flow label or DiffServ marker.

- Layer 3: Specific source and destination address and ports.

5.7.1.3 QoS enabled media transport - third party controlled

This Service Capability enables QoS transport for media flows. These flows may be established through network management or may be requested in real-time controlled by an authorized third party. End-points indicate their desire to send packets (containing for instance media, signalling or VPN tunnels) with the established QoS by providing appropriate source and destination address and ports.

5.7.2 End-to-end transport capabilities

5.7.2.1 Packet switching

The packet routing Service Capability is used for end-to-end connectivity. It provides:

- data transfer capability;

- transparency to user data;

- provision for multi-protocol support.

5.7.2.2 Packet routing

The packet routing Service Capability is used for end-to-end connectivity. It provides:

- Data Transfer Capability;

- accommodation different address schemes;

- transparency to user data;

- provision for arbitrary topologies (ranging, for example, from hub-and-spoke, partial mesh to full mesh);

- provision for multi-protocol support;

- provision of multi-homed user sites.

5.8 End-point capabilities

The following end-point capabilities have been identified.

5.8.1 Audio (narrowband) media presentation

This Service Capability enables audio flows to be received and presented to the user.

5.8.2 Bearer Topology end-point

This Service Capability enables media streams to be established as part of a communication session.

> NOTE: This Service Capability may be extended to control an end-point-based conference bridge.

5.8.3 Communication initiation

This Service Capability enables communication sessions of the designated type to be established to the designated Alias (username, chat group, etc.) with the designated Alias.

5.8.4 Communication termination

This Service Capability enables a designated communication session to be terminated. If advice of charge is enabled, this shall be presented.

5.8.5 IM session client

This Service Capability enables an end-point to communicate with an IM session control Service Capability in the network.

This service capability has the following functions:

- Allow user to communicate with the IM service.

- Remain apprised of the presentity of "buddies".

5.8.6 MMS session client

This Service Capability enables an end-point to communicate with an MMS session control Service Capability in the network.

This service capability has the following functions:

- Allow user to initiate sending of MMS messages to user's Aliases.

5.8.7 CHAT session client

This Service Capability enables an end-point to communicate with an CHAT session control Service Capability in the network.

This service capability has the following functions:

- Allow user to communicate with the CHAT service.

5.8.8 Video Media presentation

This Service Capability enables video flows to be received and presented to the user.

5.8.9   Terminal/USIM storage of user profile

This Service Capability enables the user profile for a particular service to be sorted in the Terminal or USIM.

This Service Capability comes in several flavours:

  1)   Communication profile.

  2)   MMS profile.

  3)   IM profile.

  4)   CHAT.

  5)   User profile (as identified in ETSI Human Factor's document on User Profile Management [8] in clauses 3.1
        and 4).

5.8.10   MMS - Delivery control

This Service Capability enables user control over MMS delivery options.

5.8.11   MMS - creation

This Service Capability enables MMS creation by the user.

5.8.12   MMS - presentation

This Service Capability enables MMS presentation to the user.

5.8.13   MMS - storage

This Service Capability enables MMS storage in the terminal.

5.8.14   MMS - notification presentation

This Service Capability enables MMS notification presentation to the user.

5.8.15   IM - creation

This Service Capability enables IM creation by the user.

5.8.16   IM - presentation

This Service Capability enables IM presentation to the user.

5.8.17   IM - storage

This Service Capability enables IM storage in the terminal.

5.8.18   IM - notification presentation

This Service Capability enables IM notification presentation to the user.

5.8.19 Stored message manipulation (retrieval/deletion/forwarding/etc)

This Service Capability enables manipulation or locally stored Instant Messages/MMS/CHAT messages by the user. This Service Capability comes in several flavours:

1) MMS message manipulation.

2) IM message manipulation.

3) CHAT message manipulation.

5.8.20 CHAT session establishment/joining/leaving

This Service Capability enables the user to establish/join/leave a CHAT session.

5.8.21 CHAT session presentation

This Service Capability enables presentation of a chat session to the user.

5.8.22 CHAT message creation

This Service Capability enables creation of a chat message by the user.

5.8.23 CHAT invitation creation

This Service Capability enables creation of a chat invitation by the user to another user (by Alias).

5.8.24 CHAT group creation

This Service Capability enables the user to establish a CHAT group.

5.8.25 User profile editing

This Service Capability enables the user to edit their user profile.

This Service Capability comes in several flavours:

1) Presence profile editing.

2) Location profile editing.

3) Communication profile editing.

4) MMS profile editing.

5) CHAT profile editing.

6) IM profile editing.

7) user profile editing.

5.8.26 User sign-on

This Service Capability allows the user to sign-on and authenticate to the network.

5.8.27 User presence setting

This Service Capability enables the user set their presence values.

5.8.28   User location setting

This Service Capability enables the user set their geographic location values.

5.8.29   Media encryption

This Service Capability enables media encryption/decryption.

5.8.30   Media transport

This Service Capability enables media to be stored in packets and sent on the transport network.

5.8.31   QoS tagging

This Service Capability enables packets to be tagged for appropriate QoS handling before sending to the NGN.

5.8.32   Transport packet encryption

This Service Capability enables packets to be encrypted before sending to the NGN.

6   Example service descriptions using Service Capabilities

6.1   Introduction

This clause shows that even with a limited set of Service Capabilities many services can be created. By mapping the generic capabilities to a service, a clear interface over the network (either NNI or UNI) is provided, on the other hand, no service logic is considered.

   NOTE: Consider describing amazon.com and yahoo.com. Both services, when considering their exposed service
            capabilities, are identical, a simple http-based text retrieval capability. The service logic is the essence
            that differentiates these services. This service logic is proprietary and not required for interworking.

The first service family under consideration is the Communication Service Family that ranges from a simple telephone call to an NGN call with QoS and basic audio conferences.

The second service family under consideration is Multimedia Communication Service Family that ranges from a simple video call to unstructured video conference, an on-line classroom applications.

The third service family is the Messaging Service Family and details instant messaging and chat room applications.

For each service an end-user definition is given as well as a network description. The service is mapped to its comprising service capabilities and possible extensions (supplementary services) of the service are enumerated as well as the service capabilities which would give these extensions.

6.2   Communication service family

The family of communication services start with the simple telephone call defined in TS 181 002 [4] and ranges up to broadband multimedia video conferencing some examples have been identified in TR 181 003 [1]. This clause shows how these services may be (re-)created using the Service Capabilities identified in this deliverable.

In this clause the range of scenarios is explored than TISPAN NGN needs to be available in. It starts with a simple telephone call, adding the sign-on and user profiles, subsequently QoS transport is added before going to conferencing and multimedia scenarios.

6.2.1   Simple telephone call

The simple telephone call service has been defined in TS 181 002 [4] ,TS 181 005 [5], etc.

This service uses the following Service Capabilities:

- End-point:

    - Audio (narrowband) media presentation.

    - Media transport.

    - Bearer Topology end-point.

    - Communication initiation/termination.

- Network:

    - Communication control.

    - Telephony conversational Bearer Topology.

    - Media gateway.

- Implementing: Bidirectional narrowband conversational voice streaming.

Figure 4 shows the relevant Service Capabilities when an NGN makes a call to a user on the PSTN. The straight lines indicate direct communication. In this scenario the Bearer Topology Service Capability has the simple job of selecting the appropriate media gateway.
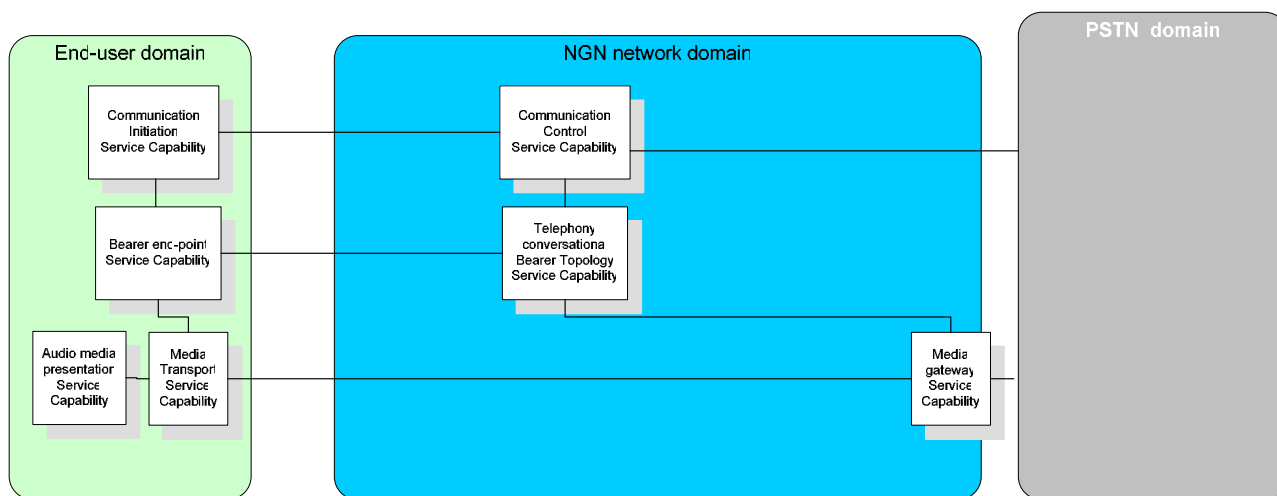
Figure 4: Basic telephone service showing a scenario where an NGN user calls a PSTN user

6.2.2   Sign-on and user profiles

Any user needs to be authorized before a regular call may be made. TISPAN NGN is assuming mobile/nomadic users who need to sign-on before they may be authorized.

This scenario uses the following extra Service Capabilities:

- End-point:

    - Terminal storage of user profile.

    - Sign-on.

- Network:

    - Log-on/Sign-on.

    - User profile for communication service.

    - User presence profile.

    - User presence setting

Figure 5 shows the relevant Service Capabilities when an NGN user signs-on to the network and subsequently makes a call to a user on the PSTN. During the call set-up the user's profiles may be queried for authorization (is this user allowed to make this call) or service delivery (e.g. short dialling plans).
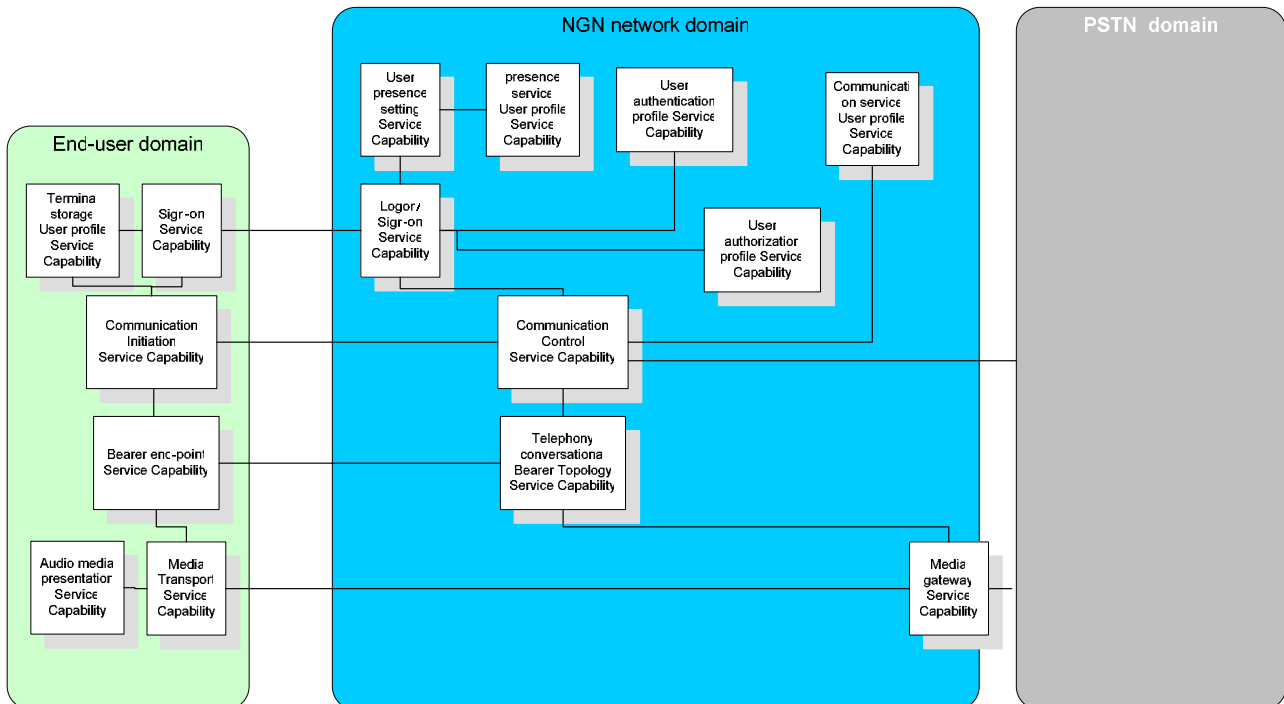
**Figure 5: Basic telephone service showing a scenario where an NGN user
signs-on and then calls a PSTN user**

6.2.3   Simple telephone call with controlled QoS

In this scenario the NGN network dynamically sets-up QoS transport through the (access) network for the call to receive appropriate quality.

This service uses the following extra Service Capabilities:

- End-point:

    - None.

NOTE: The 3rd party controlled QoS requires no changes in the end-point.

- Network:

    - Bidirectional narrowband conversational voice streaming.

    - QoS-enabled media transport (3PTY).

    - Packet switching.

The resulting diagram is shown in figure 6. In this scenario the Bidirectional narrowband conversational voice streaming Service Capability is explicitly shown to translate the knowledge of media framing and transport to the transport QoS settings, the dotted line shows that the media transport *logically* communicates at its own level.
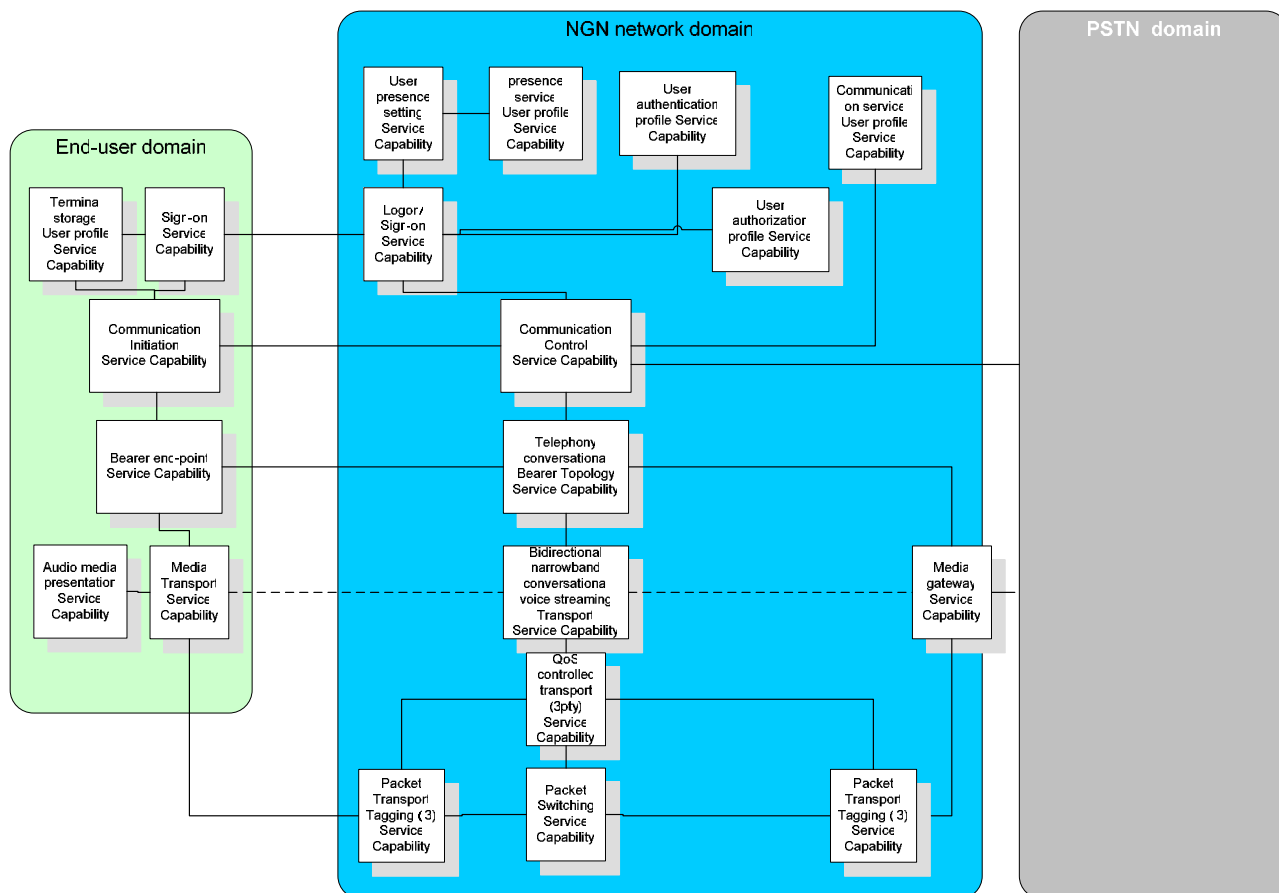
**Figure 6: Basic telephone service showing a scenario where an NGN user
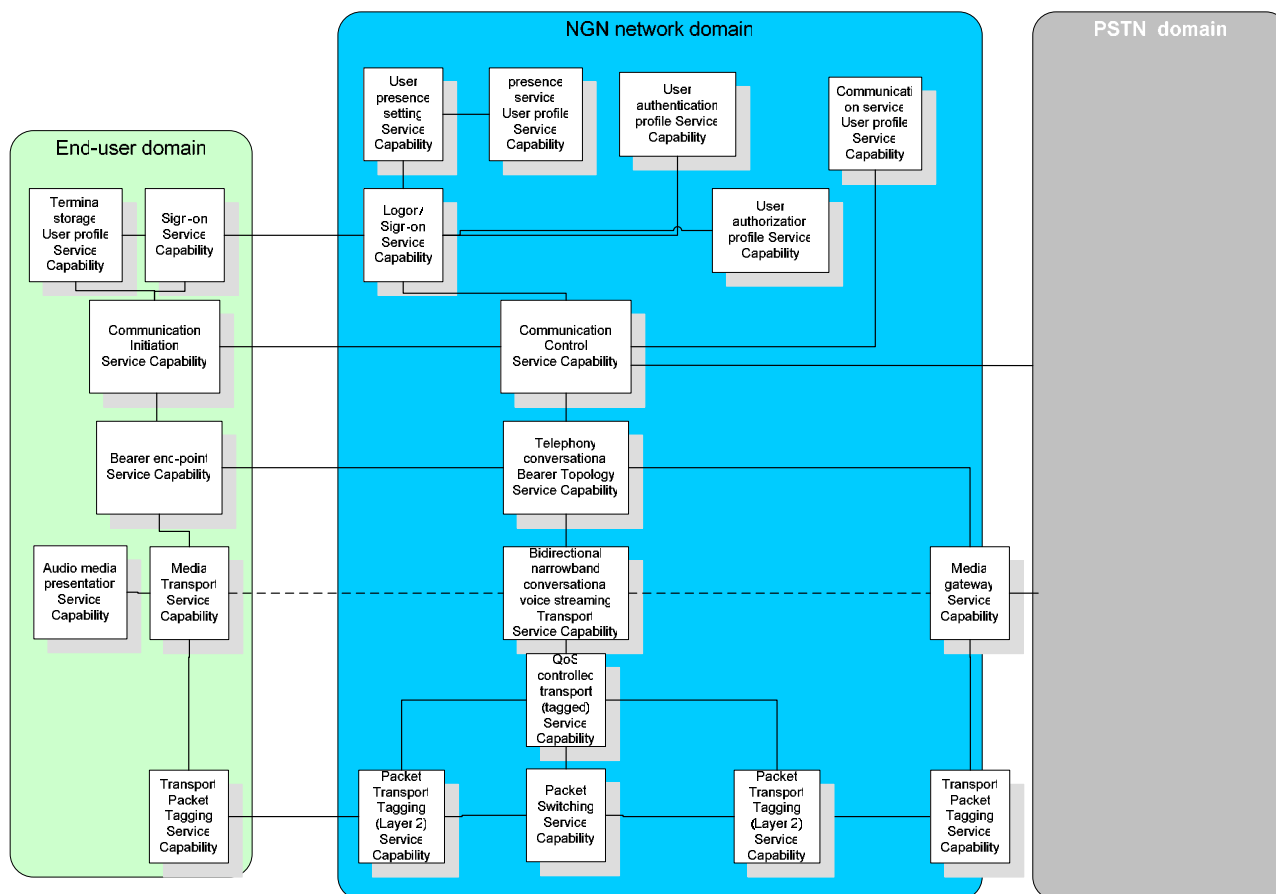calls a PSTN user with controlled QoS**

6.2.4   Simple telephone call with tagged QoS

In this scenario the NGN network dynamically sets-up QoS transport through the (access) network for the call to receive appropriate quality. The difference with the scenario above is that in this case tagged QoS is used.

This service uses the following extra Service Capabilities:

- End-point:

    - QoS Layer 2 tagging.

- Network:

    - QoS controlled transport (tagged).

    - Packet switching.

The resulting diagram is shown in figure 7. In this scenario the Bidirectional narrowband conversational voice streaming Service Capability is explicitly shown to translate the knowledge of media framing and transport to the transport QoS settings, the dotted line shows that the media transport *logically* communicates at its own level.

**Figure 7: Basic telephone service showing a scenario where an NGN user
calls a PSTN user with tagged QoS**

6.2.5   Simple call among NGN users

In this scenario one NGN user is calling another NGN user.

This scenario requires the following extra service capabilities;

- End-point:

    - Communication termination.

- Network:

    - Presence delivery.

Figure 8 shows the relevant Service Capabilities in a call between two NGN users where the terminating NGN network queries the user's presentity to see if the user is reachable.
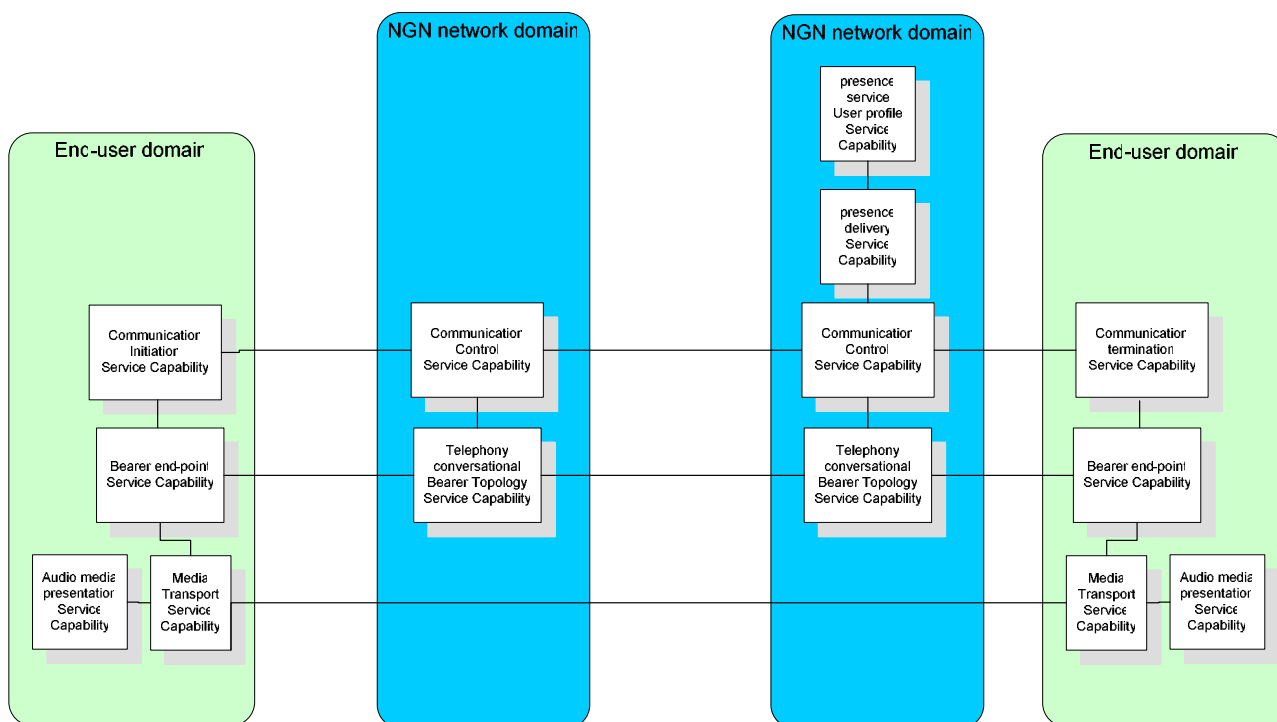
Figure 8: Basic telephone service showing a scenario where an NGN user calls another NGN user

6.2.6 NGN call with QoS

In this scenario the two NGN domains each have chosen their own QoS approach, figure 9 shows the result. The right-hand NGN network domain has to implement the tagging Service Capability to interwork with the left hand NGN network.
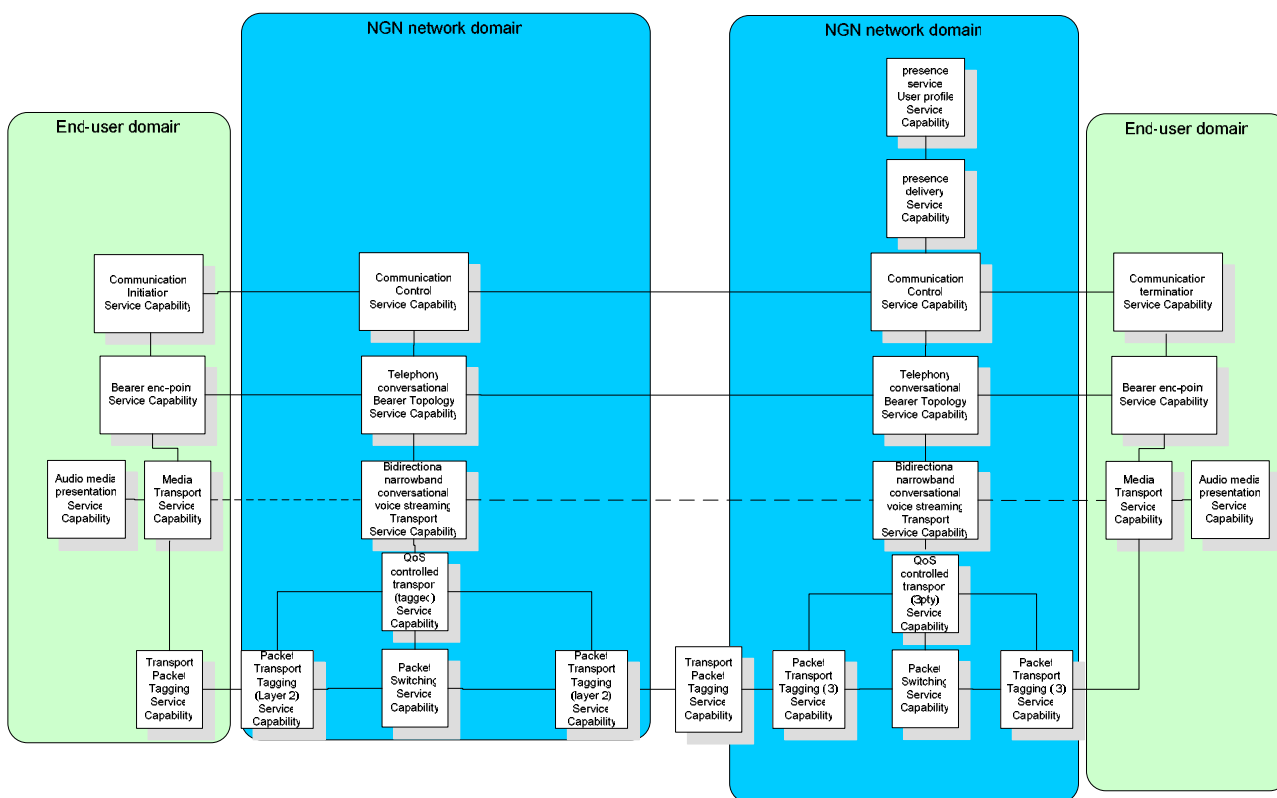

Figure 9: Basic telephone service showing a scenario where an NGN user calls another NGN user each NGN domain has its own QoS approach

6.2.7   Basic audio conference

The conference service requires the addition of a conferencing bridge to the scenarios described above. This scenario requires an extra Conference Bridge Service Capability and a Bearer Topology Service Capability to match this. The result is shown in figure 10.
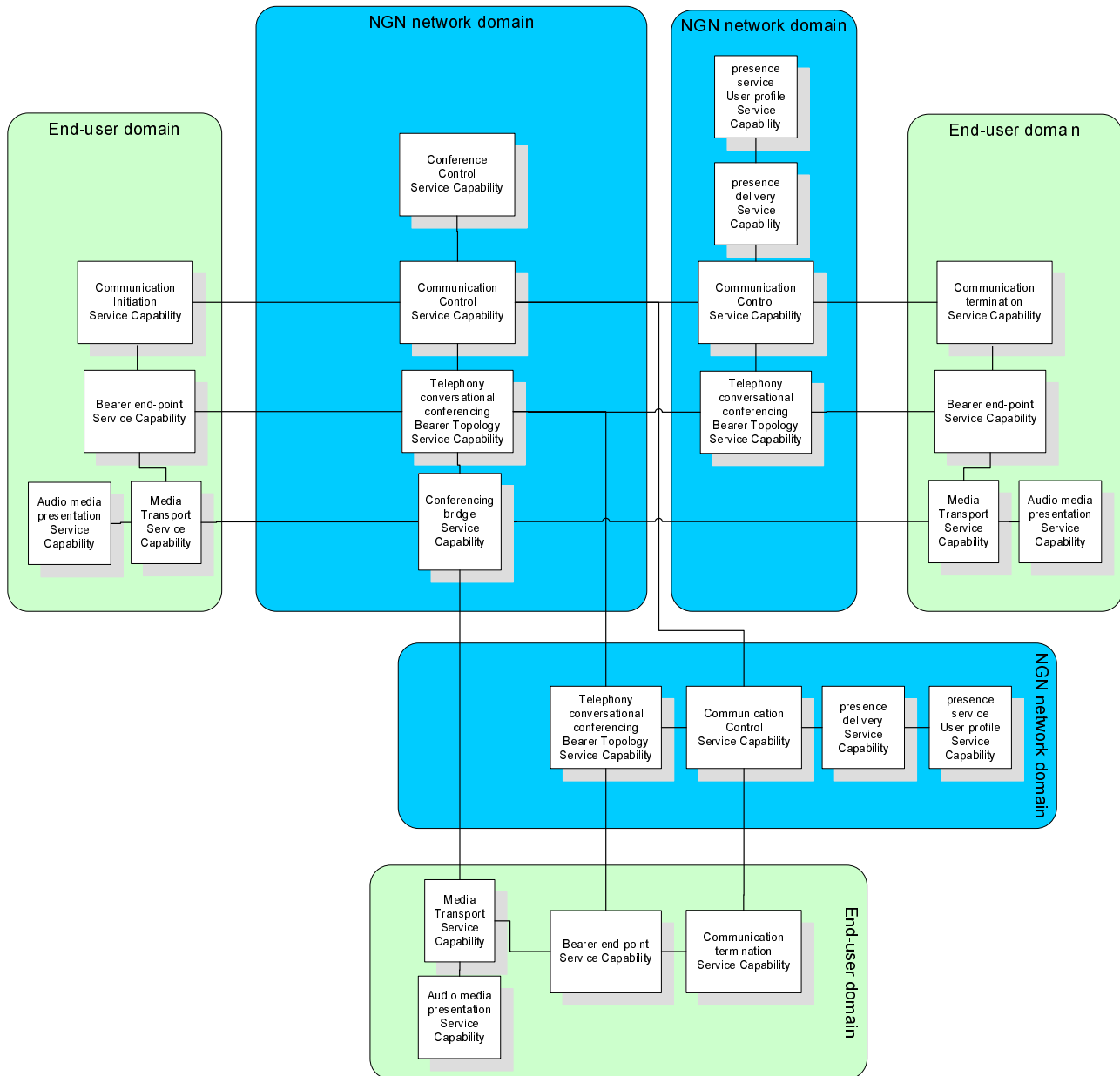

Figure 10: Basic telephone service showing a conferencing scenario among multiple NGN users

6.3   Multimedia Communication Services

6.3.1   Simple Video Call

The video call service is defined in TS 181 001 [3]. This service is described as an extension of the basic call scenarios described above. In this scenario another aspect of the split between Communication Control and Bearer Topology is demonstrated. The simple call in figure 8 is extended with an additional video stream.

This scenario requires the following extra service capabilities:

- End-point:

    - Video Media presentation.

- Network:

    - Video Conversational Bearer Topology.

Figure 11 shows the resulting diagram. The video call is shown as a telephony call with an extra media flow under the control of a video bearer topology Service Capability.
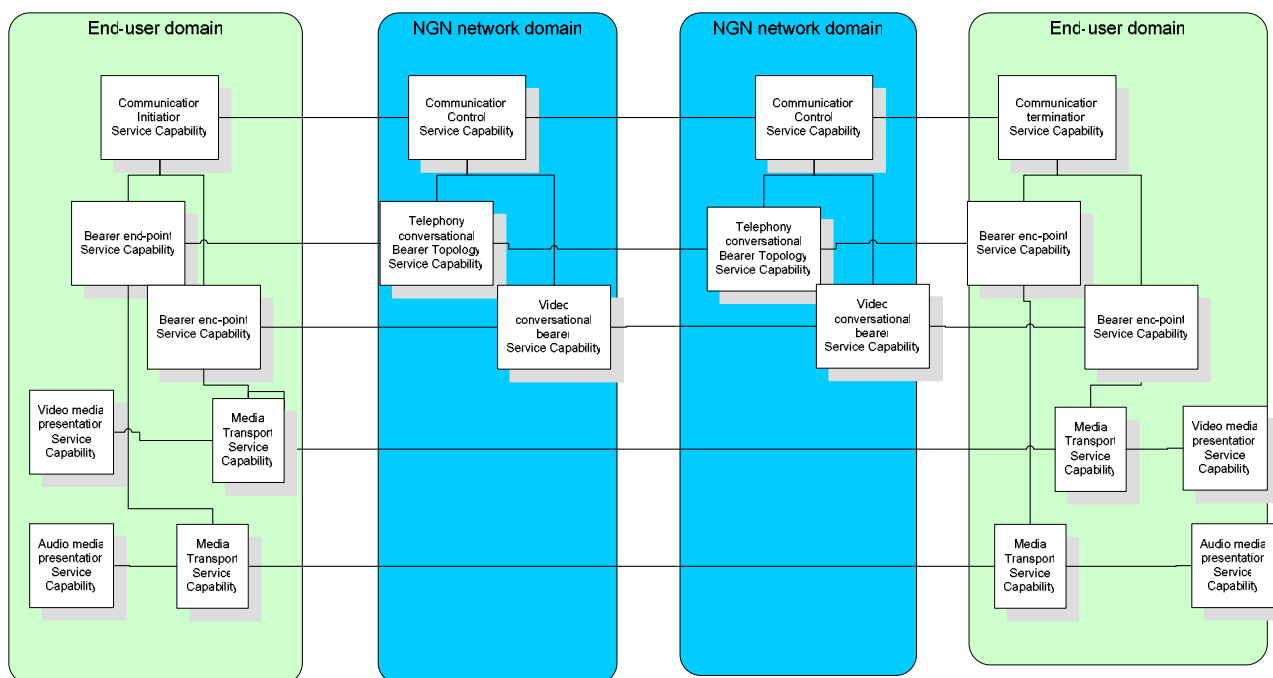

Figure 11: Videocall service

6.3.2 Simple Unstructured Video conference

6.3.2.1 End-user definition

An interactive teleservice that allows a user to communicate in real-time with one or more other users using audio and video. Joining this session is either by invitation of one of the participants or by dial-in to the conference (so then the new participant has to know the identity of the conference). Participants should be made aware of the current list of participants.

6.3.2.2 Service capabilities

Extending the video call from the previous scenario to a video conference is analogous to the telephone conference shown above, figure 12 shows the result.
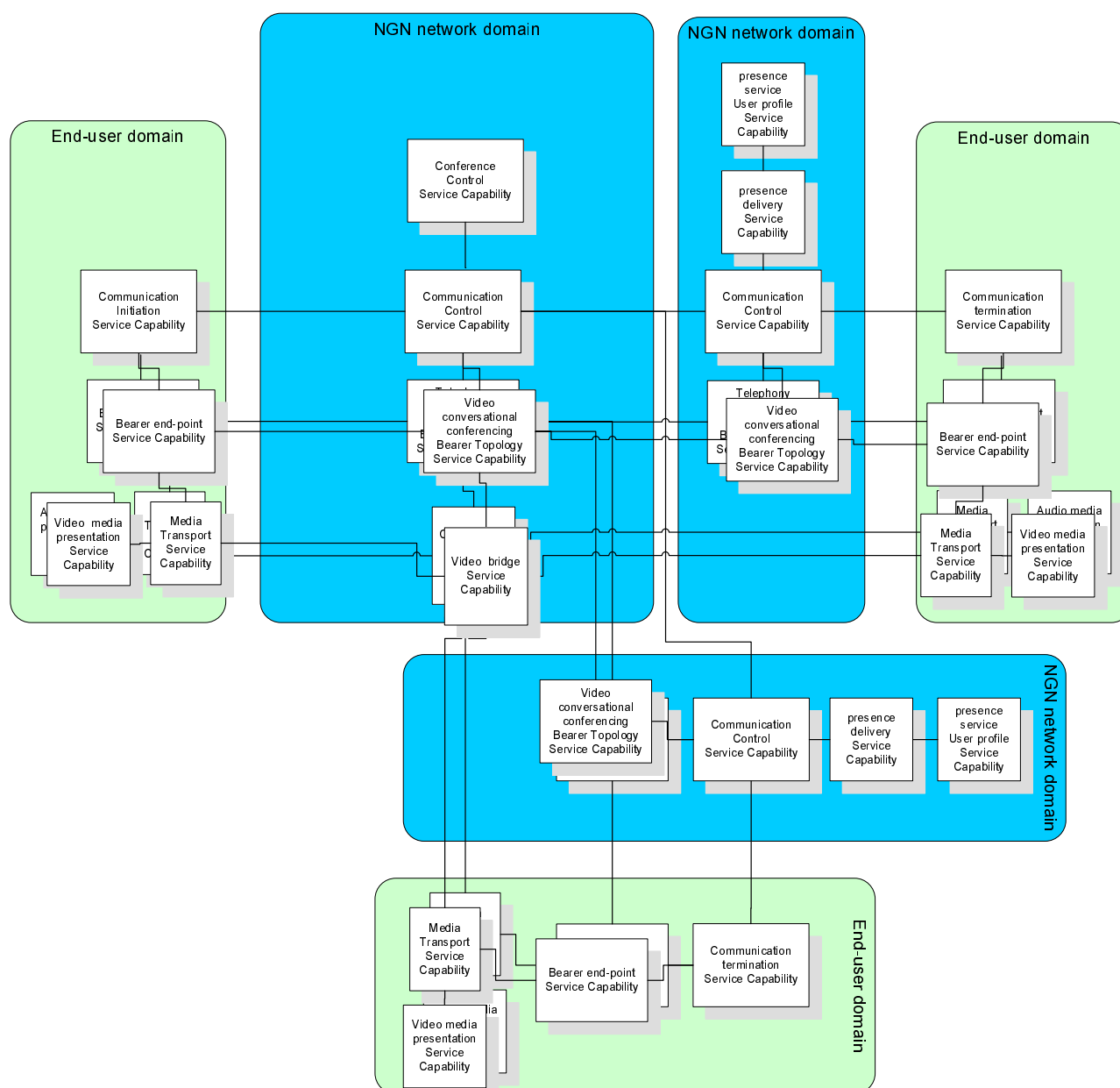
Figure 12: Video Conference service among multiple NGN users

6.3.3   Classroom

This service is an extension of a simple video conference but with more formal control.

6.3.3.1   End-user definition

An interactive teleservice that allows a user to communicate in real-time with one or more other users using audio and video under the control of a teacher user who has control over who may speak. Also applications that are run on student machines may be open for inspection by the teacher. The teacher has control on joining and leaving of student members of the session. The master has an overview of the current participants in the session. The students may not have this overview.

6.3.3.2   Service Capabilities

This scenario requires the addition of a specialized classroom conference control Service Capability in the network hosting the conference. Figure 13 shows the result. Such an extension would be a typical example of the proprietary service logic mentioned in the introduction.
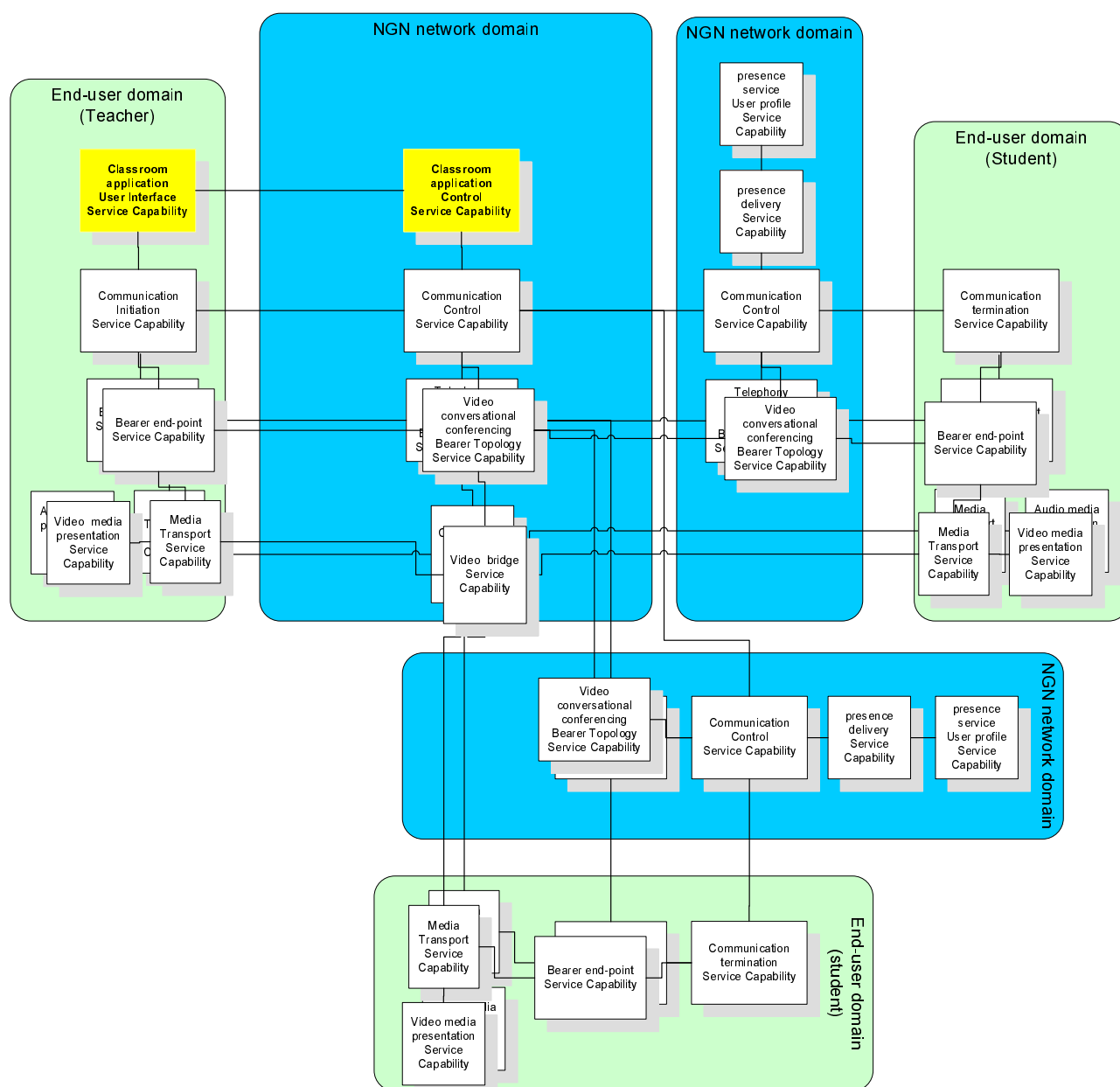
Figure 13: Classroom service among multiple NGN users

6.3.3.3   Possible extensions (supplementary services)

1)   Conference log.

2)   Shared black/whiteboard (with optional write control).

3)   (private) Chatting among students.

These would be visible in the Service Capabilities of call and media/Bearer Topology state.

## 6.4   Messaging service family

The messaging services are defined in TR 181 007 [13]. In this clause describes how the service identified in that deliverable may be implemented using the service capabilities.

6.4.1 Instant messaging

Typically, sender is aware of the availability of the recipient(s) (possibly through the use of the Presence service) before sending this type of message as, if the recipient is not available, the message may be discarded or deferred. An immediate message may be deferred by the recipient's network based on the message filtering settings defined by the recipient or by the recipient's IMS service provider.

6.4.1.1 Service Capabilities

Figure 14 shows how the Service Capabilities make up this service.
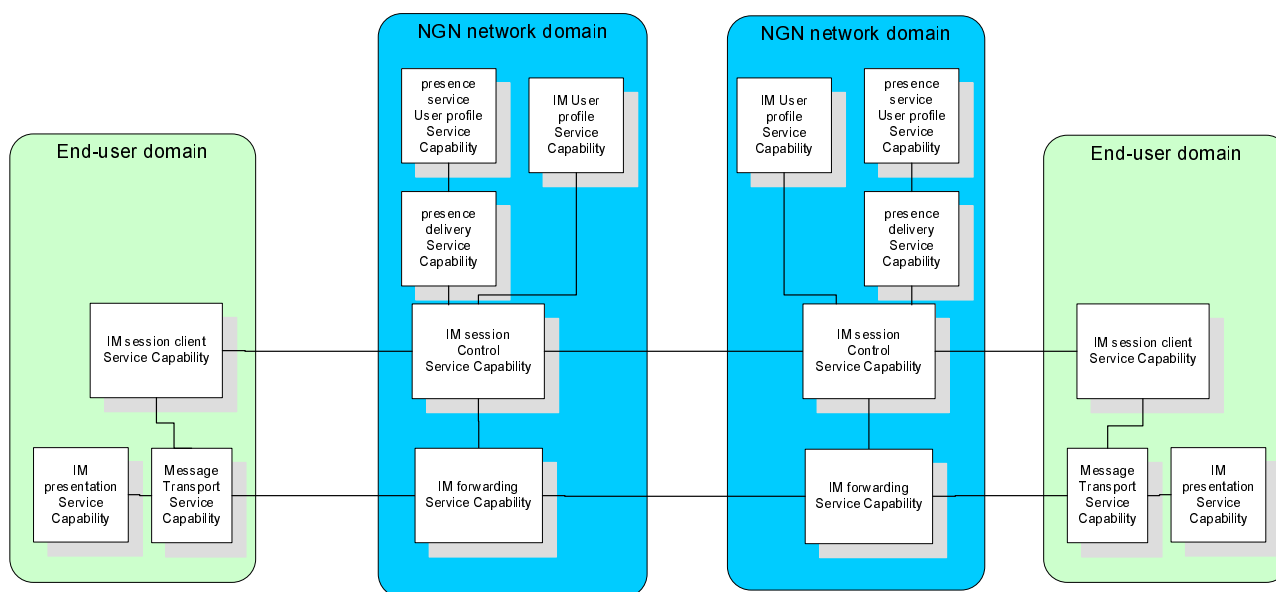
Figure 14: IM service between two NGN users connecting to different NGN networks

6.4.2 Chat

The CHAT service allows users to communicate using messages. The CHAT service has the following aspects; the sender and recipient expect near real time message delivery. Typically, recipients of the session based messaging that are not joined to a group or are not available will not receive the messages. Typically, a sender may send a message to all participants in the messaging session without addressing them individually.

6.4.2.1 Service Capabilities

Figure 15 shows how the Service Capabilities make up the CHAT service. The chat group is hosted in the left-hand network, users connect to this service to send and receive chat messages.
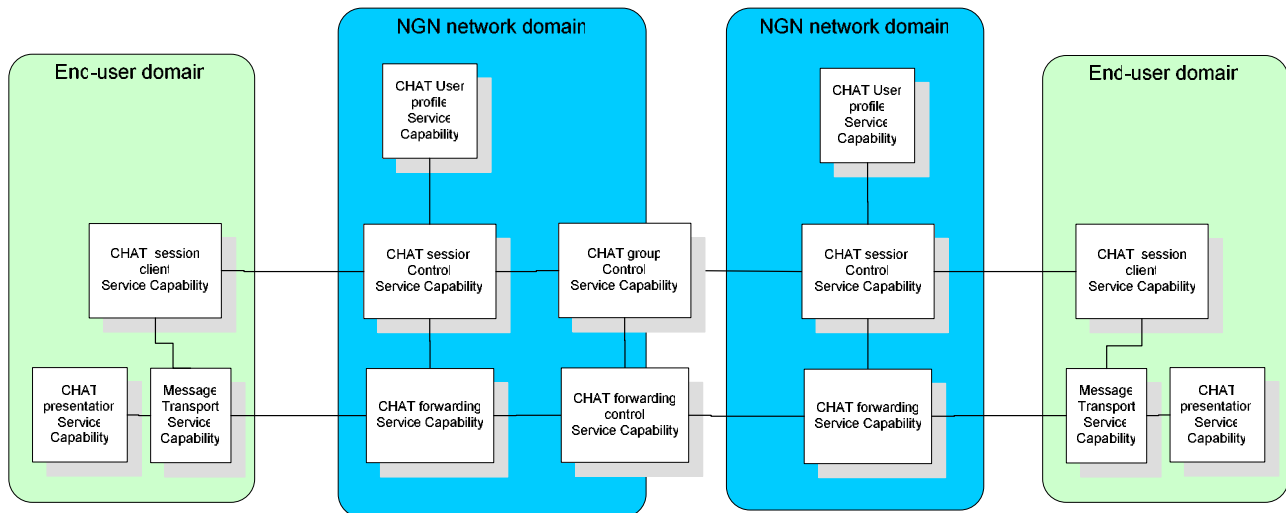
Figure 15: CHAT service between two NGN users connecting to different NGN networks

6.5   VPN service

Network-based VPNs have a common set of requirements and are implemented through the use of one or more sets of mechanisms. ITU-T Recommendation Y.1311 [9] describes NB VPN service definitions, framework and general requirements.

The scope of ITU-T Recommendation Y.1311 [9] covers the various core implementations of an NB VPN, as well as the services offered to the customer.

The scope is also illustrated in figure 16, which depicts the principles arrangement between services and implementation approaches:
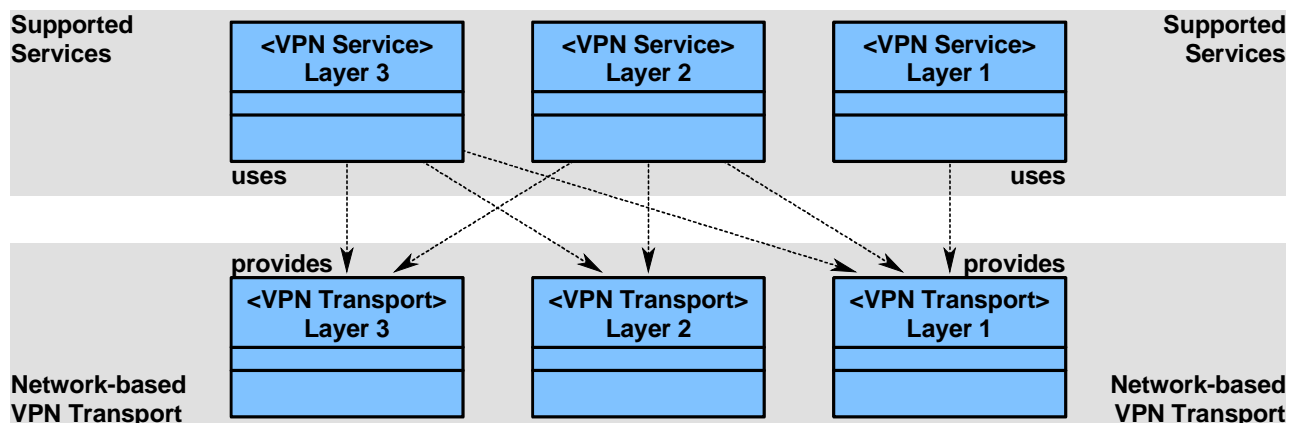

Figure 16: VPN service and transport split

NOTE 1:   The examples shown above are non-exhaustive.
NOTE 2:   Not all combinations of elements shown in the figure are feasible, or are within the scope of this
               Recommendation.
NOTE 3:   From the viewpoint of VPN, frame transport mechanisms (e.g., ATM) are considered Layer 1 transport
               services.

6.5.1   VPN service creation using service-capabilities

The following three types of service are identified in the present document, draft ITU-T recommendation Y.1314 provides complete service type definitions and functionality. These three scenarios described below do not represent all of the service capabilities required for a VPN service.

6.5.1.1   Layer 1 VPN service

TISPAN needs to study this subject for R2.

6.5.1.2   Layer 2 VPN service

In a layer 2 VPN service, customer edge device receives data link layer (i.e. layer 2) service from the network provider.
The customer edge device and the provider edge device are peered to each other at the data link layer across the access
network. The network performs forwarding of user data packets based on information in the packets' data link layer
headers. This type of VPN is implemented using the following Service Capabilities:

- End-point:

  - Transport packet encryption.

  - Transport packet tagging (Layer 2 flavour).

- Network:

  - QoS tagged packet transport (layer 2 flavour).

  - Packet switching.

Figure 17 shows a diagram combining these Service Capabilities to an end-to-end service.
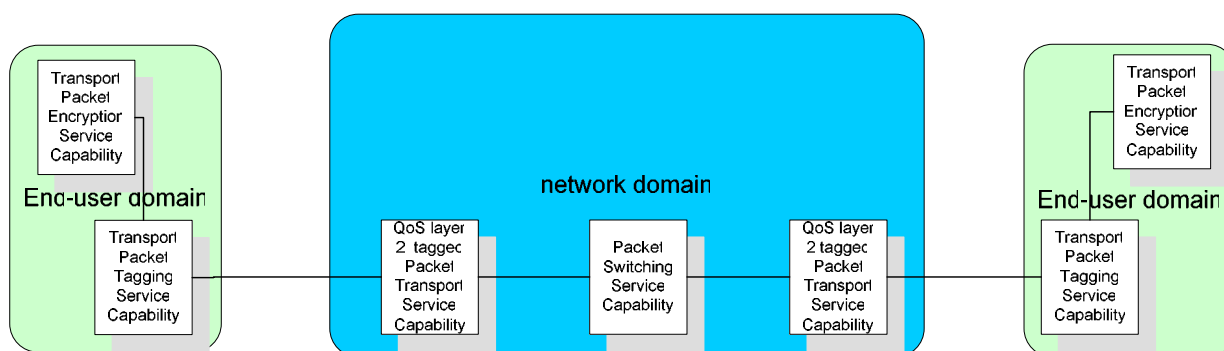
Figure 17: Layer 2 VPN service

6.5.1.3   Layer 3 VPN service

In a layer 3 VPN service, customer edge device receives network layer service (typically in the form of IP packets) from
the network provider. The customer edge device and the provider edge device are peered to each other at the network
layer across the access network. The network performs forwarding of user data packets based on information in the IP
layer header, such as an IPv4 or IPv6 destination address. The customer sees the network as a layer 3 device such as an
IPv4 or IPv6 router.

- End-point:

  - Transport packet encryption.

NOTE: If the end-point/enterprise network needs to support multiple VPNs concurrently it becomes in effect its
          own network and hence will need the Packet Routing Service Capability.

- Network:

  - QoS tagged packet transport (layer 3 flavour).

  - Packet Routing.

Figure 18 shows a diagram combining these Service Capabilities to an end-to-end service.
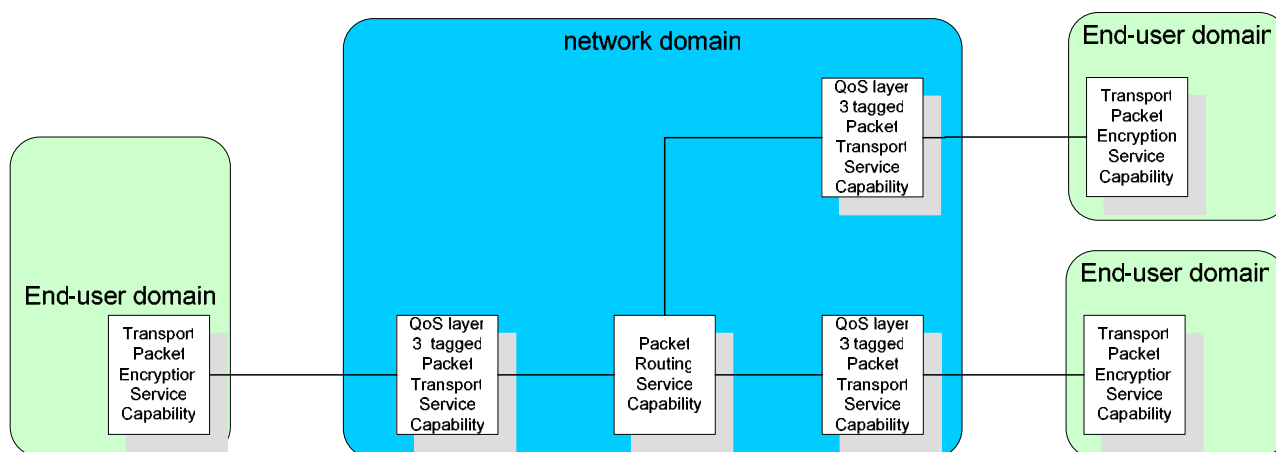
Figure 18: Layer 3 VPN service

7 Additional Service Capability Mappings

The services identified in TR 181 003 [1] may also be expressed in Service Capabilities. In this clause for each identified services a mapping to service capabilities is given.

In general it must be noted that the services identified in TR 181 003 [1] are for the most part third-party add-on services that do not impact the core communication infrastructure, yet require access to the information in the network. This analysis has shown which information needs to be available to add-on services.

7.1 Services from Eurescom projects

7.1.1 Meet Me service

7.1.1.1 Introduction to the service

The Meet Me Service Concept should enable the encounter between two or more persons sharing similar and/or compatible interests. This Service Concept would take advantage on service components as Context Awareness (including Presence, Status and Localization and User Profiles. It may be applied on different areas, like:

- Individual relationships including friendships and dating (e.g., boy/girl seek girl/boy);

- Enterprise relationships in situations such as human resource management and outsourcing; or

- Individual - Enterprise relationships in situations such as the management of broken cars and domestic disasters.

EXAMPLE: Our car is broken and we are looking for a mechanist that is open on Sunday and who is specialist on brakes and it belongs to a special company.

7.1.1.2   Mapping to Service Capabilities

This service would require no new service capabilities beyond the customized service logic. However this service does require access to presence and user profile data and possibly the ability to initiate sessions. Most of this information is generally considered to be private so persons and companies that wish to be found this way need to establish this service is entitled to access their data.

7.1.2   Sweet home Service

7.1.2.1   Introduction to the service

The Sweet Home Service Concept aims to leverage security and confidence feelings about home with home networking technologies (i.e., residential gateways) as an extension of network services including personal data storage, unified mailboxes, cameras, etc.

7.1.2.2   Mapping to Service Capabilities

This service requires no new service capabilities. The Sweet Home Service exists in and around the home and may be reachable by owners either in the home. However if it is to be contacted outside the home, this service will need to have its own Alias to be reachable.

7.1.3   Community Cooperation

7.1.3.1   Introduction to the service

The Community Cooperation Service Concept should be applied to enhance collaboration between different people for work, for education, for leisure and for inter-social relationships.

This concept should provide support to Communities, i.e., people with similar interests, identities, commitment to ideals and beliefs. Communities can be geographically defined (like the Community Communication Networks, City Nets or Digital Cities), or can be Virtual Communities like the Internet Communities. Community Cooperation should provide the means to share resources and information within communities by enabling a more effective way that people can:

- work together;
- play together;
- help each other;
- teach each other;
- worship together;
- do business together;
- campaign together;
- argue together; or
- debate with one other.

7.1.3.2   Mapping to Service Capabilities

This service can be created from the existing Service Capabilities, the existing multimedia session capabilities are already sufficient.

7.1.4   Give me money

7.1.4.1   Introduction to the service

The Give Me Money Service Concept should be applied to promote business opportunities to application subscribers. For example, subscribers can provide their own applications by taking advantage of NGS openness and its programmable interfaces. In such cases, subscribers would be able to apply their creativity to develop and sell their own applications; the Service Provider would play a kind of broker role.

7.1.4.2   Mapping to Service Capabilities

This service requires a couple of things:

1)   Third party service creation leveraging the capabilities in the NGN. The Service Capability model is created exactly for this purpose, so that requirement is covered.

2)   Third party service publishing allowing the third-party service provider to announce their service to the customers of a service provider.

3)   Third party service billing allowing the NGN service provider to bill on behalf of the third-party service provider who will receive their fair share of the charge.

7.1.5   Personal Assistance

7.1.5.1   Introduction to the service

The Personal Assistance (PA) Service Concept should follow the Virtual Personal Assistant metaphor where each subscriber is the owner of a Virtual Entity - its Personal Assistant - existing somewhere in the network. Such an Assistant is:

- accessible from any terminal;

- accessible at any time;

- accessible from anywhere; and

- always available to satisfy the client needs according to his profile.

The Personal Assistant should act on behalf of its owner in an autonomous way to:

- manage communications;

- manage the user's agenda and contact list;

- manage the user's electronic shopping.

The Personal Assistant Concept may be applied to non-individual entities, e.g., Families, Enterprises and Social Communities. In these cases, the assistant would be always available to satisfy family, enterprise or social community needs according to a particular profile.

7.1.5.2   Mapping to Service Capabilities

This service could be implemented as a combination of the following Service Capabilities identified in the present document:

- Logon/Sign-on.

- User presence delivery.

- User location delivery.

- User Profile.

7.1.6   Financial Assistance

7.1.6.1   Introduction to the service

The Financial Assistant would be a more specific Personal Assistant that would give the user assistance in financial matters. It could offer a wide variety of assistance functions, e.g.:

- using fixed or mobile terminals to check accounts, transfer money and pay for goods and services;

- supporting Authentication, Authorization and Accounting (AAA) features for signing transactions;

- support links into software for buying and selling stocks; or

- obtaining statistics and/or professional advice concerning whether to bind the loan interest rate or not, when to buy or sell stocks etc.

7.1.6.2   Mapping to Service Capabilities

This service would combine the same set of service capabilities as the Personal Assistant with the addition of specialized connection to financial transactions.

7.1.7   Virtual presence

7.1.7.1   Introduction to the service

Virtual Presence enables the user to be virtually present at another location, or receive information that is presented in a way augmenting the perception of the situation the user is in or the task the user is performing.

Scenarios where the user is virtually present at another location may have a one-way or two-way direction, and the other location may be in the real world or in the virtual world. In one-way scenarios the user may see or get other sense impressions from the other location, and may navigate and "move around" to do inspections etc. In two-way scenarios the user in addition may cause changes in the other location.

Scenarios where the users perception is augmented may be implemented with computer graphics superimposed with the real world. In this way it seems to the user that the real and virtual objects coexist.

Concepts known from the Virtual Reality and Augmented Reality areas are included in the Virtual presence service concept, and examples of use may be:

- videoconferences;

- telemedicine. For instance specialists following an operation, or performing real-time actions using remotely controlled equipment;

- inspection of installations hardly accessible, for instance subsea oil installations;

- advanced games;

- real-time multimedia intelligence briefings;

- command and control communications;

- theatre meetings;

- training;

- distance learning;

- information dissemination for real-time emergency management preparedness;

- command, control and coordination for real-time emergency management response; or

- other federal, state and local government collaborative work.

7.1.7.2 Mapping to Service Capabilities

This service may be created to from the existing set of service capabilities. However it will require terminal innovations to be implemented. It is unclear if this will require new types of media to be supported.

7.1.8 Device Unify Service

7.1.8.1 Introduction to the service

DUS helps the users to unify all their computing and communication devices in such a way that they can behave as one device with multiple input and output capabilities.

7.1.8.2 Mapping to Service Capabilities

This service seems to be an aggregation of all requirements on the NGN. The service capabilities defined in the present document seem to be sufficient to construct this service.

7.1.9 Residential broadband entertainment

7.1.9.1 Introduction to the service

The provision of residential broadband entertainment and new interactive services (like traditional TV, upcoming Interactive TV services) via IP-based networks (especially over DSL access) focussing on acceptability and quality aspects compared to traditional TV services. Services include:

- Radio.

- On demand services (video and music) with PVR functionalities, online storage and archive function (whereas life events, linear broadcast TV and radio are still important in comparison to on-demand content).

- Near Video on demand services as Time shifted TV.

- Interactive information services.

- Video communication services.

- Internet access.

- Transaction services and E-commerce functionalities.

- A TV broadcast navigation system and EPG (Electronic Programming Guide).

- Individually tailored service and content bundles according to:

    - the users interests; and

    - time flexible access.

The content provided by the services include:

- A broad spectrum of quality content.

- News.

- Movies/TV.

- Sport.

- Entertainment.

- Music; etc.

7.1.9.2 Mapping to Service Capabilities

This service focuses very much on the content. The service capabilities identified in the present document clearly allow this content to be streamed to the end-user.

In Release 2 or later TISPAN may identify also media storage service capabilities and best-effort non-real-time streaming as network services.

7.1.10 Location

7.1.10.1 Introduction to the service

The project focus is on location-based services as information services accessible through mobile phones, PDA and other mobile appliances, that revolve around the known position of a user in space, which is either provided by a telecom operator or by a GPS enabled handset. Applications include emergency services, location of emergency calls, navigation information, location sensitive information screening, lost traveller support, track and trace of people/objects, mobile workers support and schedule, and many others.

The project identifies four categories of location-based services:

- Safety: roadside emergency, accident emergency, fire fighting, public safety vehicle management.

- Billing.

- Information: geo-coding, routing service, mapping, subscription and event notification. And;

- Tracking: People or animal tracking, vehicle theft localization and recovery, public transport scheduling, and packets and fleet tracking.

7.1.10.2 Mapping to Service Capabilities

The location-related Service Capabilities in the present document allow this service to be created.

7.1.11 Connectivity services

7.1.11.1 Introduction to the service

The project focus is on the connectivity services. The generic term connectivity services covers telecommunication products and services, ranging from low level products like dark fibre and bandwidth to more elaborated and complex products like voice traffic and IP-transit. This term includes more or less all the bandwidth and voice products and services and can also be referred to as telecommunication capacity.

As no uniform scheme for the categorization of connectivity services and bandwidth products exists, we will present two complementary approaches. One that looks at the products and services from a purely technological angle and another that puts the emphasis on the splitting of the responsibility between buyer and seller of a service and the added value the buyer gets beyond plain connectivity. As products and services are closely linked - connectivity services make use of bandwidth products and bandwidth products can be upgraded to connectivity services and there is no clearly defined separation anyway - we will use these categorizations in parallel in the project.

7.1.11.2 Mapping to Service Capabilities

The communication-related and media-related Service Capabilities in the present document allow this service to be created.

7.2   Services from IST projects

7.2.1   "On-line" guide for tourists

7.2.1.1   Introduction to the service

The development of an advanced 3G mobile application, that will act as an "on-line" guide thanks to the new multi-media capabilities of the cellular phones. Visitors will be provided with enriched and personalized information on monuments and places of interest. Agamemnon will drive them through a personalized itinerary, created according to their interests and time available. The system will be also capable of recognizing specific monuments through the pictures taken by visitors with their mobile phones cameras. Agamemnon will also contribute to optimize the visit path (avoid over-crowding situations) and to the preservation of the site by sending images taken by visitors to site guardians.

The final prototype, available at mid 2006, will be capable of:

- Relay on existing 3G phones and networks (i.e. UMTS, GPRS, etc.).

- Image analysis technology to identify users attention.

- Personalized information delivery based on users attention and profile, leveraging on 3G services.

- Advanced user profiling based on static questionnaires and unobtrusive dynamic human behaviour/preferences analysis.

- Profile-based, adaptive and proactive visit scheduling, also considering overcrowding avoidance analysis.

- Voice-based commands interaction.

- Active role played by the visitors in preserving the cultural heritage through specifically tagged pictures taking.

NOTE: This service has commonalities with "Meet me" (see clause 7.1.1); instead of looking for a car mechanic you are looking for a monument.

7.2.1.2   Mapping to Service Capabilities

This service is another example of how adding extra service logic to the base capabilities may produce interesting services. The Service Capabilities identified in this deliverable can serve as a basis for this service to be created. However the capabilities like Image analysis technology to identify users attention and Profile-based, adaptive and proactive visit scheduling, also considering overcrowding avoidance analysis or Voice-based commands interaction are currently not part of the R2 service capabilities.

7.2.2   Virtual Science Thematic Park

7.2.2.1   Introduction to the service

An advanced learning environment will be developed, the CONNECT Virtual Science Thematic Park, in order to act as the main "hub" of all resources available in the CONNECT network of science parks, science museums and research centres. The Virtual Science Thematic Park will serve as distributor of information and organizer of suitable educational activities. It will incorporate all the innovative use of the technology for educational purposes and will also interconnect all the members of the network. It will also organize the procedure of students" both virtual and conventional visits to the science museums and thematic parks. These visits will fulfil (through an informal but yet structured way) main pedagogical aims of the official curriculum. The Virtual Science Thematic Park will include two major components:

- the mobile AR system (mobile unit) which the visitor will wear during his/her visit; and

- the CONNECT platform which will facilitate the virtual visits to the museums and science parks.

NOTE: Also this project shows commonality with "Meet Me".

7.2.2.2   Mapping to Service Capabilities

This service is another example of a third-party service that can use the NGN Service Capabilities but does not require to be part of it. This service will require from the NGN the ability to connect to the service, and receive the information collected in the Virtual Science Park, the existing capabilities seem to be sufficient to achieve that.

7.2.3   Digital Libraries

7.2.3.1   Introduction to the service

Digital Libraries have been made possible through the integration and use of a number of IC technologies, the availability of digital content on a global scale and a strong demand for users who are now online. They are destined to become essential part of the information infrastructure in the 21st century.

The DELOS network intends to conduct a joint program of activities aimed at integrating and coordinating the ongoing research activities of the major European teams working in Digital Library - related areas with the goal of developing the next generation Digital Library technologies. The objective is to:

- define unifying and comprehensive theories and frameworks over the life-cycle of Digital Library information; and

- build interoperable multimodal/multilingual services and integrated content management ranging from the personal to the global for the specialist and the general population. The Network aims at developing generic Digital Library technology to be incorporated into industrial-strength Digital Library Management Systems (DLMSs), offering advanced functionality through reliable and extensible services.

The Network will also disseminate knowledge of Digital Library technologies to many diverse application domains. To this end a Virtual Digital Library Competence Centre has been established which provides specific user communities with access to advanced Digital Library technologies, services, testbeds, and the necessary expertise and knowledge to facilitate their take-up.

Other important objectives are:

- to network and structure European Digital Library - related research in order to consolidate an emerging community;

- to provide a forum where researchers, practitioners, and representatives of interested applications and industries can exchange ideas and experiences;

- to promote an exchange programme towards improving international cooperation in Digital Library research areas.

7.2.3.2   Mapping to Service Capabilities

This service is another example of a third-party service that can use the NGN Service Capabilities but does not require to be part of it. This service will require from the NGN the ability to connect to the service, and receive the information collected in the libraries, the existing capabilities seem to be sufficient to achieve that.

7.2.4   Exchanging audiovisual content

7.2.4.1   Introduction to the service

The services identified in ePerSpace are:

- The exchange audiovisual content between user terminals and home equipment.

- Innovative seamless access by sharing user profiles in a secure manner.

- Home and Personal Devices building unified personal environments. And;

- Rich Media Object Management supplying the tools for content creators to make optimal use of the infrastructure.

7.2.4.2 Mapping to Service Capabilities

The NGN service capabilities seem to support this service well. However one must be aware that very rich content or production-quality video requires much bandwidth and low latency. TISPAN needs to investigate in Release 2 if this has impact on the Service Capabilities.

7.2.5 New media for new millennium

7.2.5.1 Introduction to the service

New forms of storytelling to develop that are uniquely suited to the characteristics of digital distribution via broadband. By utilizing the unique characteristics of digital broadband networks, the new media will engage our attention in original and compelling ways.

NM2 is about creating a variety of new media genres using all of the facilities of modern broadband communication and interactive terminals. The project will create new production tools for the media industry that will allow the easy production of non-linear broadband media that can be personalized to suit the preferences of the individual user. Viewers will be able to interact directly with the medium and influence what they see and hear according to their personal tastes and wishes.

7.2.5.2 Mapping to Service Capabilities

This service is another example of a third-party service that can use the NGN Service Capabilities but does not require to be part of it. This service will require from the NGN the ability to connect to the service, and receive the information collected in the stories, the existing capabilities seem to be sufficient to achieve that.

7.2.6 Dynamic and configurable harmonized services for the mobile user

Among the objectives of the MobileIN project we can find:

- To define and develop a novel set of advanced, future-proof, dynamic and configurable harmonized services for the mobile user and worker by taking full advantage of heterogeneous service infrastructures (Intelligent Network Services, Mobile Network Services, VoIP Services) and architectures (SIP, VoIP, VHE, etc).

- To specify, implement and demonstrate standardized, but to date, unrealized PSTN and PLMN services e.g., INAP CS2 (EN 301 140 series [14]), INAP CS3 (EN 301 931 series [15]) and INAP CS4 (EN 302 039 series [18]).

- To specify, design and develop mobile terminal applications for the MobileIN services utilizing state-of-the-art technologies like J2ME/J2EE, Symbian O/S, Windows CE, MExE etc.

- To specify, design and develop an open service creation and execution framework enabling the provision, execution and discovery of MobileIN services across several domains and the coordination of MobileIN application servers and Open Access Gateways.

- To analyse existing PSTN/IN and PLMN/CAMEL infrastructures, protocols and services, and identify essential but at the same time, minimum enhancements needed to boost the deployment of unrealized services from Capability Sets 2-4 at minimum cost and time. Also, to accommodate the provisioning of new harmonized ones for heterogeneous domains. To enhance existing services with new features to accommodate emerging technologies and networks (SIP, VoIP, VHE etc). And;

- To analyse the status of OSA APIs and respective mappings from ES 201 915 series [16] and TS 129 078 [17] related to IN and CAMEL protocols (INAP, CAP etc). To propose enhancements and additions to existing APIs and contribute towards the definition, specification and standardization of OSA/Parlay mapping documents for IN and CAMEL networks.

NOTE: It is expected that this project will be considered by 3GPP and the other relevant bodies and adapted to TISPAN NGN in later releases.

7.3 Services from Celtic projects

7.3.1 Tele Immersion service

7.3.1.1 Introduction to the service

The development of a tele-immersion application which will permit users to have the realistic feeling of being physically in front of each other, interacting in a natural way and having both the possibility of handling, in addition, 3D objects or visualizing a 3D animation embedded in their virtual environment, or having other advanced possibilities such as interacting with labs tools.

7.3.1.2 Mapping to Service Capabilities

Such an immersion service will require a service with more video streams (at least one per eye) and possibly some tactile feedback media stream. The current Service Capability Structure will support this as is shown below.
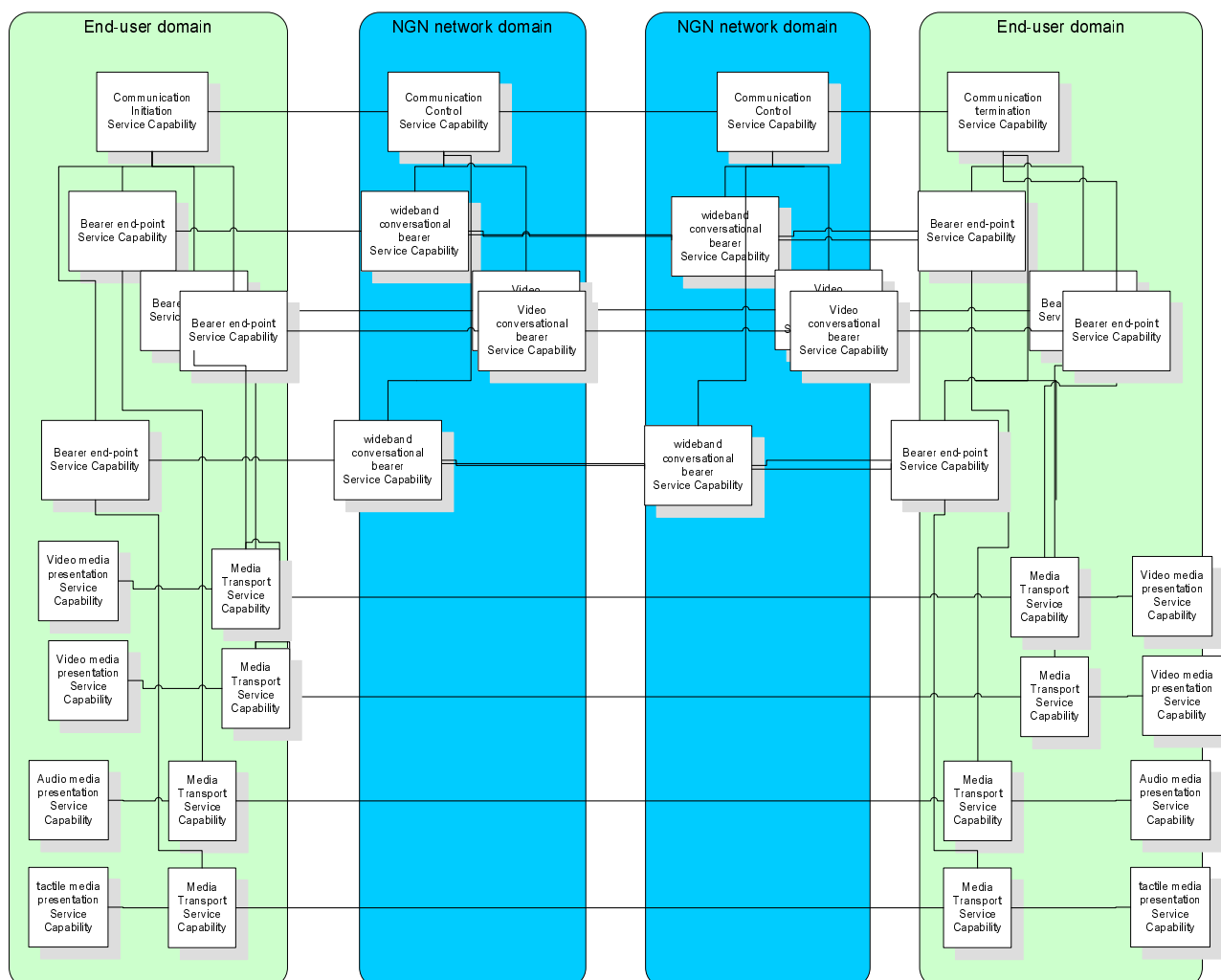

Figure 19: Tele-immersion service

7.3.2   Automation/supervision as a continuous integrated service

7.3.2.1   Introduction to the service

EURO-HOME defines home automation/supervision as a continuous integrated service rather than a set of standalone applications and provides the framework and the essential components for the creation of such a service and its adaptation to specific client environments and requirements.

EURO-Home's platform will have the following novel features:

- It will be independent user equipment and of access and core network technologies.

- It will allow users easy access to their residential services even while they are away from home - travelling or in a new environment.

- It will facilitate the creation and flexible deployment of a wide variety of services, both present and future.

EURO-Home's service platform will able to host a large variety of complex services.

EURO-HOME will use state of the art techniques such as intelligent agent, semantic web and GRID technologies, to more forward decisively from the work of other EU-IST and EUREKA projects in order to meet the rapidly rising expectations of the residential consumer for flexible, easy to use services. EURO-HOME expects to make a strong contribution to emerging standards for residential networks.

7.3.2.2   Mapping to Service Capabilities

This service requires the user to be able to the reach their homes while travelling. The NGN security services may block this service if it does not use the NGN communication session service capabilities to set-up its communication. The service is unclear about the kinds of media it will communicate so it may require the NGN equivalent of an unrestricted codec.

7.3.3   High bandwidth gateway for emergency services

7.3.3.1   Introduction to the service

The project will develop a deployable high bandwidth gateway for emergency services accompanied with applications. The gateway will extend high capacity data communication through the use of existing radio technology. The deployable gateway will be used in addition to the low bandwidth voice and data systems already deployed by the emergency services. The innovative aspects will be in terms of the applications, control, management and security for the communication resources. From a service perspective, the innovative aspects will be ability to thoroughly demonstrate and pilot high capacity services for the emergency services.

The foundation for the project is interaction with user communities, so the functional requirement for the overall architecture and for the gateway itself is based on their needs. The usability of the concept will be demonstrated with trials aimed at the user community. The project will utilize and interact with other existing European projects within the emergency services, in particular the Widens and the Oasis project. Several of the project partners participate in one or more of these, and the will extend the knowledgebase from these project. In addition, public available demonstrators from the Widens projects will be extended in the planned demonstrations.

7.3.4   Multimedia Communication Service

7.3.4.1   Introduction to the service

The project targets the development of an integrated solution for multimedia conversational services, focusing on end to end delivery to the user. The project will handle three main aspects:

- Services: the target is to build a platform which allows seamless usage of new increased services addressing the needs of interpersonal communities, such as Videotelephony, Presence and Reachability Management, Local and Network Address Book or Multimedia Messaging.

- Terminals: in order to address the residential market, simple and affordable multimedia terminals are needed. They must interoperate with the Next Generation Networks (NGN) architecture and protocols. Key functions need to be implemented in order to offer the services described above with the adequate quality and sufficient ergonomics.

- Terminals will be SIP (Session Initiation Protocol) based. Network: in parallel to the growing demand for multimedia services, the different actors involved in the model will face very important issues, such as guaranteed quality of service, resource management, security, privacy, regulations constraints or nomadic communication, which allows a user to activate.

7.3.4.2   Mapping to Service Capabilities

This service has been explained thoroughly in clause 6 of the present document.

7.3.5   Adaptative Portals in the fixed and mobile environments

7.3.5.1   Introduction to the service

Dynamic personalized and customizable portal in the fixed and mobile environments where the user can benefit from multiple content and web services can interact and spawn new services or content.

7.3.5.2   Mapping to Service Capabilities

This service is another example of a third-party service that can use the NGN Service Capabilities but does not require to be part of it. Even if this portal is to be deployed by the NGN operator, this may be best deployed as-if it was a 3rd party application on top of the NGN for flexibility and operational reasons.

Annex A:
Service Capabilities and TISPAN suggested process

A.1   TISPAN process

TISPAN considers a wide range of complex technology issues arising from the inter-working of differing and independently evolving network technologies. The TISPAN process therefore comprises two distinct stages. The first stage is concerned with establishing a fixed set of requirements to be worked on and in doing so defines the scope of a TISPAN Release. Whilst the second stage is concerned with developing a coherent set of specifications from a fixed set of requirements for a specific TISPAN Release, as shown in figure A.1.
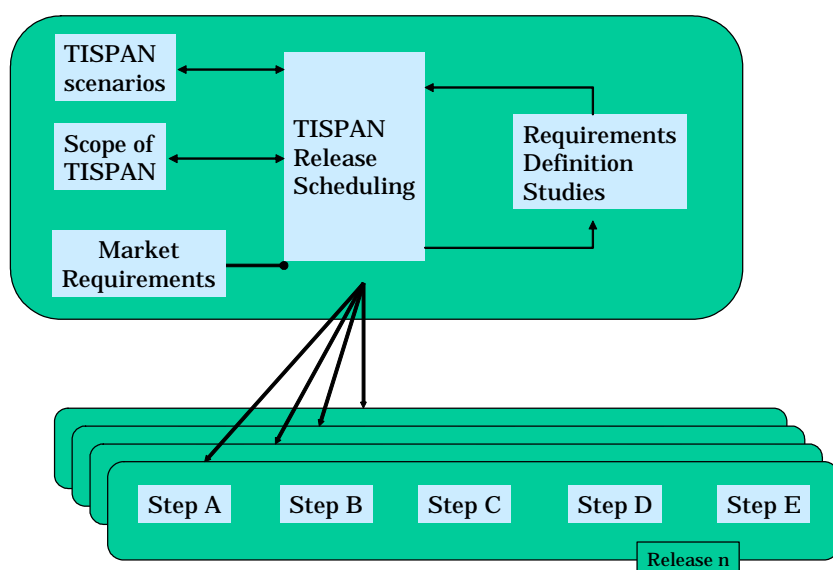
Figure A.1: Overview of the TISPAN process

A.1.1   Release Schedule

TISPAN works towards its goals from clearly stated and expressed requirements derived from three sources; scope, the usage scenarios and specific market requirements. Where an aspect relevant to TISPAN cannot be clearly stated or is insufficiently understood from these three sources, a TISPAN Requirements Definition Study (RDS) may be required before these aspects can be considered for incorporation within a Release. A Requirements Definition Study considers various aspects of a given topic as is appropriate and produces a qualified set of requirements relating to the topic as a result. The project will therefore be constrained to working on a clearly understood, scoped and qualified set of requirements within each Release whilst having the ability through Requirements Definition Studies to adapt to a continually changing environment.

A.1.2   Step A - Release Definition

As shown in figure A.2, a Release shall be constructed from a set of qualified requirements that can be progressed through to a coherent and focussed set of specifications of the necessary quality within an acceptable period of time. The Release definition shall comprise a statement of the top-level topics to be addressed within a specific release and the declaration of a plan with the identification of the associated work items.

It is very important to explicitly document pre-requisites at this point in time. Assumptions such as technologies that the system is to be compatible with or build upon are to be documented explicitly here as well as the reasons for those requirements. Such as; "This release will re-use IMS as we expect a significant time saving in getting the present document to the market" or "this release will support the interworking with deployed PSTN networks".
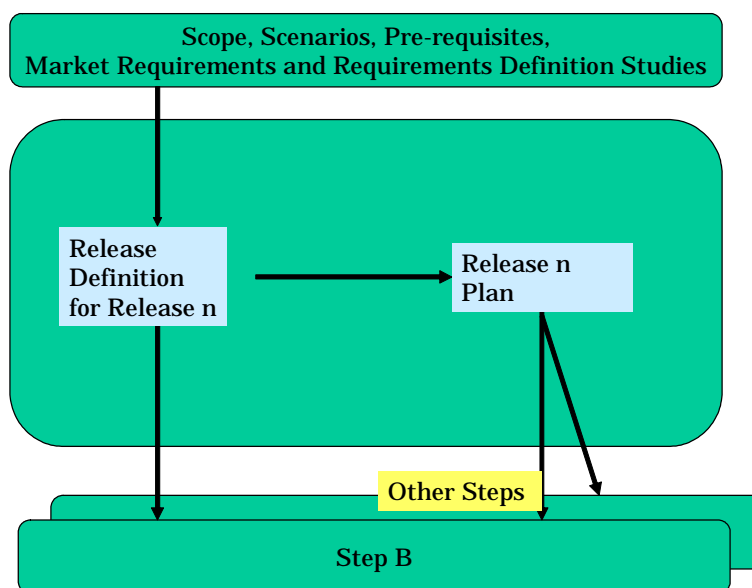

Figure A.2: Step A - Release definition in TISPAN

# A.1.3   Step B - Capabilities and Requirements

Based upon the information contained and referenced by a TISPAN Release Definition, Step B will develop appropriate Service Capability Definitions and associated Statements of Service Independent Requirements. These aspects of the process draw upon but are not constrained by the stage 1 elements of the ISDN three stage process..

Step B Service Capability Definitions, indicated in figure A.3, specify the core components expected from the network technology and associated management technology and processes to deliver the functions specified for the Release. Additionally, it is inevitable that there will be aspects implied for a Release that cannot be defined within a Service Capability Definition; these requirements will be captured in a Statement of Service Independent Requirements for the associated Release.
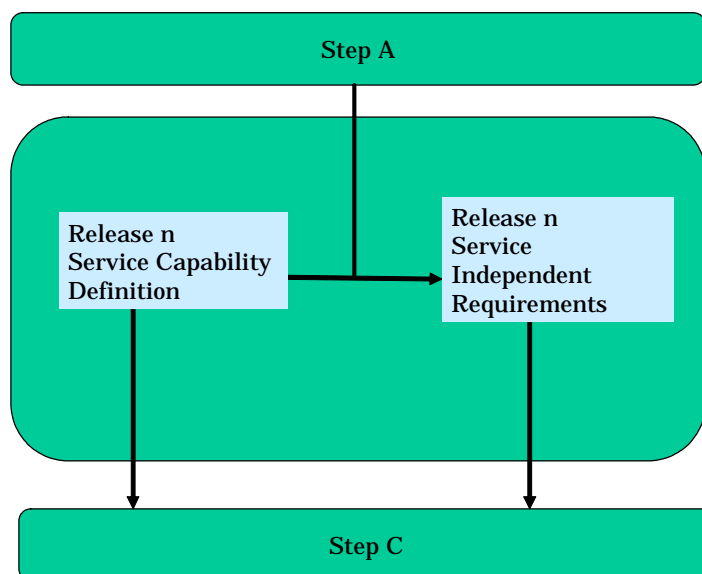
Figure A.3: Step B - Release capability definition

End services are understood to mean functionality provided by service applications set in a commercial context (see figure A.4). It is therefore not the purpose of TISPAN to specify services; rather the scope is to address the needs of how service applications can be constructed from sets of functionality. In line with the approach adopted by Third Generation networks, the focus is on the definition of User and Network Capabilities that may be assembled into Service Capabilities. Whilst the support of Third Generation Network services is seen as desirable, such support is not a mandatory requirement of the process.
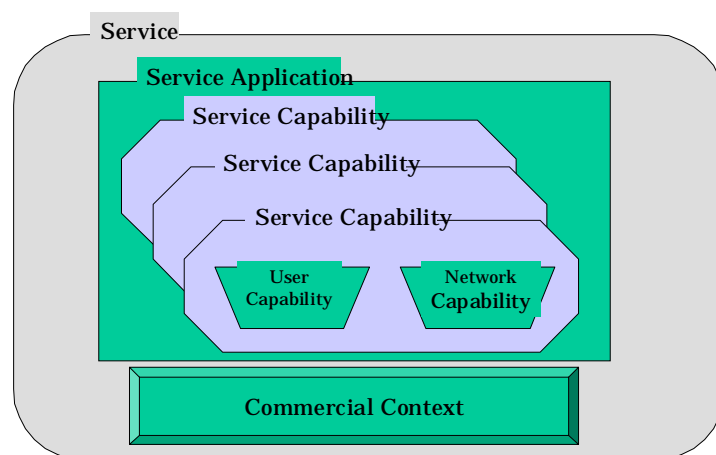
Figure A.4: Services and service capabilities

A.1.4 Step C - Reference Architecture

The outputs from both Step A and Step B form the source documents for Step C that develops a Reference Architecture in support of the Release. The Reference Architecture is developed independently of underlying technology issues where possible and represents a static design for the Release. In support of the Reference Architecture, Management and Network Information flows are developed to express the dynamic behaviour of the system (see figure A.5).
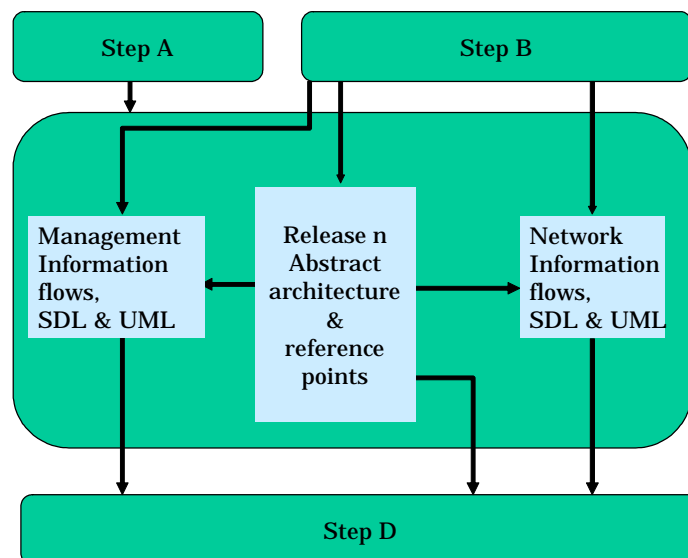
Figure A.5: Step C - Development of the reference architecture

A.1.5   Step D - Implementation Framework

For a given Release, the reference architecture and associated network and management information flows will be mapped into individual protocol and management frameworks, as indicated in figure A.6. The frameworks identify key interfaces and establish requirements for information flows over each interface. These frameworks are the essential means by which the specification development remains protocol neutral to the last point- ensuring that the complex inter-working issues addressed by the project can be fully explored independently of technology constraints. Once the interface requirements have been produced, they can then be mapped into a given technology through technology mapping and compliance definitions.
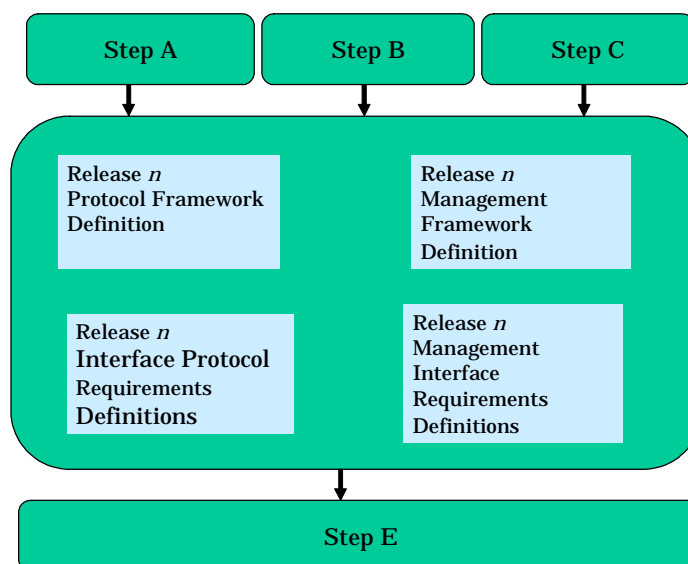

Figure A.6: Step D - Implementation framework

For the network technology elements, the Protocol Framework is developed to provide an identification of the key interfaces required in a system that is compliant with the specific Release. For each interface identified, detailed requirements state the behaviour that is to be provided across the interface.

A.1.6   Step E - Technology Mapping and Verification

Once completed, the interface definitions are then mapped into the technologies supported by that release of the TISPAN. This is achieved by providing an appropriate profile of the technology for a given interface, as shown in figure A.7. Where a technology fully meets the requirements for a specific interface, a protocol profile will be produced for that protocol which defines its use in implementing that interface. However where a specific technology does not support the required functionality, the mapping will not be able to generate a profile - as shown in the case of Technology A in figure 9 for interface "q". For such cases, the requirements identified for the interface may be used as the basis of extensions to the technology in question.
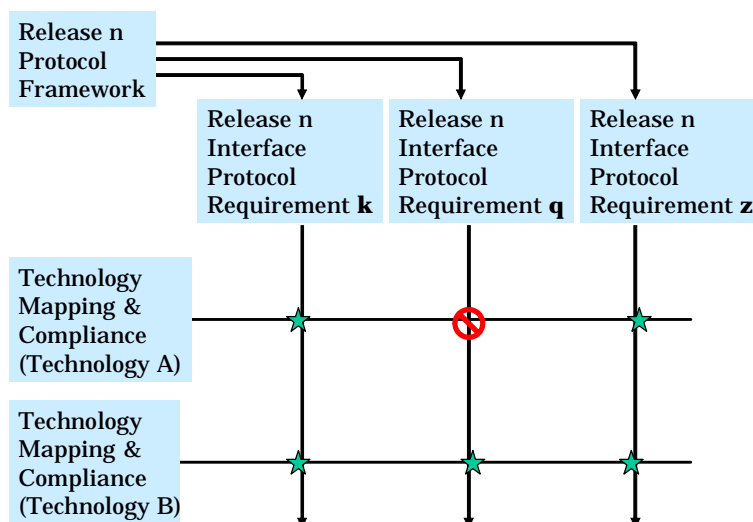

Figure A.7: Step E - Network technology mapping

In a similar manner, the Management Framework is developed and mapped via Management Interfaces onto supporting technologies as shown in figure A.8. As with the Network Technology Framework, the process of mapping will expose any deficiencies in the underlying technology. In the example shown, Technology A is found to meet the requirements for Management Interfaces "k" and "z" but does not meet the requirements for interface "q". This contrasts with Technology B which is able to meet the requirements for all three interfaces shown through appropriate profiles as indicated.
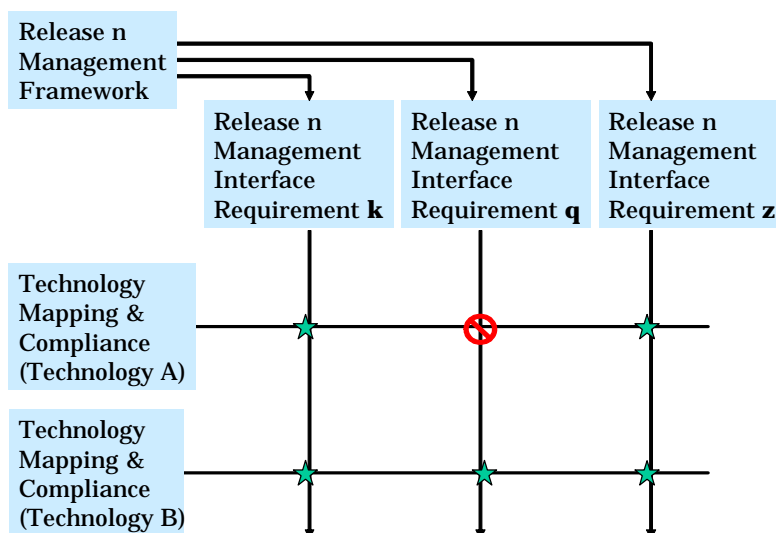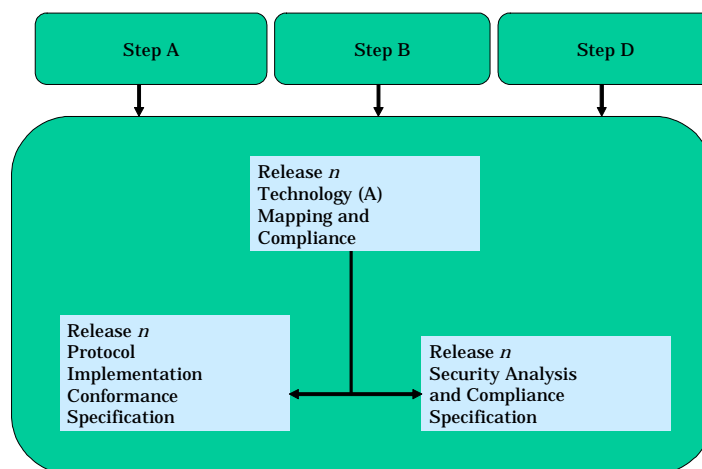

Figure A.8: Step E - Management technology mapping

Having developed the Network Technology and Management Frameworks and mapped them to specific technologies, appropriate Protocol Implementation Conformance Specifications must be constructed to ensure the profiles are implemented correctly.

Figure A.9: Step E - Conformance specifications and security analysis

The final element of Step E is to complete the security analysis and compliance specification for the Release acts as a final check on the Release to ensure security and integrity issues have been correctly addressed. This is illustrated in figure A.9.

A.1.6.1   Endorsement of standards from other standards bodies and industry groups

When a document from either ETSI or a 3rd party is normatively referenced in an ETSI specification the parts of the document referred to become normative to the subject document and are thus endorsed by reference. This method of endorsement may be most suitable when a 3rd party document, such as one from 3GPP, only applies in specific areas.

A.1.6.2   Approach to analysis

The approach to analysis taken for the present document is as follows:

- Identification of NGN R1 requirements from TS 181 005 [5].

- Identify the endorsement work already undertaken in the TISPAN WGs.

- Comparison of remaining requirements to capabilities offered in third party or external specification.

- Identification of gaps ("Gap analysis").

- Stimulate discussion with other standards group through the working groups while the updates are not yet cast in stone.

- Identify if the proposed updates have aspects that need to be brought to other standards groups in relation to this spec (such as IETF for IMS).

- Discuss updates in WG3 and get a company delegate assigned to bring the CR to other group.

A.1.6.3   Model of analysis method

The flowchart presented in figure A.10 and in table A.1 define the analysis approach to be used in determining if endorsement of external specifications is required.
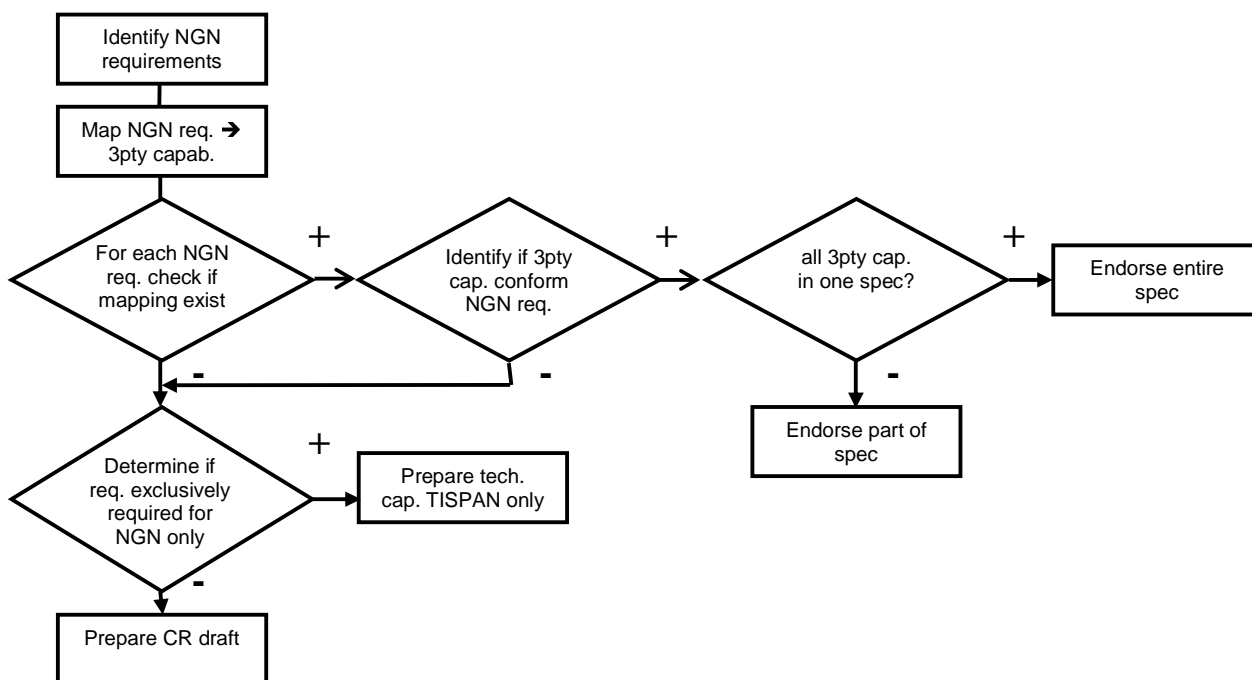
Figure A.10: Endorsement flow chart

Table A.1: Endorsement flow chart activities

Endorsement analysis phase	Activity	Methods
1	identify NGN requirements	Use cases, Stage 1, Stage 2
2	Catalogue NGN requirements	Database, text document
3	Mapping to 3rd-party capabilities	Manual inspection
4	Document 3rd party capability to NGN requirement mapping	Database, text document reference
5 (see note)	Identify if CR is necessary	
6	Identify if scope of CR is acceptable to both other body and TISPAN	Joint agreement
7	If 6 is true prepare CR for other body document	
8	If 6 is true prepare new TISPAN specification	
NOTE: All endorsements require at least one CR to extend the scope of IMS documents to apply to TISPAN NGN.		

If a mapping exists determine how fully it meets the NGN requirement. Capabilities which can be extended to suit both NGN and the other body need to be developed as CRs and agreed to by both TISPAN and the other body (this acts as *endorsement* of the change). If the capabilities of 3rd party spec fully meet the requirements of TISPAN and other body it is still necessary to agree (*endorsement*) to a change in the present document to clarify that the capability is not restricted in scope. If a change is required that is only supported and necessary for TISPAN then it should be developed as a separate TISPAN specification with the agreement of both the other body and TISPAN (again this is the *endorsement* activity).

A.2   Deliverables for TISPAN Releases

Each step of the TISPAN process has one or more associated deliverables that contribute to the formal TISPAN Release documentation set. To assist identification, it is recommended that the title of each document start with "TISPAN Release n: ", where n is the number of the TISPAN Release. Note that in the following clauses, the bracketed text following each bullet contains the suggested document type for each deliverable with TR representing Technical Report and TS representing Technical Specification. Note that this is a non-exhaustive list of deliverables and a specific Release may adopt the general framework of deliverables as is appropriate.

A.2.1   Deliverables for Step A

Step A comprises:

- Release Definition (TR).

- Release Plan (TISPAN Permanent Document).

A.2.2   Deliverables for Step B

Step B comprises:

- Service Capability Definition (TR).

- Service Independent Requirements Definition (Release Specific and Core requirements) (TR).

A.2.3   Deliverables for Step C

Step C comprises:

- Functional Architecture Definition (TR).

- Information Flow and Reference Point Definitions (TS).

A.2.4   Deliverables for Step D

Step D comprises:

- Protocol Framework definition (TR).

- Interface Protocol Requirements definitions (TS).

- Management Framework definition (TR).

- Management Process Requirements definitions (TS).

A.2.5   Deliverables for Step E

Step E comprises:

- Technology Mappings (TS).

- Technology Compliance Specifications (TS).

- Security Analysis and Compliance Specification (TR).

- Release Protocol Implementation Conformance Specifications (TS).

A.3   Relationships between process steps and TISPAN WGs

A.3.1   Roles of TISPAN Working Groups in the Process

The main elements of the process are concerned with establishing requirements for inter-working networks and developing frameworks for protocols and management solutions based upon a technology independent Reference Architecture. In support of this core process, specialist groups will be required to address detailed issues in depth.
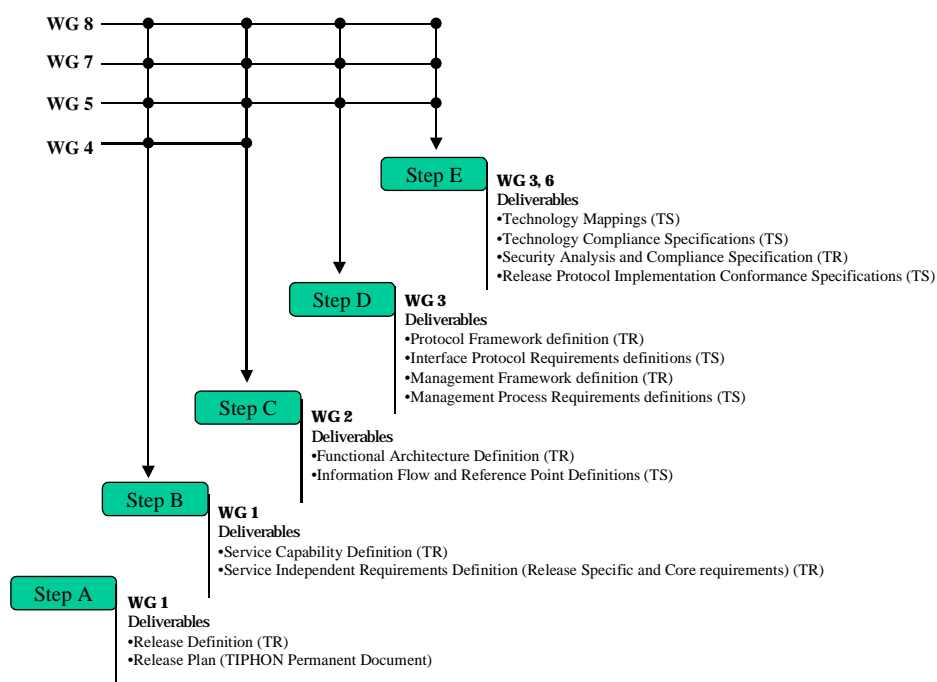
Figure A.11: Process steps and work group allocation in TISPAN

The TISPAN working groups can therefore be mapped onto the process as shown in figure A.11 as follows:

- Step A - WG1.

- Step B - WG1.

- Step C - WG2.

- Step D - WG2.

- Step E Technology Mapping - WG3.

- Step E Protocol Implementation - WG3.

- Step E Conformance - WG6.

- Step E Security Analysis & Compliance - WG7.

The work of the above groups is expected to be supplemented by the other TISPAN working groups are follows:

- WG4 - is expected to contribute into WG1 (Step B) and WG2 (Step C).

- WG5 - is expected to contribute into WG1 (Step B), WG2 (Step C) and WG3 (Step D and Step E).

- WG7 - is expected to contribute into WG1 (Step B), WG2 (Step C) and WG3 (Step D and Step E - Technology Mapping & PICS).

- WG8 - is expected to contribute into WG1 (Step B), WG2 (Step C) and WG3 (Step D and Step E).

A.4   Requirements Definition Studies

A.4.1   Introduction

Requirements Definition Studies are expected to be a flexible route to TISPAN adapting its work to meet the continuing changes in the market place without engaging in inconclusive debate. They may be initiated within any working group within the project to explore aspects requiring further study. Ideally they should be timed to deliver requirements into a TISPAN Release.

A.4.2   Headings for Requirements Definition Studies reports

The following are suggested as headings for and RDS document:

- Issue statement - defines the problem being considered and stating why it is important and relevant to TISPAN.

- Issue scope - declares the bounds of the problem being considered to focus the work of the study.

- Discussion - considers the various aspects of the problem and identifies those aspects that are relevant to TISPAN, stating core requirements derived from the discussion.

- Conclusions, Results and Recommendations - states the key findings of the study, making recommendations as to how the problem considered can be addressed and identifying requirements that should be adopted within a TISPAN Release as appropriate.

When considering structuring an RDS, it is important to remember that the study period from initiation to completion of work should be as short as possible. It is not intended that RDS deliverables should be used for open-ended work.

A.5   Technology Mapping and Compliance

A.5.1   Mapping and Compliance

For each interface identified in the framework, a protocol profile shall be generated for each technology defined within the scope of TISPAN as stated in the Release Definition. The profile shall state in an unambiguous manner how the specific protocol should be used in terms of elements of procedure and protocol data elements.

Where a protocol cannot meet the requirements identified, the protocol mapping should clearly indicate the non-conformance. The requirements that have not been met should be stated in a manner such that the developers of the technology can establish the deficiency and determine any necessary corrective action that needs to be taken.

Annex B:
Areas for further study

This annex lists areas that require further study.

B.1 Dynamic and configurable harmonized services for the user

The objectives of this project are to define and develop a novel set of advanced, future-proof, dynamic and configurable harmonized services for the NGN user by taking full advantage of heterogeneous service infrastructures (Intelligent Network Services, Mobile Network Services, VoIP Services) and architectures (SIP, VoIP, VHE) etc. (see clause 7.2.6).

It is expected that this project will be considered by 3GPP and other relevant bodies and adapted to TISPAN NGN in later NGN releases.

B.2 High bandwidth gateway for emergency services

This CELTIC project will develop a deployable high bandwidth gateway for emergency services accompanied with applications. The gateway will extend high capacity data communication through the use of existing radio technology. The deployable gateway will be used in addition to the low bandwidth voice and data systems already deployed by the emergency services. The innovative aspects will be in terms of the applications, control, management and security for the communication resources. From a service perspective, the innovative aspects will be ability to thoroughly demonstrate and pilot high capacity services for the emergency services (see TR 181 003 [1], clause 5.3.3).

The foundation for the project is interaction with user communities, so the functional requirement for the overall architecture and for the gateway itself is based on their needs. The usability of the concept will be demonstrated with trials aimed at the user community. The project will utilize and interact with other existing European projects within the emergency services.

A high bandwidth gateway for emergency services might be specified by TISPAN NGN for later NGN releases.

B.3 Media

Whether the QoS aspect of the following Service Capabilities meet the requirements needs further study (see clause 5.6):

- Bidirectional Narrowband conversational voice streaming.

- Bidirectional Broadband conversational audio streaming.

- In-call/session events.

- Unidirectional audio streaming.

- Unidirectional video streaming. And;

- Bidirectional conversational video streaming.

B.4 Video quality

The following parameters are taken into account: Overall Delay, Delay Variation, Differential Delay between sound and image, Sound Quality, Image Quality, Echo Cancellation, Sensitivity to Packet Loss, etc. The definition of video quality profiles requires further study (see TR 181 003 [1], clause A.3.3).

B.5 "On-line" guide for tourists

There exists a whole class of services that depend on precise location (e.g., standing before a monument). If there exist several monuments close by, even the direction of attention would be required. Such information opens a large discussion on privacy (see clause 7.2.1).

TISPAN needs to identify whether such service capabilities should be generically available or that they should be classified as specific to a particular service logic.

NOTE: There also exist novel services that make use of location as derived from the location of a mobile terminal; privacy issues exist also here but to a lesser extent.

B.6 Miscellaneous

B.6.1 Third party service publishing

Service publishing has not had much attention in TISPAN but should be studied further by TISPAN NGN for later NGN releases; such service publishing has the potential to generate revenues for the NGN provider, the third party service publishing provider, and the third party service provider (see clause 7.1.4).

B.6.2 Third party service billing

Service billing has not had much attention in TISPAN but should be studied further by TISPAN NGN for later NGN releases. This is one means by which charges for third party service provision could be collected (see clause 7.1.4).

B.6.3 Financial Assistance

At the moment financial transactions are not part of the work of TISPAN. Nevertheless, TISPAN needs further study to decide whether standardization of financial transactions (or some aspects thereof) might fall into the realm of NGN providers (see clause 7.1.6).

B.6.4 MMS sender identification and restriction

The Service Capabilities derived from TISPAN release 1 service MMS might be incomplete (MMS sender identification and restriction may be missing; see TR 181 003 [1], clause A.4.1). This requires further study.

History

Document history		
V1.1.1	March 2006	Publication