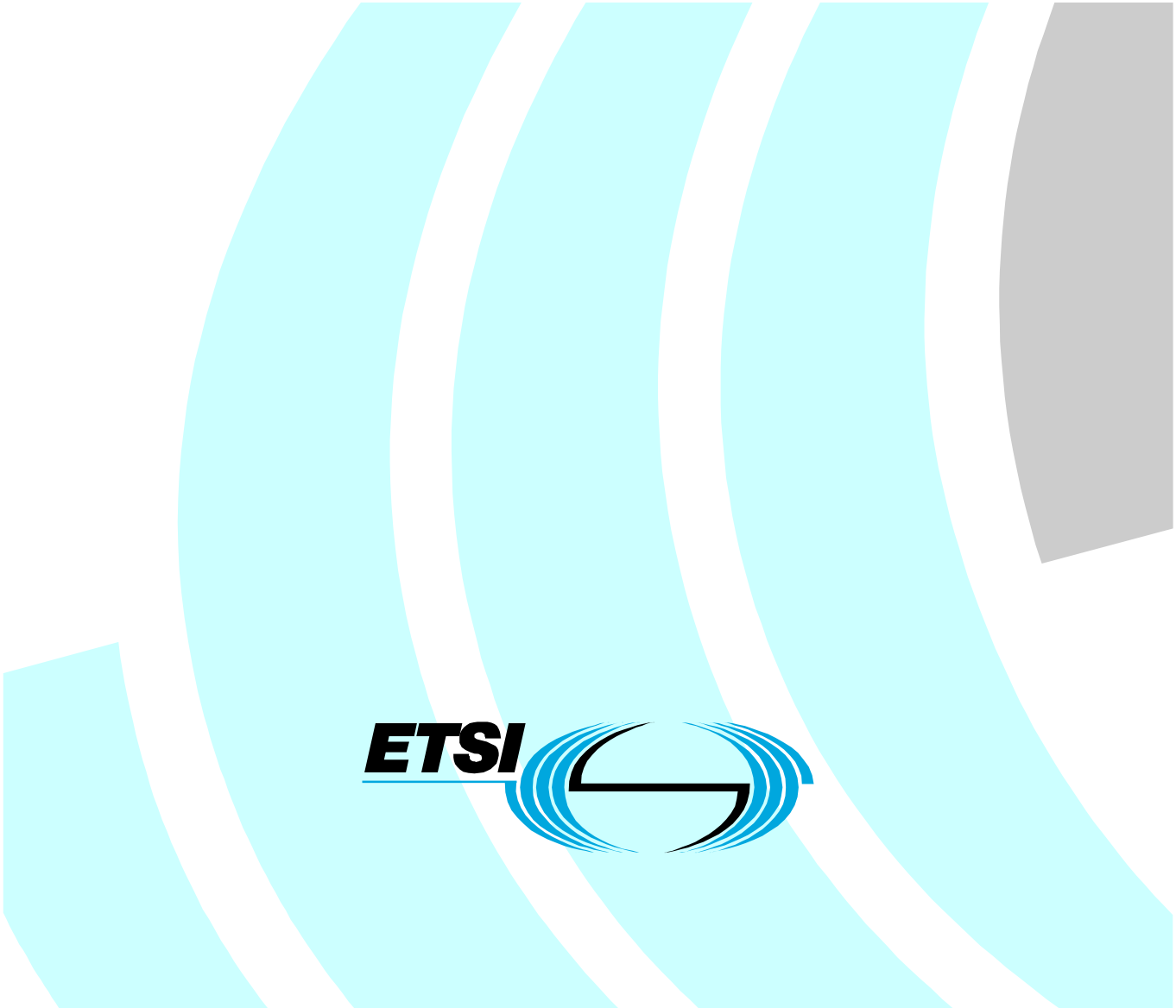
ETSI TS 101 315 V4.1.1 (2003-11)

Technical Specification

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Information flow and reference point definitions; Implementation of service capabilities



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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

1 Scope

The present document specifies how the service capabilities as defined in TS 101 878 [1] can be used to synthesize examples of TIPHON simple call, call diversion on busy and call completion on no reply.

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
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Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1] ETSI TS 101 878 (V4.1.1): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Service Capability Definition; Service Capabilities for TIPHON Release 4".

[2] ETSI TS 101 314 (V4.1.1): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Abstract Architecture and Reference Points Definition; Network Architecture and Reference Points".

[3] ETSI TS 101 882-1: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 1: Meta-protocol design rules, development method, and mapping guideline".

[4] ETSI TS 101 315 (V1.1.1): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Functional entities, information flow and reference point definitions; Guidelines for application of TIPHON functional architecture to inter-domain services".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

bearer: logical association of functional entities in an IP telephony application and transport network which creates an end to end media flow for no longer than the duration of a call

domain: collection of physical or functional entities within an administrative domain which share a consistent set of policies and common technologies

Domain Identifier (DID): globally unique identifier of a domain

NOTE: Domain identifiers may be mapped to the IP Telephony Administrative Domain (ITAD) Numbers, registered by IANA and used by the TRIP Protocol.

end-user: entity using the services of an IP telephony service provider or transport network operator

end-user domain: collection of physical or functional entities under the control of an end-user which share a consistent set of policies and common technologies

functional entity: entity in a system that performs a specific set of functions

Functional Group (FG): collection of functional entities within a domain

NOTE: In TIPHON systems functional groups are used to structure the necessary functionality to offer IP telephony services across domains.

gateway functional group: functional group containing the functionality of a network functional group also the functionality necessary to connect calls to the SCN

NOTE: Gateway functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

home network functional group: functional group, which is aware of the service application subscribed to by the end-user

NOTE: Home network functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

intermediate (transit) network functional group: functional group connecting the serving network functional group to the home network functional group

NOTE: The intermediate network functional grouping is only present when the serving network functional grouping and the home network functional grouping are not directly connected.

information flow: interaction between a communicating pair of functional entities

interconnection function: functional entity connecting two networks having differing administrative policy such as Quality of Service (QoS) or addressing policy but employing the same signalling protocol, and transport technology, at the point of interconnect

interface: shared boundary between two communicating systems, devices or equipment

IP network: packet transport network comprising one or more transport domains each employing the IP protocol

IP telephony: any telephony related service that is supported on a managed IP network

IP telephony service provider: service provider who offers IP telephony services

NOTE: The same business entity may act as both a transport network operator and an IP telephony service provider.

network functional group: functional group containing the functionality required to establish a call between two terminals, a gateway and a terminal, or two gateways

NOTE: network functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

packet flow/transport flow: stream of packets of the same type identified by common address and port numbers

NOTE: The stream may contain either signalling information or content description together with media information.

protocol: set of semantics, syntax and procedures, which govern the exchange of information across an interface

reference point: conceptual point at the conjunction of two communicating functional entities

service domain: collection of physical or functional entities offering IP telephony services under the control of an IP telephony service provider which share a consistent set of policies and common technologies

serving network functional group: functional group that enables terminal functional groups to connect to an IP telephony service provide

Switched Circuit Network (SCN): telecommunications network, e.g. Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), and General System for Mobile communications (GSM), that uses circuit-switched technologies for the support of voice calls

NOTE: The SCN may be a public network or a private network.

terminal: endpoint within the user equipment on which signalling and media flows originate and/or terminate

terminal functional group: functional group representing all the IP telephony functionality within an end-user's terminal

NOTE: Terminal functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

ticket: obtained through the registration session, when used in a call it provides the terminal/user with a means to show a valid registration exists

transport domain: collection of transport resources sharing a common set of policies, QoS mechanisms and transport technologies under the control of a transport network operator

transport function: functional entity representing the collection of transport resources within a transport domain which are capable of control by a transport resource manager

transport network: collection of transport resources, which provide IP transport functionality

transport network operator: business entity operating a transport network

transport policy entity: functional entity that maintains the policies of a transport domain

Transport Resource Manager (TRM): functional entity that applies a set of policies and mechanisms to a set of transport resources to ensure that those resources are allocated such that they are sufficient to enable transport flows with QoS guarantees across the domain of control of the TRM

user equipment: equipment under the control of an end-user

user profile: service specific information about a user of a service application

3.2 Abbreviations

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

AC	Access Control
AP	Application Plane
BC	Bearer Control
CC	Call Control
CCNR	Call Completion on No Reply
CFB	Call Forwarding on Busy
DID	Domain IDentifier
GSM	General System for Mobile communications
IANA	Internet Assigned Numbers Authority
ICF	InterConnect Function
IP	Internet Protocol
ISDN	Integrated Service Digital Network
ITAD	IP Telephony Administrative Domain
LI	Lawful Interception
MC	Media Control
NGN	Next Generation Networks
PSTN	Public Switched Telephony Network
QoS	Quality of Service
QoSM	Quality of Service Management
QoSP	Quality of Service Policy
SC	Service Control
SCN	Switched Circuit Network
SpoA	Service point of Attachment

SREG	Service network REGistration function
TRIP	Telephony Routing over IP Protocol
TRM	Transport Resource Manager

4 Introduction

The TIPHON project does not specify standards for services (including supplementary services) but rather standardizes a set of root capabilities termed service capabilities. The purpose of the present document is to link the use of service capabilities as building blocks to the more familiar language of services.

The development picture used in TIPHON is shown in figure 1. The area shaded in yellow identifies those areas which are subject to standardization, i.e. for which TSs, ESs, and ENs will be developed. The present document shows by example how a small set of services is built from the suite of service capabilities with a view to show that the set of service capabilities is sufficient to allow service providers to build their services.

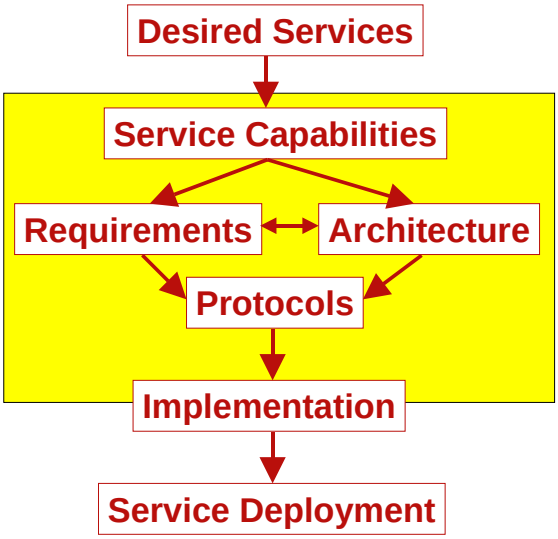


Figure 1: Standardization map of TIPHON

5 Solutions offered by TIPHON

5.1 Introduction

The service capabilities of TIPHON defined in TS 101 878 [1] offer the capability to build a large number of services. Existing services may be emulated using the service capabilities, and new services may be synthesized from them. The following clauses offer some examples of the form of services that may be offered using TIPHON.

5.2 Access Control (AC)

Access Control (AC) is the ability of a service provider to control the traffic utilizing its communications resources. This ability was inherent in the Circuit Switched Networks, where the access to network resources could be restricted by the local switch. The access control may be applied for example, to ensure only authorized (e.g. paying) users have access to communications resources, to restrict the number of sessions to avoid congestion etc. Therefore, Access Control remains an important capability that should be supported in IP environment also.

TIPHON has developed an access control capability for IP environment based on its Registration and transport plane capabilities. The registration framework ensures that only authorized users have access to the requested services. Once authorized for a service, e.g. telephony, a user is provided with an authorization token which enables the user access to communications services. The access to transport resources is provided with the authorization of the application plane. The transport plane has functions called Transport Resource Manager (TRM), and Interconnect Function (ICF) that play an important role in supporting access control, amongst many other services. ICF acts as a controllable firewall and allows traffic to flow through once it has been authorized by the Application Plane (AP). Unauthorized traffic is blocked.

5.3 Protocol interworking

There are several standardized protocols available that can be implemented on one or more reference points of the TIPHON architecture defined in TS 101 314 [2], e.g. The "C" reference point can be implemented using BICC, SIP, H.323, or ISUP. The choice of protocol for a reference point is implementation specific. TIPHON recognizes that different service providers may support one or more of the above protocols in their networks, and require interworking between different protocols. TIPHON addresses this issue via the TIPHON meta-protocol (TS 101 882-1 [3]) and protocol profiles. The protocol profiles are based on the context and behaviour of meta-protocol, which can act as an interworking function, leading to automatic interworking between different protocols such as H.323 and SIP as shown in figure 2.

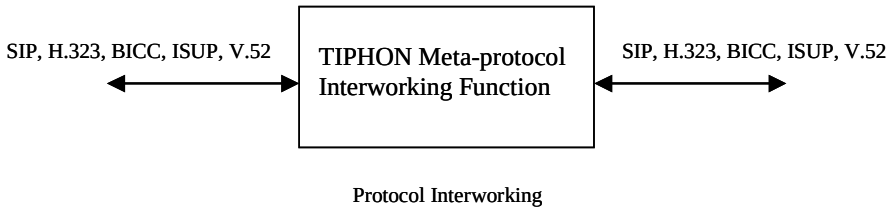


Figure 2: Protocol Interworking via TIPHON meta-protocol

Another direct advantage of using the meta-protocol as an interworking function is that it ensures the service interworking between similar services implemented using different protocols, provided the TIPHON service capabilities support such services.

5.4 Mobility

TIPHON supports user mobility via its registration framework (TS 101 882-1 [3]). The user mobility enables a user to register from different locations and terminals. This allows the user to access the communications services from different locations. This includes access to unique or standardized services offered by the Home service provider.

There are two scenarios of mobility covered by TIPHON:

- User at home.
- Roaming user scenario.

The first scenario allows a user to receive services from its Home service provider inside its home domain. This includes accessing services from different points of attachment.

The second scenario allows a user to receive services while roaming in another administrative domain. This includes the provision for services provided by the visited domain, as well as Home domain. The execution of services from Home domain is particularly important in the case of unique services that only the Home service provider provides, and does not share the service logic with the visited domain.

5.5 Lawful Interception (LI)

Lawful Interception (LI) is an ability to intercept voice communications origination from or terminating to a party, on the request of the law enforcement agencies. Lawful Interception is a regulatory requirement and must be supported irrespective of the underlying technology for communications. TIPHON has developed capabilities in Application and Transport planes (TS 101 315 [4]) to support this service. TIPHON achieves lawful interception via its Interconnect Function, ICF, which allows multiple call legs to be set up between the NWFG serving the party to be intercepted, and the law enforcement agency. This service is illustrated in TS 101 315 [4].

VoIP interconnection allows a service provider domain to connect to another service provider domain, and terminate calls originating from one domain to another. TIPHON has developed capabilities in the application and Transport planes to handover calls from one domain to another in a secure and QoS enabled manner. This service is illustrated in TS 101 882-1 [3]. If the interconnecting domains deploy different call control protocols, the interworking can also be achieved via the Meta-protocol Interworking function, as explained in clause 5.3. Privacy of IP addresses of parties in communications on different domains is also achieved via ICF.

6 Creation of services from service capabilities

The flexibility of the approach taken in TIPHON to define service capabilities rather than standardized services means that there may be many ways to construct the same potential service. The presentation of services in the present document are therefore examples that demonstrate the use of service capabilities and which do not emulate precisely the ISDN basic call or ISDN supplementary services.

6.1 Method overview

6.1.1 TIPHON Service capabilities

TS 101 878 [1] describes the set of service capabilities required for the realization of services for TIPHON Release 4. These service capabilities are shown in class notation in figure 3.

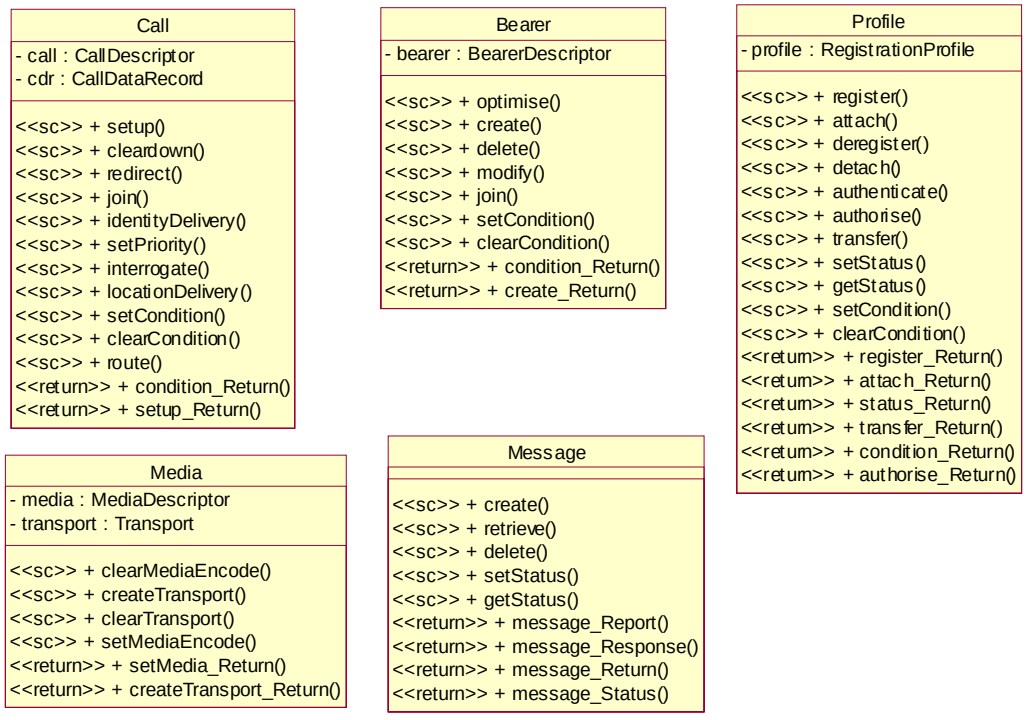


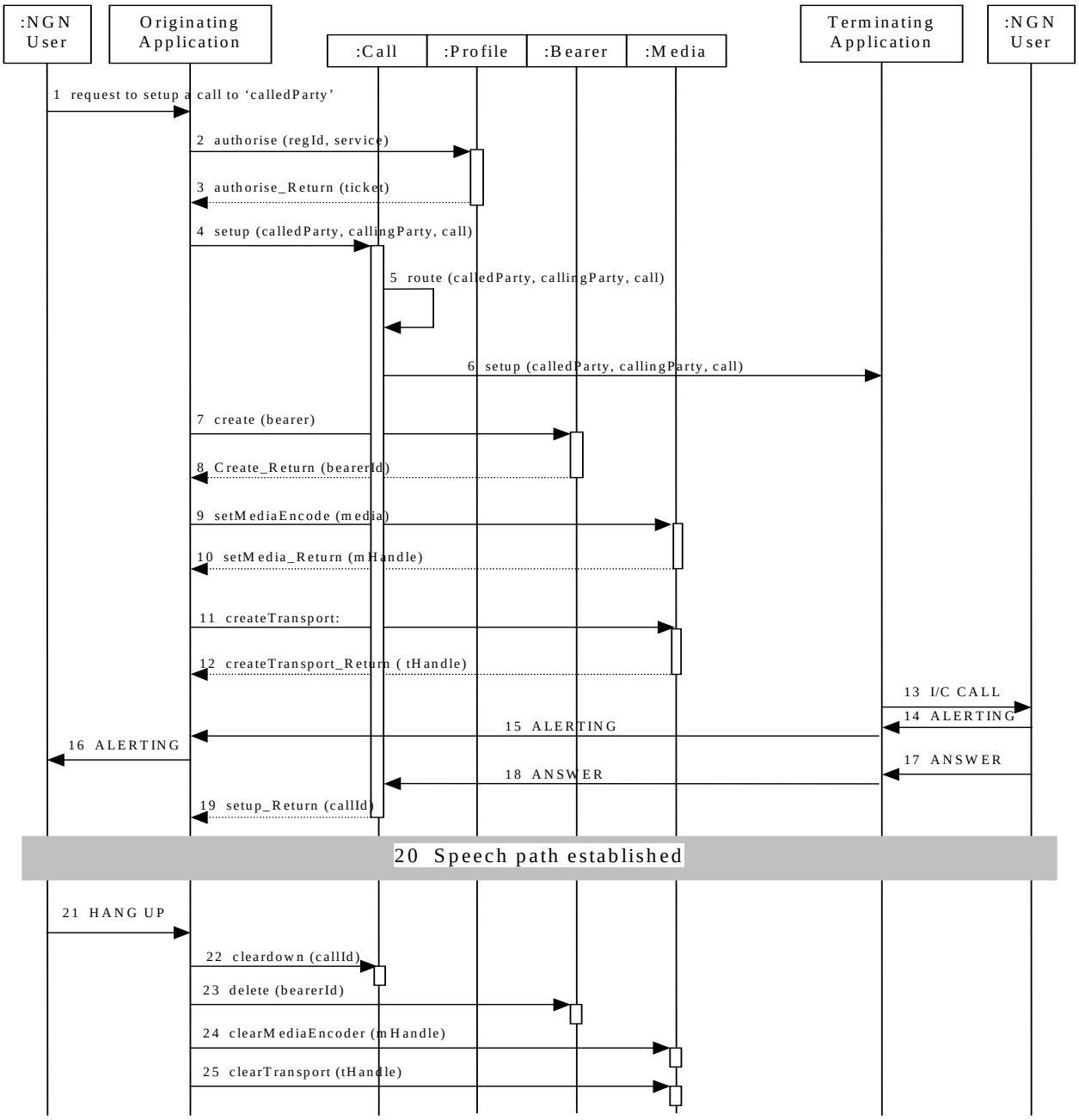
Figure 3: Overall UML class model for TIPHON (NGN) service capabilities

6.2 Example of the simple call service

The following example shows how service capabilities may be used to construct a typical service e.g. simple call.

6.2.1 Operation invocation sequence for the example Call

Figure 4 shows the example simple call service involving originating and terminating networks. It is important to note that this example shows how a non-standardized application may use TIPHON standardized service capabilities to synthesize an example simple call service. Figure 4 conforms to the UML conventions for an operation invocation sequence diagram.



NOTE: The usual call progress indications e.g. alerting, busy, connect, are contained within setup.

Figure 4: Example operation invocation sequence for the call

Table 1 describes the class object invocations for the example call. The parameters that are supplied to and returned by each operation are identified.

Table 1: Explanation of operation invocation sequences for an example call

#	Operation	class	Parameters	Comments
1				The TIPHON User requests a call to a given called party
2	Authorize	Profile	user identity, service capability to be authorized	
3	Authorize_Return	Profile	authorization ticket	
4	Setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	
5	Route	Call	calling user identifier, called user identifier, service provider preference, QoS service class, next network name	
6	Setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	Next instance of setup
7	create	Bearer	bearer characteristics	
8	create_Return	Bearer	bearer identifier	
9	setMediaEncode	Media	media type, media attributes, transport characteristics	
10	SetMedia_Return	Media	media identifier	
11	createTransport	Media	transport descriptor	
12	createTransport_Return	Media	transport identifier	
13				Terminating application informs called party terminal of an incoming call
14				Called party terminal informs the terminating application that the called user is being alerted
15				The terminating application informs the originating application that the called user is being alerted
16				The originating application informs the calling party that the called user is being alerted
17				The called party answers the call and informs the terminating application
18				The terminating application informs the originating call class that the called user has answered
19	setup_Return	Call	call identifier	
20				The speech path is established
21				The calling party hangs up
22	Cleardown	Call	call identifier	
23	Delete	Bearer	bearer identifier	
24	ClearMediaEncode	Media	media identifier	
25	clearTransport	Media	transport identifier	

6.3 Example call forwarding on busy service

The following clauses provide examples showing how service capabilities may be used to construct typical services.

6.3.1 Operation invocation sequence for CFB service activation

The following example given in figure 5 shows how service capabilities may be used to construct a typical CFB service including activation and deactivation. It is important to note that this example shows how a non-standardized application may use TIPHON standardized service capabilities to synthesize an example service activation. Figure 5 conforms to the UML conventions for an operation invocation sequence diagram.

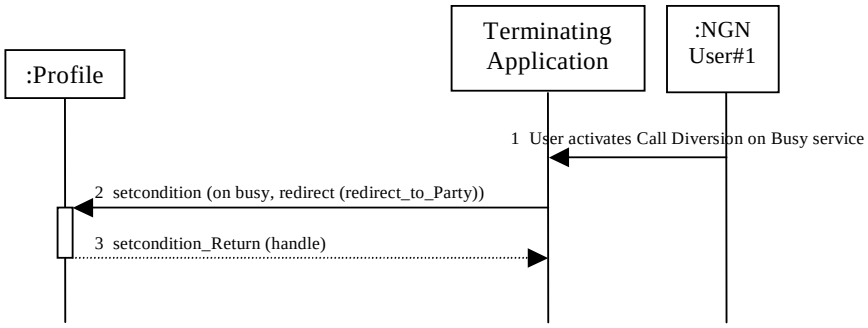


Figure 5: Example operation invocation sequence for CFB activation

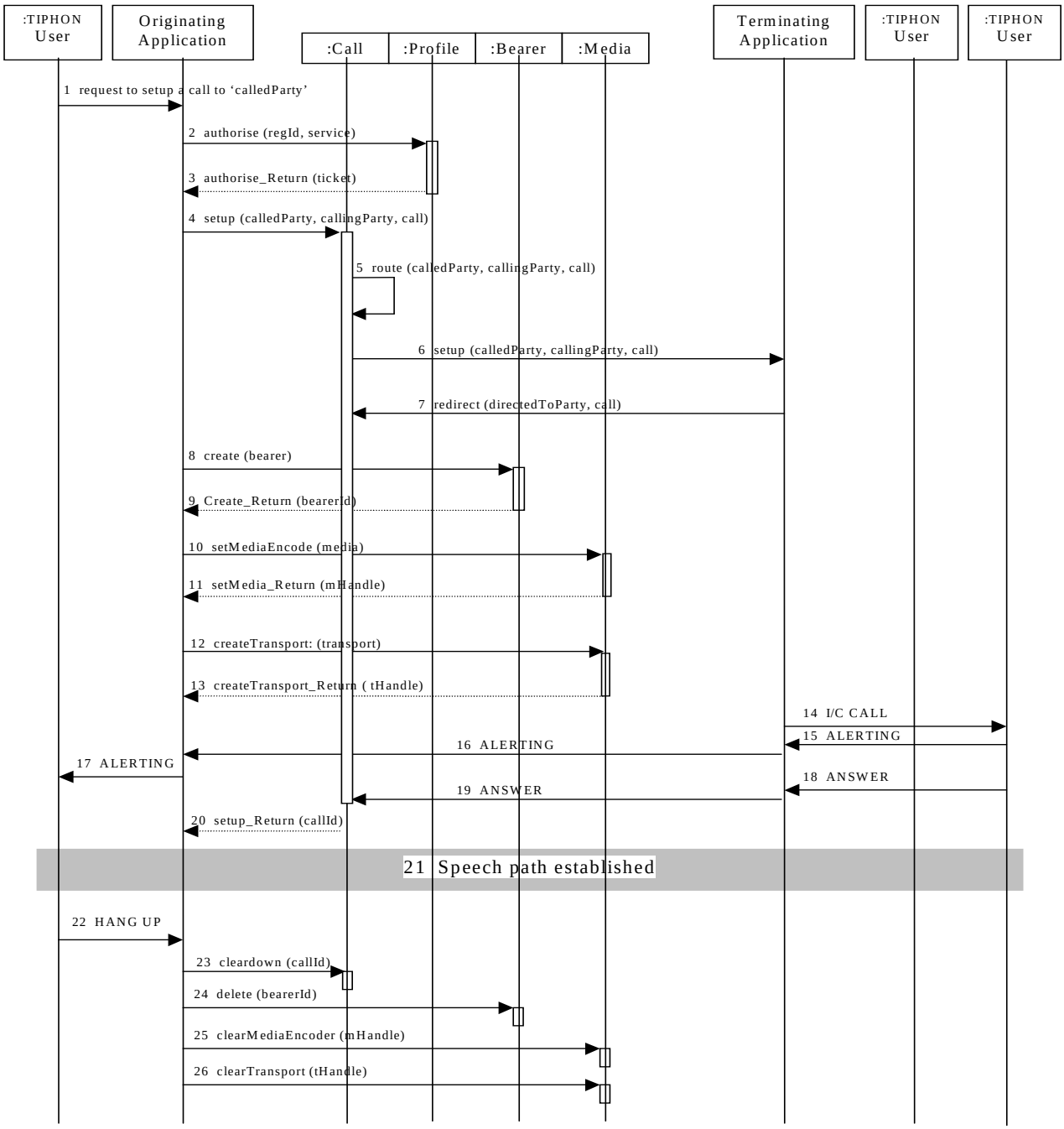
Table 2: Explanation of the operation invocations

#	Operation	class	Parameters	Comments
1				The TIPHON User activates the Call Diversion on Busy service
2	SetCondition	Profile	condition, redirect process, directed to address	
3	SetCondition_Return	Profile	condition identifier	

6.3.2 Operation invocation sequence for CFB service

The following example describes how a Call Forwarding on Busy (CFB) service could be synthesized using TIPHON service capabilities. The preconditions for the CFB service are that both the calling and called users are registered, the called user has activated the CFB service and is active in a call.

Figure 6 shows the operation invocation sequence. It is important to note that this example shows how a non-standardized application may use TIPHON standardized service capabilities to synthesize an example CFB service. Figure 6 conforms to the UML conventions for an operation invocation sequence diagram.



NOTE: The usual call progress indications e.g. alerting, busy, connect, are contained within setup.

Figure 6: Example operation invocation sequence for CFB establishment

Table 3: Explanation of the operation invocations

#	Operation	class	Parameters	Comments
1				The TIPHON User requests a call to a given called party
2	Authorize	Profile	user identity, service capability to be authorized	
3	authorize_Return	Profile	authorization ticket	
4	setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	
5	route	Call	calling user identifier, called user identifier, service provider preference, QoS service class, next network name	
6	setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	Next instance of setup
7	redirect	Call	Call identifier, redirect to party identifier	
8	create	Bearer	bearer characteristics	
9	create_Return	Bearer	bearer identifier	
10	setMediaEncode	Media	media type, media attributes, transport characteristics	
11	setMedia_Return	Media	media identifier	
12	createTransport	Media	transport descriptor	
13	createTransport_Return	Media	transport identifier	
14				Terminating application informs called party terminal of an incoming call
15				Called party terminal informs the terminating application that the called user is being alerted
16				The terminating application informs the originating application that the called user is being alerted
17				The originating application informs the calling party that the called user is being alerted
18				The called party answers the call and informs the terminating application
19				The terminating application informs the originating call class that the called user has answered
20	setup_Return	Call	call identifier	
21				The speech path is established
22				The calling party hangs up
23	cleardown	Call	call identifier	
24	delete	Bearer	bearer identifier	
25	ClearMediaEncode	Media	media identifier	
26	clearTransport	Media	transport identifier	

6.3.3 Operation invocation sequence for CFB service deactivation

Figure 7 shows an example of deactivation of the CFB service. It is important to note that this example shows how a non-standardized application may use TIPHON standardized service capabilities to synthesize an example service. Figure 7 conforms to the UML conventions for an operation invocation sequence diagram.

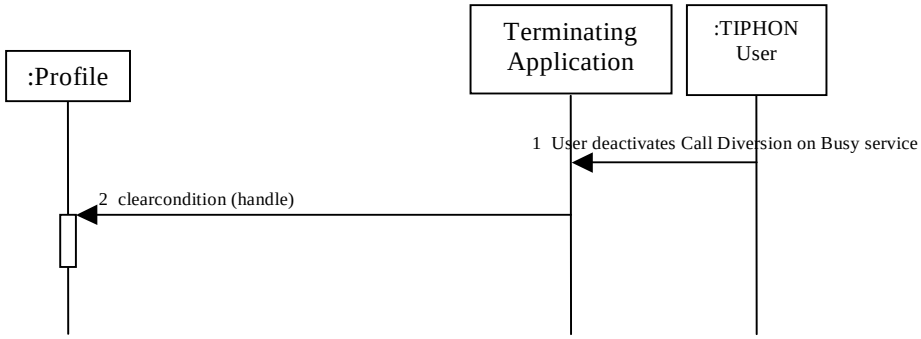


Figure 7: Example operation invocation sequence for CFB deactivation

Table 4: Explanation of the operation invocations

#	Operation	class	Parameters	Comments
1				The TIPHON User deactivates the Call Diversion on Busy service
2	ClearCondition	Profile	condition identifier	

6.4 Example Call Completion on No Reply (CCNR) service

6.4.1 Operation invocation sequence for the CCNR service

Figure 8 shows the operation invocation sequence for an example TIPHON Call Completion on No Reply service. The precondition needed for the CCNR service is that both the calling and called users are registered and authenticated.

The following example describes how a CCNR service could be synthesized using TIPHON service capabilities. The preconditions for the CCNR service are that both the calling and called users are registered and the calling user subscribes to the CCNR service. It is important to note that this example shows how a non-standardized application may use TIPHON standardized service capabilities to synthesize an example CFB service. Figure 8 conforms to the UML conventions for an operation invocation sequence diagram.

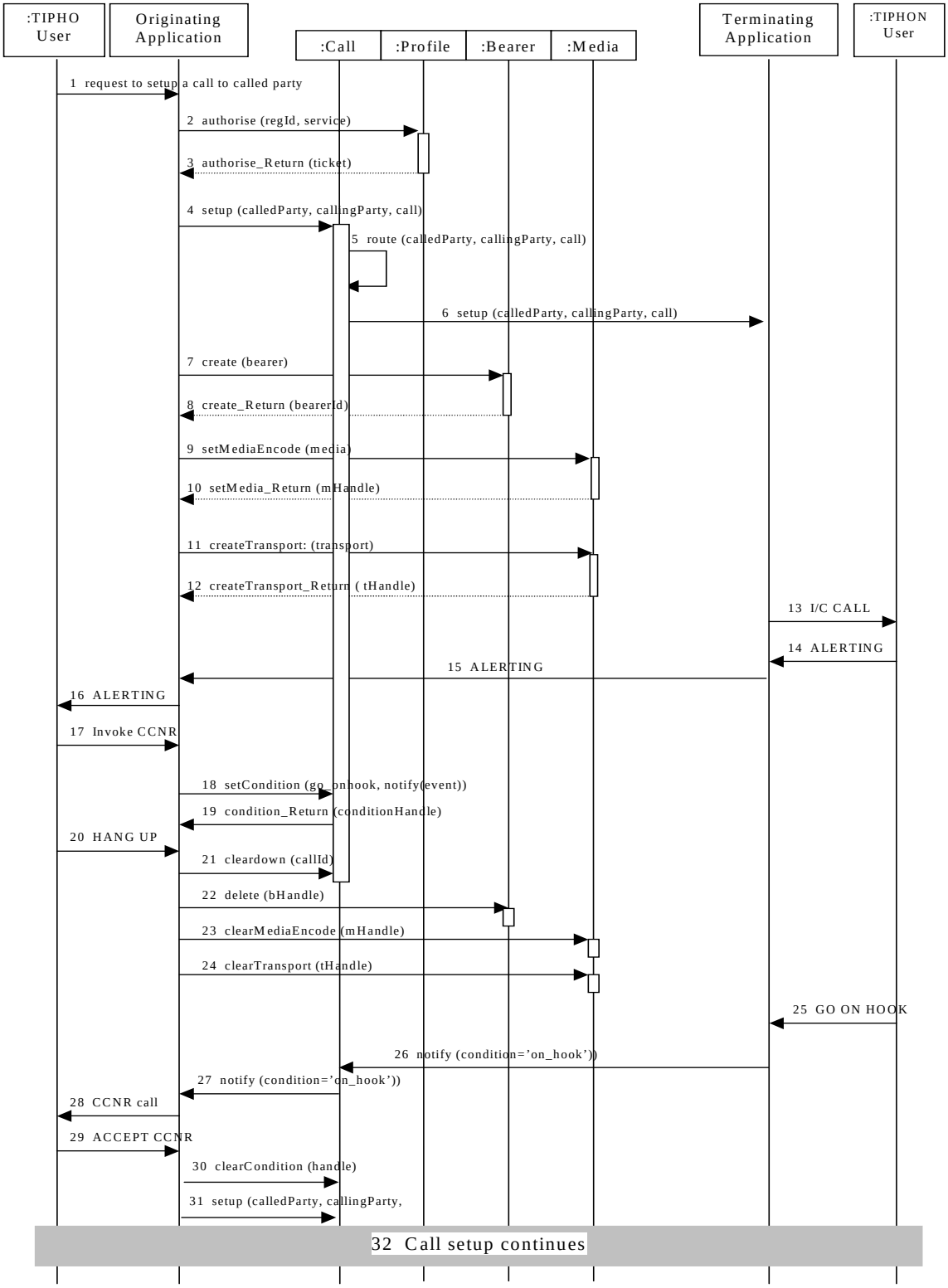


Figure 8: Example operation invocation sequence for CCNR establishment

Table 5: Explanation of the operation invocations

#	Operation	class	Parameters	Comments
1				The TIPHON User requests a call to a given called party
2	authorize	Profile	user identity, service capability to be authorized	
3	authorize_Return	Profile	authorization ticket	
4	Setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	
5	route	Call	calling user identifier, called user identifier, service provider preference, QoS service class, next network name	
6	setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	Next instance of setup
7	create	Bearer	bearer characteristics	
8	create_Return	Bearer	bearer identifier	
9	setMediaEncode	Media	media type, media attributes, transport characteristics	
10	setMedia_Return	Media	media identifier	
11	createTransport	Media	transport descriptor	
12	createTransport_Return	Media	transport identifier	
13				Terminating application informs called party terminal of an incoming call
14				Called party terminal informs the terminating application that the called user is being alerted
15				The terminating application informs the originating application that the called user is being alerted
16				The originating application informs the calling party that the called user is being alerted
17				The calling party invokes the CCNR service
18	SetCondition	call	condition, redirect process	
19	condition_Return	call	condition identifier	
20				The calling party hangs up
21	cleardown	call	call identifier	
22	delete	bearer	bearer identifier	
23	clearMediaEncode	media	media identifier	
24	clearTransport	media	transport identifier	
25				The intended called party goes on hook
26	status	call	condition identifier	Event "go on hook" triggers callback
27				The call class reports the condition to the originating application
28				The originating application notifies the terminal of the CCNR call
29				The calling party goes on hook and accepts the CCNR call
30	ClearCondition	call	condition identifier	
31	Setup	Call	calling user identifier, called user identifier, call identity, call type, service provider preference, QoS service class	
32				Normal call setup continues

History

Document history		
V1.1.1	March 2002	Publication
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