ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

SUPPLEMENTARY SERVICES AND ADDITIONAL NETWORK FEATURES IN PRIVATE TELECOMMUNICATION NETWORKS

ECMA TR/60

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Brief History

This Technical Report provides information on supplementary services provided by Private Telecommunication Networks (PTNs), many of which services are to be the subject of standardization.

It is based on the ISDN concepts as developed by CCITT and is also within the framework of standards for open systems interconnection as defined by ISO.

The Technical Report is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO, CCITT, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

This Technical Report is a contribution to the joint ETSI/ECMA work in the area of PTN standardization.

Adopted as an ECMA Technical Report by the General Assembly of June 1992.

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1 Scope

Private Telecommunication Networks (PTNs), as described in Technical Report ECMA TR/57, provide services to their users based on the services provided to users of public ISDNs and described in the I.200 series of Recommendations from CCITT. Whilst basic services (bearer services and teleservices) available to users of public ISDNs are generally available in the same form to users of PTNs, the situation with supplementary services is more complicated:

- PTNs offer some supplementary services which are not generally available to users of public ISDNs;
- a few public ISDN supplementary services are not applicable to PTNs;
- some supplementary services available to users of public ISDNs are available in a modified form to users of PTNs.

This ECMA Technical Report therefore contains brief descriptions of supplementary services typically offered by PTNs, some of which are currently undergoing standardization. Relationships with corresponding standardized services in public ISDNs are also described, where applicable.

ECMA uses the term Additional Network Feature (ANF) to describe certain features which cannot correctly be described as supplementary services but, like supplementary services, enhance the control of basic services. Whilst a supplementary service is made available to individual users for the direct benefit of those users, an ANF operates autonomously within a PTN and enhances the operation of the PTN for the benefit of all users or of the PTN administration. This Technical Report also considers some ANFs.

The list of supplementary services and ANFs covered by this Technical Report is not intended to be exhaustive.

A special type of PTN user of importance is the attendant. This Technical Report also considers the special characteristics of attendants and the applicability of supplementary services to attendants.

The purpose of this ECMA Technical Report is to guide manufacturers of PTN equipment and operators of PTNs in the selection of supplementary services and ANFs to be made available. It can also act as a tool for identifying potential candidates for standardization, although the appearance of a supplementary service in this Technical Report does not imply that it should or will be standardized for PTNs. Where an ECMA Standard exists containing a service description for a supplementary service or ANF described in this Technical Report, the service description in that Standard should be regarded as correct in the event of conflict with the description in this Technical Report. Deviation from a description in this Technical Report may be found necessary during the more detailed investigations involved in the writing of a Standard.

The use of Computer-Supported Telecommunication Applications (CSTA) in the provision of supplementary services and ANFs is outside the scope of this Technical Report.

2 References

ECMA-133	Reference Configurations for Calls through Exchanges of Private Telecommunication Networks (1989)
ECMA-155	Addressing in Private Telecommunication Networks (1991)
ECMA TR/57	Private Telecommunication Networks (1991)
CCITT Rec. I.210 (1988)	Principles of telecommunication services supported by an ISDN and the means to describe them

3 Definitions

3.1 Additional Network Feature (ANF)

A capability, over and above that of a basic service, provided by a PTN, but not directly to a PTN user.

3.2 Attendant

A PTN user whose prime task is to provide assistance and support to other users.

3.3 Attendant group

A distribution group comprising attendants.

3.4 Basic service

The definition in CCITT Rec. I.210 applies.

3.5 Bearer service

The definition in CCITT Rec I.210 applies.

3.6 Centralized attendant

An attendant acting as an assistance point for more than one PTNX.

3.7 Cooperative

A particular class of supplementary service, from the point of view of its applicability to PTNs and public ISDNs, as described in Technical Report ECMA TR/57.

3.8 Distribution group

A group of users having a common PTN number, calls to that number being distributed between the individual users by some algorithm. A user may belong to more than one distribution group.

3.9 Dual

A particular class of supplementary service, from the point of view of its applicability to PTNs and public ISDNs, as described in Technical Report ECMA TR/57.

3.10 Local

A particular class of supplementary service, from the point of view of its applicability to PTNs and public ISDNs, as described in Technical Report ECMA TR/57.

3.11 Ordinary PTN user

A PTN user which is not an attendant.

3.12 Night answer point

A PTN number to which calls are redirected in the event of a destination being in night mode.

3.13 Night mode

A condition where a PTN number is known by the PTN to be unattended and therefore cannot accept incoming calls. There may be an arrangement for calls to be redirected to a night answer point during night mode.

3.14 Supplementary service

The definition in CCITT Rec. I.210 applies.

3.15 Teleservice

The definition in CCITT Rec. I.210 applies.

4 Acronyms

ANF	Additional Network Feature
AOC	Advice of Charge
CCBS	Completion of Calls to Busy Subscriber
CCNR	Completion of Calls on No Reply
CD	Call Deflection
CDIVC	Controlled Diversion Consult
CDIVI	Controlled Diversion Immediate
CFB	Call Forwarding on Busy
CFNR	Call Forwarding on No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling/Connected Line Identification Restriction
CNIP	Calling Name Identification Presentation
CNIR	Calling/Connected Name Identification Restriction
CO	Call Offer
COLP	Connected Line Identification Presentation
CONF	Add-On Conference
CONP	Connected Name Identification Presentation
CPK	Call Park
CPU	Call Pick-Up
CUG	Closed User Group
CT	Call Transfer
CW	Call Waiting
DDI	Direct Dialling In
DIST	Call Distribution
DND	Do Not Disturb
DNDO	Do Not Disturb Override
HOLD	Call Hold
IM	In-Call Modification
INTR	Intrusion
ISDN	Integrated Services Digital Network
MCID	Malicious Call Identification
MLPP	Multi-Level Precedence and Pre-emption
MSN	Multiple Subscriber Number
NI	Network Interception
NS	Night Service
PR	Path Replacement
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network Exchange
SC	Serial Call
SS	Supplementary Service
SUB	Subaddressing
TP	Terminal Portability
UST	User Status
UUS	User-to-User Signalling

5 Supplementary services

This part of the Technical Report lists supplementary services which have been identified as having possible application in PTNs, some of which may be appropriate for standardization. In particular, most of the supplementary services which are being specified by ETSI for public ISDNs in Europe are included.

NOTE 1

Supplementary services which have not been standardized can still be supported in a PTN. Signalling protocols at the Q and S reference points will provide escape mechanisms for manufacturer specific information for the support of supplementary services which are not standardized, or for the support of non-standard extensions to standardized supplementary services.

For each supplementary service, a brief description is given.

The anticipated impact of each supplementary service on signalling at the Q and S reference points is explored briefly. Should the service be standardized, the full impact on signalling will be revealed when the stage 2 specification is complete.

Finally, the relationship of each supplementary service with the corresponding supplementary service, if any, in public ISDNs and the impact on signalling at the T reference point are discussed.

Certain supplementary services of public ISDNs are used by PTNs, even though PTNs do not provide corresponding supplementary services. These are:

1. Direct Dialling In (DDI). PTNs can enter into arrangements with public ISDNs for DDI, so that incoming calls can be addressed directly to called PTN users. A DDI call from a public ISDN is progressed across the PTN and to the called PTN user as a basic call.

2. Subaddressing (SUB). PTNs can enter into arrangements with public ISDNs for Subaddressing, so that incoming calls can be accompanied by a called party subaddress if supplied by the calling user. Basic call signalling protocols at the S and Q reference points will provide for the transmission of a called party subaddress to a called PTN user, and therefore there is no need for a separate Subaddressing supplementary service in PTNs.

The S, T and Q reference points are defined in ECMA-133.

5.1 Supplementary Service Calling Line Identification Presentation (SS-CLIP)

5.1.1 Description

SS-CLIP is a service offered to the called user and provides that user with the calling user's number and, if applicable, the calling user's subaddress.

5.1.2 Impact on signalling at the S reference point

The information is passed across the S reference point to the called user.

5.1.3 Impact on signalling at the Q reference point

The information concerned is passed across the Q reference point as part of the basic service, and therefore there is no impact.

5.1.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.1.5 Impact on signalling at the T reference point

This service is classified as dual. For an incoming call from a public ISDN, the PTN can use the corresponding service of the public ISDN to obtain the calling user's number and, if applicable, subaddress. This information can then be used by the PTN to provide SS-CLIP to the called PTN user.

NOTE 2

For an outgoing call to the public ISDN, the PTN can provide the calling PTN user's number and, if applicable, subaddress to the public ISDN as part of the basic service, so that the public ISDN can provide SS-CLIP to the called user.

5.2 Supplementary Service Connected Line Identification Presentation (SS-COLP)

5.2.1 Description

SS-COLP is a service offered to the calling user and provides that user with the connected user's number and, if applicable, the connected user's subaddress.

5.2.2 Impact on signalling at the S reference point

The information is passed across the S reference point to the calling user.

5.2.3 Impact on signalling at the Q reference point

The information concerned is passed across the Q reference point as part of the basic service, and therefore there is no impact.

5.2.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.2.5 Impact on signalling at the T reference point

This service is classified as dual. For an outgoing call to a public ISDN, the PTN can use the corresponding service of the public ISDN to obtain the connected user's number and, if applicable, subaddress. This information can then be used by the PTN to provide SS-COLP to the calling PTN user.

NOTE 3

For an incoming call from the public ISDN, the PTN can provide the connected PTN user's number and, if applicable, subaddress to the public ISDN as part of the basic service, so that the public ISDN can provide SS-COLP to the calling user.

5.3 Supplementary Service Calling/Connected Line Identification Restriction (SS-CLIR)

5.3.1 Description

SS-CLIR is a service which prevents the served user's number being presented to another user. It can apply to all calls or can be invoked on a per call basis. It can restrict the presentation of the served user's number not only during normal call establishment but also when the possibility of number presentation arises during the operation of other supplementary services, e.g. Call Forwarding and Call Transfer.

5.3.2 Impact on signalling at the S reference point

The information is passed across the S reference point from the calling or called user to the network.

5.3.3 Impact on signalling at the Q reference point

The information concerned is passed across the Q reference point as part of the basic service, and therefore there is no impact.

5.3.4 Relationship with the corresponding service in public ISDNs

This service is similar to the combination of supplementary services Calling Line Identification Restriction (CLIR) and Connected Line Identification Restriction (COLR) in public ISDNs. Signalling at the S reference point should be compatible with that a the S/T reference point to permit terminal interchangeability.

5.3.5 Impact on signalling at the T reference point

This service is classified as dual. For an incoming call from a public ISDN, if the connected PTN user has invoked SS-CLIR, the PTN will not present the connected user's number to the public ISDN, and may be able to invoke the public ISDN's COLR supplementary service in order to prevent the public ISDN presenting a default number to the calling user.

For an outgoing call to a public ISDN, if the calling PTN user has invoked SS-CLIR, the PTN will not present the calling user's number to the public ISDN, and may be able to invoke the public ISDN's CLIR supplementary service in order to prevent the public ISDN presenting a default number to the called user.

Alternatively, a PTN can subscribe to the permanent mode of the public ISDN's CLIR or COLR supplementary service, in which case the public ISDN will never present a calling number to a called user or a connected number to a calling user respectively.

NOTE 4

For an incoming call from a public ISDN, the PTN will not receive the calling user's number or subaddress if the public ISDN's CLIR supplementary service has been invoked, For an outgoing call to a public ISDN, the PTN will not receive the connected user's number or subaddress if the public ISDN's COLR supplementary service has been invoked.

5.4 Supplementary Service Multiple Subscriber Number (SS-MSN)

5.4.1 Description

SS-MSN is a supplementary service which permits more than one number (PTN number or ISDN number) to be associated with a PTN access.

The Standards for basic services in PTNs will include SS-MSN aspects, so that separate Standards for this supplementary service will not be necessary. The number handling aspects of the service are specified in ECMA-155.

5.4.2 Impact on signalling at the S reference point

The only impact at the S reference point is the ability to transport the numbers involved. This will be included in the basic call protocol.

5.4.3 Impact on signalling at the Q reference point

No impact.

5.4.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.4.5 Impact on signalling at the T reference point

This service is classified as local. Public ISDNs and PTNs offer this service independently. There are no interworking considerations.

5.5 Supplementary Service Calling Name Identification Presentation (SS-CNIP)

5.5.1 Description

SS-CNIP is a service offered to the called user and provides that user with the calling user's name.

5.5.2 Impact on signalling at the S reference point

The information is passed across the S reference point to the called user.

5.5.3 Impact on signalling at the Q reference point

The information is passed across the Q reference point from the calling user's PTNX to the called user's PTNX.

5.5.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.5.5 Impact on signalling at the T reference point

Not applicable. The calling user's name will not be available on calls from public ISDNs.

5.6 Supplementary Service Connected Name Identification Presentation (SS-CONP)

5.6.1 Description

SS-CONP is a service offered to the calling user and provides that user with the connected user's name.

5.6.2 Impact on signalling at the S reference point

The information is passed across the S reference point to the calling user.

5.6.3 Impact on signalling at the Q reference point

The information is passed across the Q reference point from the connected user's PTNX to the calling user's PTNX.

5.6.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.6.5 Impact on signalling at the T reference point

Not applicable. The connected user's name will not be available on calls to public ISDNs.

5.7 Supplementary Service Calling/Connected Name Identification Restriction (SS-CNIR)

5.7.1 Description

SS-CNIR is a service which prevents the served user's name being presented to another user. It can apply to all calls or can be invoked on a per call basis. It can restrict the presentation of the served user's name not only during normal call establishment but also when the possibility of name presentation arises during the operation of other supplementary services, e.g. Call Forwarding and Call Transfer.

5.7.2 Impact on signalling at the S reference point

The information is passed across the S reference point from the calling or called user to the network.

5.7.3 Impact on signalling at the Q reference point

The information concerned is passed across the Q reference point as part of SS-CNIP and SS-CONP, and therefore there is no impact.

5.7.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.7.5 Impact on signalling at the T reference point

Not applicable.

5.8 Supplementary Service Malicious Call Identification (SS-MCID)

5.8.1 Description

This supplementary service enables a user to request that the source of an incoming call be identified and registered in the network. Registration is not affected by SS-CLIR.

The main interest for PTNs in this supplementary service is to be able to invoke the corresponding service in a public ISDN.

5.8.2 Impact on signalling at the S reference point

The signalling protocol will have to support service invocation by the served PTN user.

5.8.3 Impact on signalling at the Q reference point

The signalling protocol will have to convey service invocations between PTN users and public ISDN accesses.

5.8.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.8.5 Impact on signalling at the T reference point

This service is classified as cooperative. Depending on subscription arrangements with the public ISDN, all PTN users or users of specific DDI numbers should be able to invoke SS-MCID in the public network on any incoming call from the public ISDN access(es) concerned.

In addition, if public ISDNs are able to indicate to a PTN during an outgoing call that SS-MCID is invoked, the PTN may register details of the call.

NOTE 4

This has signalling impact only at the T reference point, since the Outgoing Gateway PTNX will already be in possession of the calling user's number and subaddress.

5.9 Supplementary Service Call Forwarding Unconditional (SS-CFU)

5.9.1 Description

All incoming calls to the served user, or just those relating to a specific basic service, are diverted to another destination defined by a number, and optionally a subaddress, specified at the time of activation of the service. Incoming calls are diverted immediately, independently of whether the served user is busy or free. A diversion according to SS-CFU may be concatenated with one or more other diversions according to SS-CFU and/or according to other call forwarding or call deflection services.

Activation, deactivation and interrogation of this service can be performed by the served user or by another authorised user, e.g. the user who is already the diverted-to user may be able to deactivate forwarding or activate forwarding to a different diverted-to user.

5.9.2 Impact on signalling at the S reference point

The signalling protocol at S has to support notifications of forwarding to the served user, the calling user and the forwarded-to user. In addition it has to support activation, deactivation and interrogation by the served user or another authorised user.

5.9.3 Impact on signalling at the Q reference point

Diversion can be achieved by forward switching (routeing onwards from the served user's PTNX) or by re-routeing from the Originating PTNX or from a Transit PTNX. Network signalling is required to request re-routeing. In either case, network signalling is needed to convey indications to the calling and forwarded-to users.

Network signalling is also required for activation, deactivation and interrogation by users other than the served user.

5.9.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

Public ISDNs are not at present planning to support activation, deactivation and interrogation by users other than the served user.

5.9.5 Impact on signalling at the T reference point

This service is normally classified as local. A public ISDN can divert a call which has arrived from a PTN and can divert a call to a PTN. A PTN can divert a call which has arrived from a public ISDN and can divert a call to a public ISDN. Appropriate indications are sent to the other network. One or more diversions in a PTN can be concatenated with one or more diversions in a public ISDN.

Diversion in a public ISDN is normally by means of forward switching.

An incoming call from a public ISDN encountering diversion within a PTN can be diverted by means of forward switching or re-routeing (from a Transit PTNX or the Incoming Gateway PTNX).

Alternatively, if the new destination is also within the public ISDN, the PTN can optionally request that the public ISDN perform re-routeing from the local exchange to which the PTN is attached (known as partial re-routeing). This method of working is classified as cooperative and is subject to the availability of this option in the public ISDN. Apart from offering the advantage of avoiding the unnecessary use of public network access resources, the alternative of routeing from the PTN back into the public ISDN may be illegal in some territories.

5.10 Supplementary Service Call Forwarding on Busy (SS-CFB)

5.10.1 Description

All incoming calls to the served user, or just those relating to a specific basic service, are diverted to another destination defined by a number, and optionally a subaddress, specified at the time of activation of the service, subject to the served user being busy at the time of call arrival. A diversion according to SS-CFB may be concatenated with one or more other diversions according to SS-CFB and/or according to other call forwarding or call deflection services.

Activation, deactivation and interrogation of this service can be performed by the served user or by another authorised user, e.g. the user who is already the diverted-to user may be able to deactivate forwarding or activate forwarding to a different diverted-to user.

5.10.2 Impact on signalling at the S reference point

As for SS-CFU.

5.10.3 Impact on signalling at the Q reference point

As for SS-CFU.

5.10.4 Relationship with the corresponding service in public ISDNs

As for SS-CFU.

5.10.5 Impact on signalling at the T reference point

As for SS-CFU.

5.11 Supplementary Service Call Forwarding on No Reply (SS-CFNR)

5.11.1 Description

All incoming calls to the served user, or just those relating to a specific basic service, are diverted to another destination defined by a number, and optionally a subaddress, specified at the time of activation of the service, subject to the served user failing to answer within a predefined period of time. A diversion according to SS-CFNR may be concatenated with one or more other diversions according to SS-CFNR and/or according to other call forwarding or call deflection services.

Activation, deactivation and interrogation of this service can be performed by the served user or by another authorised user, e.g. the user who is already the diverted-to user may be able to deactivate forwarding or activate forwarding to a different diverted-to user.

5.11.2 Impact on signalling at the S reference point

As for SS-CFU.

5.11.3 Impact on signalling at the Q reference point

As for SS-CFU.

5.11.4 Relationship with the corresponding service in public ISDNs

As for SS-CFU.

5.11.5 Impact on signalling at the T reference point

As for SS-CFU.

5.12 Supplementary Service Call Deflection (SS-CD)

5.12.1 Description

This service permits the served user, on arrival of an incoming call, to request that the PTN divert the call to another destination. The request can be generated automatically by the terminal immediately the call arrives or after remaining unanswered for a certain period of time, or the request can be generated as a result of user action on being alerted.

A call deflection may be concatenated with one or more other call deflections and/or call forwardings.

5.12.2 Impact on signalling at the S reference point

The signalling protocol at S has to support service requests by the served user and notifications of deflection to the calling user and the deflected-to user.

5.12.3 Impact on signalling at the Q reference point

As for SS-CFU, except signalling for activation, deactivation and interrogation is not required.

5.12.4 Relationship with the corresponding service in public ISDNs

As for SS-CFU, except that the remarks concerning activation, deactivation and interrogation do not apply.

5.12.5 Impact on signalling at the T reference point

As for SS-CFU.

5.13 Supplementary Service Controlled Diversion Immediate (SS-CDIVI)

5.13.1 Description

SS-CDIVI is offered to the calling PTN user and grants that user the possibility of immediately overriding all diversions (call forwarding or call deflection) encountered.

5.13.2 Impact on signalling at the S reference point

The signalling protocol at S has to support the service request.

5.13.3 Impact on signalling at the Q reference point

The signalling protocol at Q has to support the service request.

5.13.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.13.5 Impact on signalling at the T reference point

Not applicable. The served user cannot override diversions encountered on outgoing calls to a public ISDN.

5.14 Supplementary Service Controlled Diversion Consult (SS-CDIVC)

5.14.1 Description

SS-CDIVC is offered to the calling PTN user and grants that user the possibility of being consulted on encountering diversion (call forwarding or call deflection). On consultation, the served user can elect to proceed with the diversion, override the diversion, or clear the call.

5.14.2 Impact on signalling at the S reference point

The signalling protocol at S has to support the service request and consultation.

5.14.3 Impact on signalling at the Q reference point

The signalling protocol at Q has to support the service request and consultation.

5.14.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.14.5 Impact on signalling at the T reference point

Not applicable. The served user cannot be consulted on diversions encountered in a public ISDN.

5.15 Supplementary Service Night Service (SS-NS)

5.15.1 Description

This supplementary service is particularly applicable to attendants (see clause 70).

When night mode is activated, all incoming calls to the served user are given one of the following treatments, depending on implementation and/or user requirements:

- reject the call, with an indication to the calling user that night mode has been encountered;
- attempt to forward the call to a night answer point, indicating to the calling user and the forwarded to user that night mode has been encountered.

The above actions can apply also to any calls already waiting to be answered by the served user when night mode is activated.

5.15.2 Impact on signalling at the S reference point

The signalling protocol at S has to support notifications to the calling user and to the diverted-to user. In addition it has to support activation, deactivation and interrogation by the served user.

Signalling for the support of call forwarding should align with SS-CFU or SS-CFNR (see impact at the Q reference point below).

5.15.3 Impact on signalling at the Q reference point

Network signalling is required to indicate night mode to the Originating or Incoming Gateway PTNX.

In addition, signalling to support call forwarding is required. This should align with the signalling for SS-CFU (if night mode is encountered before entering the alerting state) or SS-CFNR (if night mode is encountered after entering the alerting state).

5.15.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.15.5 Impact on signalling at the T reference point

Not applicable. Incoming calls from public ISDNs can, however, be diverted or rejected on encountering a destination with night mode activated.

5.16 Supplementary Service Network Interception (SS-NI)

5.16.1 Description

This supplementary service is particularly applicable to attendants (see clause 70).

The served user can have an arrangement that certain types of call which encounter certain types of failure condition in the PTN are diverted to the served user, where attempts can be made to assist the calling user. The types of call to which the service applies are defined by the basic service(s) and the source of the call (e.g. intra-PTN, incoming calls from public ISDNs, calls transferred by the served user, the particular organisation to which the call relates). The particular failure conditions that lead to invocation of this service are network and implementation dependent, but examples include:

- destination number unobtainable;
- no reply;
- no reply in the particular case of a transferred call, leading to interception back to the transferring user or to another user;
- rejection due to night mode (where no address to forward to has been provided as part of supplementary service night service).

5.16.2 Impact on signalling at the S reference point

The signalling protocol at S has to support notifications to the served user and to the calling user.

5.16.3 Impact on signalling at the Q reference point

Diversion can be achieved by forward switching (routeing onwards from the PTNX at which the need for diversion is detected) or by re-routeing from the Originating PTNX or from a Transit PTNX. Network signalling is required to request re-routeing. In either case, network signalling is needed to convey indications to the calling and served users.

5.16.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.16.5 Impact on signalling at the T reference point

Not applicable. Incoming calls from public ISDNs can, however, be intercepted within the PTN.

5.17 Supplementary Service Do Not Disturb (SS-DND)

5.17.1 Description

All incoming calls to the served user, or just those relating to a specific basic service, are rejected by the PTN. The calling user is given an appropriate indication.

Users may be awarded different levels of protection against override of SS-DND by SS-DNDO.

Activation, deactivation and interrogation of this service can be performed by the served user or by another authorised user.

5.17.2 Impact on signalling at the S reference point

The signalling protocol at S has to support the indication of rejection to the calling user, and also activation, deactivation and interrogation by the served user or another authorised user.

5.17.3 Impact on signalling at the Q reference point

The network signalling protocol has to support the indication of rejection, and also activation, deactivation and interrogation by a user other than the served user.

5.17.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.17.5 Impact on signalling at the T reference point

Not applicable. An incoming call from a public ISDN can, however, encounter a Do Not Disturb condition in a PTN, resulting in call rejection.

5.18 Supplementary Service Do Not disturb Override (SS-DNDO)

5.18.1 Description

The served user may override the Do Not Disturb condition and cause the called user to be alerted. Various levels of override capability can be awarded to served users, allowing the override of different levels of protection associated with users of SS-DND.

5.18.2 Impact on signalling at the S reference point

The signalling protocol has to support service requests by the calling user.

5.18.3 Impact on signalling at the Q reference point

The signalling protocol has to support service requests.

5.18.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.18.5 Impact on signalling at the T reference point

Not applicable.

5.19 Supplementary Service Serial Call (SS-SC)

5.19.1 Description

This supplementary service is particularly applicable to attendants (see clause 70).

The served user, prior to or at the time of invoking call transfer, can indicate that the call about to be transferred is to be presented again to the served user when the user to which the call is transferred clears.

5.19.2 Impact on signalling at the S reference point

The signalling protocol at S has to support the service request by the served user and notifications to the served user and the transferred user at the time of presenting the call to the served user again.

5.19.3 Impact on signalling at the Q reference point

Re-presentation to the served user can be achieved by forward switching (routeing onwards from clearing user's PTNX) or by re-routeing from the other user's PTNX or from a Transit PTNX. Network signalling is required to request re-routeing. In either case, network signalling is needed to convey indications to the users affected.

5.19.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.19.5 Impact on signalling at the T reference point

Not applicable. SS-SC can, however, be invoked by a PTN user on a call from or to a public ISDN.

5.20 Supplementary Service Completion of Calls to Busy Subscriber (SS-CCBS)

5.20.1 Description

This supplementary service allows a calling user encountering a busy destination to have the call completed when the busy destination becomes not busy, without having to make another call attempt.

5.20.2 Impact on signalling at the S reference point

The calling user has to be able to request the service, cancel the service and be recalled when the destination is no longer busy. The called user has to be interrogated to check whether the busy condition still exists.

5.20.3 Impact on signalling at the Q reference point

The network signalling protocol has to be able to convey requests for monitoring a busy destination, requests to cancel monitoring, the indication that the destination is no longer busy, reservation of the path for the call, and the completion of the call when the calling user has responded to recall.

5.20.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.20.5 Impact on signalling at the T reference point

This service is classified as cooperative. A PTN user should be able to invoke CCBS when an outgoing call to a public ISDN encounters busy. Also a public ISDN user should be able to invoke CCBS when an incoming call to a PTN encounters a busy destination in the PTN.

5.21 Supplementary Service Completion of Calls on No Reply (SS-CCNR)

5.21.1 Description

This supplementary service allows a calling user encountering a destination which fails to answer to have the call completed after that destination is next used and has become free again, without having to make another call attempt.

5.21.2 Impact on signalling at the S reference point

The calling user has to be able to request the service, cancel the service and be recalled when the destination has been used again and is no longer busy. The called user has to be interrogated to check whether the busy condition still exists after use.

5.21.3 Impact on signalling at the Q reference point

The network signalling protocol has to be able to convey requests for monitoring a destination, requests to cancel monitoring, indication that the destination has been used and is no longer busy, reservation of the path for the call, and the completion of the call when the calling user has responded to recall.

5.21.4 Relationship with the corresponding service in public ISDNs

Although standardization of this service for public ISDNs is planned, work has not yet started. However, it is anticipated that this service will be similar to the corresponding service in public ISDNs. Signalling at the S reference point should therefore be compatible with that at the S/T reference point to permit terminal interchangeability.

5.21.5 Impact on signalling at the T reference point

This service is classified as cooperative. A PTN user should be able to invoke CCNR when an outgoing call to a public ISDN fails to be answered. Also a public ISDN user should be able to invoke CCNR when an incoming call to a PTN fails to be answered.

5.22 Supplementary Service Call Waiting (SS-CW)

5.22.1 Description

This service permits the served user to be notified of an incoming call with an indication that no access information channel is available, and to then have the choice of accepting, rejecting or ignoring the waiting call.

5.22.2 Impact on signalling at the S reference point

The signalling protocol has to support the assignment of an information channel to and acceptance of a waiting call. Basic call signalling will permit the presentation of a call when no information channels are available and the rejection or ignoring of the waiting call. Notification to the calling user that the call is waiting has also to be supported.

5.22.3 Impact on signalling at the Q reference point

The signalling protocol only has to support notification to the calling user that the call is waiting.

5.22.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.22.5 Impact on signalling at the T reference point

This service is classified as local. A public ISDN can apply Call Waiting to an outgoing call from a PTN, in which case the PTN just receives a notification. A PTN can apply Call Waiting to an incoming call from a public ISDN, in which case the public ISDN just receives a notification.

5.23 Supplementary Service Call Offer (SS-CO)

5.23.1 Description

This service permits a calling user to request that the call be offered to the user at a busy destination and that the called user be given the choice of accepting, rejecting or ignoring the waiting call. This service

can be used in conjunction with SS-CT to transfer another user into a state of waiting at the busy destination.

5.23.2 Impact on signalling at the S reference point

The calling user has to be able to request the service. At the called user, the impact is as for SS-CW, possibly with an indication that SS-CO has been invoked.

5.23.3 Impact on signalling at the Q reference point

The service request and response have to be conveyed.

5.23.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.23.5 Impact on signalling at the T reference point

Not applicable.

5.24 Supplementary Service Intrusion (SS-INTR)

5.24.1 Description

This service permits a calling user to request immediate connection to a busy destination. This may involve joining the new call in conference with the existing call, or alternatively may cause the existing call to be placed on hold. The original call is restored on withdrawal of the served user.

Certain users may be given protection against their calls being intruded upon. Different levels of intrusion protection can protect against different levels of authority to intrude.

Once intrusion has occurred, the calling user may optionally have the authority to request that the unwanted user be released from the connection.

5.24.2 Impact on signalling at the S reference point

Service requests from the calling user and appropriate indications to the wanted user have to be supported.

5.24.3 Impact on signalling at the Q reference point

Service requests have to be conveyed across the network. The signalling protocol also has to support checking of the protection level of the other party in the existing call.

5.24.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.24.5 Impact on signalling at the T reference point

Not applicable.

NOTE 5

The PTN may place restrictions on intrusion into calls to or from public networks, particularly incoming calls.

5.25 Supplementary Service Terminal Portability (SS-TP)

5.25.1 Description

This supplementary service allows a user to move a terminal from one socket to another within one given basic access during the active state of the call.

5.25.2 Impact on signalling at the S reference point

Signalling is required to support suspension and resumption of the call at the served user's access and to support notifications at the other user's access.

5.25.3 Impact on signalling at the Q reference point

The signalling protocol only has to support notifications to the non-served user.

5.25.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.25.5 Impact on signalling at the T reference point

This service is classified as local. For a call incoming from or outgoing to a public network, either user can invoke terminal portability, resulting in a notification to the other network.

5.26 Supplementary Service Call Hold (SS-HOLD)

5.26.1 Description

This supplementary service allows a user to interrupt communications on an existing call and then subsequently, if desired, to re-establish communications. As a result of invoking this service, the user information channel at the served user's access becomes available for use by another call, if required.

5.26.2 Impact on signalling at the S reference point

The signalling protocol has to support requests from the served user to interrupt and re-establish communications, and notifications from the network to the other user.

5.26.3 Impact on signalling at the Q reference point

The signalling protocol only has to support notifications to the non-served user.

5.26.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.26.5 Impact on signalling at the T reference point

This service is classified as local. For a call incoming from or outgoing to a public network, either user can invoke call hold, resulting in a notification to the other network.

5.27 Supplementary Service Call Transfer (SS-CT)

5.27.1 Description

This supplementary service enables a user who has two calls of the same basic service to connect together as a new call the other two users. One of the calls must be in the active state. The other call can either be active or alerting the non-served user.

NOTE 6

SS-NI can be used to retrieve transferred calls which fail to be answered.

5.27.2 Impact on signalling at the S reference point

The signalling protocol has to support service requests from served users and notifications to the other users. It may also have to support the provision of information to the network by a transferred user for conveyance to the other transferred user.

5.27.3 Impact on signalling at the Q reference point

Transfer can be by means of join, where the two existing connections are simply joined together at the served user's PTNX, or by re-routeing. In the latter case a new connection path is established between the PTNXs of the two users to be transferred and the original connection paths are released.

5.27.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.27.5 Impact on signalling at the T reference point

This service is normally classified as local. A public ISDN can transfer a call to or from a PTN user. The public ISDN is unlikely to use re-routeing, and even if it were to do so internally, the PTN part of the connection path would not be replaced.

A PTN can transfer a call to or from a user of a public ISDN. Even if the PTN uses re-routeing, only the connection paths within the PTN will be replaced. The original connection path through the public ISDN will be retained.

Notifications of transfer in one network should be conveyed across the other network.

Where the PTN transfers together two calls to/from a public ISDN, the result will be a "trombone", i.e. a connection entering the PTN from the public ISDN and then returning to the public ISDN. Apart from being wasteful of resources, this may be illegal in some territories. In some circumstances it might be possible for the PTN to avoid this by requesting the public ISDN to perform the transfer, in which case the service would be classified as cooperative. However, there may be restrictions, such as the need for both calls to be using the same public ISDN access.

5.28 Supplementary Service Add-On Conference (SS-CONF)

5.28.1 Description

This supplementary service permits a user to have simultaneous communication with two or more other users. For each of the other users, the served user first establishes two-way communication with that user and then adds that user on to the conference by connecting the user to the conference bridge.

In addition to adding other users, the served user can remove users from the conference, hold a private conversation with an individual member of the conference, and terminate the conference.

It should be possible for another member of the conference to take over control of the conference (i.e. become the served user), particularly if the served user leaves the conference.

5.28.2 Impact on signalling at the S reference point

The signalling protocol has to support requests for initiating the conference, adding users to the conference, removing users from the conference, establishing private conversations, terminating the conference, etc.. Other users will receive notifications of addition to or removal from the conference.

5.28.3 Impact on signalling at the Q reference point

If the conference bridge is on the served user's PTNX, network signalling is confined to the conveyance of notifications to the non-served users.

If the conference bridge is allowed to be sited at a PTNX other than the served user's PTNX, more complex network signalling will be involved. This will be necessary if another user who is not on the same PTNX as the served user is allowed to take over control of the conference.

5.28.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.28.5 Impact on signalling at the T reference point

This service is normally classified as local. For a call incoming from or outgoing to a public network, either user can add the call into a conference, resulting in a notification to the other network.

Notifications of addition to or removal from a conference in one network should be conveyed across the other network.

If all the calls to be conferenced together by the PTN user are calls to/from a public ISDN, it may be possible for the PTN to invoke the Add-On Conference supplementary service of the public ISDN. This would avoid some unnecessary use of resources. Also some territories may not permit a PTN to connect public ISDN calls together, and using the public ISDN's conference service would avoid the problem. This method of working would be classified as cooperative. However, there may be restrictions, such as the need for all calls to be using the same public ISDN access.

5.29 Supplementary Service Closed User Group (SS-CUG)

5.29.1 Description

This supplementary service enables users to form groups to and from which access is restricted. A specific user may be a member of one or more closed user groups. Members of a closed user group can communicate among themselves but not, in general, with users outside the group.

5.29.2 Impact on signalling at the S reference point

Closed user group requests at call establishment time have to be supported.

5.29.3 Impact on signalling at the Q reference point

Closed user group information has to be conveyed at call establishment time.

5.29.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.29.5 Impact on signalling at the T reference point

A PTN can be a member of a public ISDN closed user group.

The PTN can restrict access to the public ISDN closed user group to certain PTN users by maintaining its own closed user group which has, as a member, the public ISDN closed user group, and restricting access to/from the public ISDN closed user group to PTN users who are members of the PTN closed user group. This method of working is classified as cooperative.

If the PTN does not restrict access in this way, the service is classified as local.

5.30 Supplementary Service Call Pick-Up (SS-CPU)

5.30.1 Description

This supplementary service allows a call which is alerting or parked at a user to be answered by a different, authorised, user. Various methods of providing security are possible.

5.30.2 Impact on signalling at the S reference point

The signalling protocol has to support service requests from served users and notifications to calling users.

5.30.3 Impact on signalling at the Q reference point

There are several ways in which this pick-up could be achieved in the network. Further study is required.

5.30.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.30.5 Impact on signalling at the T reference point

No impact. Incoming calls from public ISDNs can, however, be picked up.

5.31 Supplementary Service Call Park (SS-CPK)

5.31.1 Description

This supplementary service allows the served user to place a call on hold such that it can be picked up by another authorised user, e.g. a paged user. The call will also be retrievable by the served user. The call may be parked either:

- locally against the served user's number; or
- remotely against another user's number, nominated by the served user.

The call will be identifiable either by the number against which it is parked or by some other identifier assigned by the served user at the time of parking.

5.31.2 Impact on signalling at the S reference point

The signalling protocol has to support service requests from the served user and possible indications to the user on which the call is parked and to the parked user.

5.31.3 Impact on signalling at the Q reference point

The signalling protocol has to support notifications to the parked user and parking on a remote user.

5.31.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.31.5 Impact on signalling at the T reference point

Not applicable.

5.32 Supplementary Service Advice of Charge (SS-AOC)

5.32.1 Description

This allows the served user to receive information concerning charges for a call. Three versions of the service provide information on:

1. charging rates at call establishment time and changes to charging rates during a call;
2. cumulative charge information automatically or on request during a call;
3. final charge information when a call is released.

Initially the main interest in this service is the provision of charging information for calls incurring charges in public networks.

5.32.2 Impact on signalling at the S reference point

The signalling protocol has to support the provision of and requests for charging information.

5.32.3 Impact on signalling at the Q reference point

The signalling protocol has to support the provision of and requests for charging information for calls to public networks.

5.32.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.32.5 Impact on signalling at the T reference point

This service is classified as dual. In order to provide this service to PTN users, the PTN can use the corresponding service in the public ISDN to obtain charging information for outgoing calls.

The PTN may provide to its users a different version of the service from that which the public ISDN provides to the PTN. Furthermore it may make adjustments to the charges, e.g. as is the practice in hotels.

5.33 Supplementary Service User-to-User Signalling (SS-UUS)

5.33.1 Description

This supplementary service allows a user to send/receive a limited amount of information to/from another user over the signalling channel in association with a call to the other user.

Three versions of the service permit user-to-user signalling in call control messages during call establishment and call clearing, user-to-user signalling while the called user is being alerted, and user-to-user signalling during the active phase of the call.

5.33.2 Impact on signalling at the S reference point

The signalling protocol should handle explicit requests for use of the service and the conveyance and flow control of user information.

5.33.3 Impact on signalling at the Q reference point

The signalling protocol should handle explicit requests for use of the service and the conveyance and flow control of user information.

5.33.4 Relationship with the corresponding service in public ISDNs

This service is similar to the corresponding service in public ISDNs. Signalling at the S reference point should be compatible with that at the S/T reference point to permit terminal interchangeability.

5.33.5 Impact on signalling at the T reference point

This service is classified as cooperative. A PTN user should be able to use SS-UUS in association with incoming calls from and outgoing calls to public ISDNs.

5.34 Supplementary Service In-Call Modification (SS-IM)

5.34.1 Description

This service enables a user to change within an active call from one set of capabilities, as characterised by bearer capability, low layer compatibility and high layer compatibility information, to another set of capabilities without releasing the end-to-end connection. Further in-call modification back to the original set of capabilities or to another set of capabilities can be performed.

5.34.2 Impact on signalling at the S reference point

The signalling protocol has to support the requests from the served user to the network and from the network to the other user.

5.34.3 Impact on signalling at the Q reference point

The signalling protocol has to convey requests across the network.

5.34.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.34.5 Impact on signalling at the T reference point

Not applicable. Interworking with public ISDNs will be required when the equivalent is offered by public ISDNs.

5.35 Supplementary Service User Status (SS-UST)

5.35.1 Description

This supplementary service allows the served user to interrogate the status (e.g. free, busy, unassigned, do not disturb activated, call forwarding activated) of a PTN number without establishing a connection to that number.

5.35.2 Impact on signalling at the S reference point

The service request and response have to be conveyed.

5.35.3 Impact on signalling at the Q reference point

As for S.

5.35.4 Relationship with the corresponding service in public ISDNs

There is no corresponding service planned for public ISDNs.

5.35.5 Impact on signalling at the T reference point

Not applicable.

5.36 Supplementary Service Multi-Level Precedence and Pre-emption (SS-MLPP)

5.36.1 Description

This supplementary service permits users to assign precedence levels to calls, such that in order to establish a call of a precedence level which is not the lowest the network will pre-empt (clear) existing calls of lower precedence level if occupying network resources or destination resources required by the new call. Precedence levels are selected by users on a per call basis, up to the maximum level authorised. Calls to and from users who do not subscribe to the service, including such users of other networks, will not be pre-empted.

5.36.2 Impact on signalling at the S reference point

The signalling protocol has to support the selection of precedence levels by users and indications to users whose calls are pre-empted.

5.36.3 Impact on signalling at the Q reference point

Precedence levels and indications of pre-emption have to be conveyed.

5.36.4 Relationship with the corresponding service in public ISDNs

This service is not currently planned for European public ISDNs.

5.36.5 Impact on signalling at the T reference point

Not applicable.

5.37 Supplementary Service Call Distribution (SS-DIST)

5.37.1 Description

This supplementary service allows the formation of distribution groups, whereby calls addressed to a distribution group are distributed between the individual users of that group according to some algorithm. The service may also provide for the queueing of calls when all individual users are busy.

5.37.2 Impact on signalling at the S reference point

The signalling protocol has to indicate to a user that an incoming call has been assigned to that user as a result of SS-DIST and provide the identity of the group.

5.37.3 Impact on signalling at the Q reference point

The signalling protocol has to provide for distribution groups that include users from more than one PTNX.

5.37.4 Relationship with the corresponding service in public ISDNs

This service is not currently planned for European public ISDNs.

5.37.5 Impact on signalling at the T reference point

Not applicable.

6 Additional network features

PTNs can offer various features which can improve the handling of certain calls or the performance of the network as a whole, rather than directly benefiting any particular served user. However, indirect benefits may be perceived by users, e.g. the avoidance of calls with inadequate quality of service or the minimising of charges incurred. As there is no served user, these features are not called supplementary services. Instead they are given the name Additional Network Features (ANFs).

This Technical Report lists those ANFs which have been identified as having possible application in PTNs and which may be appropriate for standardization.

NOTE 7

ANFs which have not been standardized can still be supported in a PTN. Signalling protocols will provide escape mechanisms for manufacturer-specific information for the support of ANFs which are not standardized, or for the support of non-standard extensions to standardized ANFs.

In general, ANFs have impact on the signalling protocols only at the Q reference point. At the present time there are no prospects of interworking with equivalent features in public ISDNs.

6.1 Path Replacement (ANF-PR)

This ANF permits an active call's connection through the PTN to be replaced by a new connection, e.g. to obtain a more efficient connection following transfer by join. Use of this ANF in conjunction with other supplementary services or ANFs can ensure that the new connection satisfies certain criteria, e.g. different bearer capability (in conjunction with SS-IM). It is applicable to basic services where a temporary discontinuity in the transfer of user information can be tolerated, e.g. speech, video. If unsuccessful, repeat attempts can be made at intervals as long as the call remains.

6.2 Source routeing information

This ANF permits a PTNX to force subsequent PTNXs to route a call via a specific connection element or elements, rather than allowing routeing to take place on the basis of the destination number. It is used where one PTNX (e.g. an Originating PTNX) is in the best position to determine routeing through subsequent PTNXs.

6.3 Route restriction

This ANF permits an Originating PTNX to indicate to subsequent PTNXs any restrictions which the calling user might have on the choice of connection path to be used for the call, e.g. not allowed long distance calls over public networks.

6.4 Satellite hops

This ANF permits a limit to be placed on the number of satellite links used on a connection path, in order to avoid unacceptable delays to user information.

6.5 Call barring

This ANF allows the possibility of preventing the connecting together of certain PTN users and/or accesses to other networks. The feature is primarily aimed at satisfying regulatory requirements which may exist in some territories.

6.6 Quality of service

This ANF prevents the establishment of calls which exceed limits on certain quality of service parameters (e.g. delay, quantisation distortion) and allows correct compensation for certain other quality of service parameters, e.g. loudness rating.

6.7 Common information

This ANF permits the exchange of various information between end PTNXs. This information does not relate to a particular supplementary service of ANF, but is general information that may be of use to the receiving PTNX. Typically the information will concern the users or gateways to other networks involved in the call, examples being:

- a list of permitted supplementary services or ANFs;
- the capabilities of the terminal employed by a user;
- the identity of a trunk or group of trunks.

Any actions taken by the receiving PTNX are implementation dependent, e.g. to improve network behaviour, to make more effective use of resources.

NOTE 9

Some of this information may be passed on to certain users, e.g. attendants, thereby making this a supplementary service as far as that particular information is concerned.

7 Support of attendants

This clause contains a general description of attendants, the way they operate, and the supplementary services which are of importance for the support of attendants. Annex A contains a list of supplementary services with special significance for attendants.

7.1 General

7.1.1 Description of attendants

An attendant is a PTN user whose prime task is to provide assistance and support to the other users. Typically an attendant will:

- receive incoming calls from other networks, particular where direct dialling in to the PTN is not available, and extend the calls to users of the PTN;
- establish calls, particularly to other destinations in other networks, on behalf of PTN users;
- receive calls which have encountered failure within the PTN and provide assistance.

The distinction between an ordinary PTN user and an attendant is on the basis of the tasks the user is required to perform, i.e. whether the user is there to assist other users. This distinction is not necessarily reflected clearly in the capabilities available to the user. An attendant who is required to perform only modest assistance tasks often requires no greater capabilities than a sophisticated ordinary PTN user. Often a user will act as an attendant on a per call basis, perhaps being awarded greater capabilities when calls requiring assistance arrive. Therefore a whole spectrum of capabilities is possible, the capabilities of a particular user being limited only by his service profile and type of terminal.

For the purpose of this Technical Report, attendants are assumed primarily to provide assistance with voice basic services. The use of attendants to provide assistance with other types of basic service is not precluded.

7.1.2 Provisioning of attendants

Attendants are frequently arranged in attendant groups, the work load being distributed between members of a group by distributing incoming calls between the members in accordance with SS-DIST.

An attendant group or individual attendant can serve part or all of a PTN (e.g. a particular location or a particular organisation) or deal with specific types of call (e.g. calls from particular networks, calls routed to an attendant for particular reasons).

More efficient use of attendants can often be made by concentrating attendants on a specific PTNX or a few PTNXs rather than providing every PTNX with its own attendant(s). In such an arrangement the attendants are said to be centralized. A call at a particular PTNX will, when requiring assistance, be directed to centralized attendants somewhere in the PTN.

An attendant may be a member of more than one group.

7.1.3 Attendant terminals

Each attendant is equipped with a terminal, the complexity of which can vary from a very sophisticated, specialised attendant instrument to a simple telephone. For regular use, specialised instruments are usual, and these are normally of proprietary design to match the capabilities of the local PTNX. For more casual use, e.g. outside normal hours, simpler, more general purpose instruments can be used.

It is assumed in this Technical Report that an attendant's terminal is either an ISDN terminal (functional or stimulus) attached to the PTN at an interface at the S reference point or is a terminal attached to a proprietary interface. Therefore the only standardization required to support the supplementary services needed by attendants are functional signalling protocols for the S and Q reference points. It will be apparent from what follows that most of the supplementary services required are applicable also to ordinary PTN users, and therefore very little additional standardization is required to provide adequate support for attendants.

7.2 Directing calls to attendants

7.2.1 Reasons for directing calls to attendants

Most calls are directed at an attendant as a result of the destination number provided by the calling user. This can be:

- a calling user within the PTN calling alone or on behalf of a held user;
- a calling user outside the PTN supplying a direct dialling in number assigned to an attendant or attendants;
- a calling user outside the PTN supplying a number which identifies a trunk or group of trunks which is not equipped for direct dialling in and whose calls are always directed to an attendant.

In addition, calls can be directed at attendants in various failure situations, e.g.:

- automatic interception by the network to an attendant in the event of failure to reach the requested destination, e.g. number unobtainable, number out of service, no reply, no reply following call transfer (Network Interception supplementary service);
- automatic recall of an attendant in the event of no reply following a previous call transfer by an attendant (see Attendant Handling of Calls, below);
- automatic recall of an attendant when the other user of an active call clears, as a result of attendant invocation of the Serial Call supplementary service (see Attendant Handling of Calls, below);
- invocation of Call Forwarding (unconditionally, on busy or on no reply) or Call Deflection at the called user.

7.2.2 Selection of attendants

A call to be directed to an attendant will have as its destination number the PTN number of the attendant or attendant group. This will enable the call to be routed across the PTN to the PTNX where the attendant or attendant group is situated and cause the call to be awarded to the individual attendant or an attendant from the group. The means by which calls are distributed to attendants in a group is an implementation matter for the PTNX concerned.

The possibility of having a single attendant group distributed across more than one PTNX cannot be ruled out, but would require a special supplementary service. This would involve standardization of the method of distribution and special signalling protocols at the Q reference point. Such a supplementary service is not considered further in this Technical Report.

7.2.3 Night service

It is typical in PTNs for attendant positions to be staffed only at certain times, e.g. during normal office hours, and for special arrangements to be made for handling calls directed at attendants outside those times. For the purpose of this Technical Report an unstaffed attendant or attendant group will be said to be in night mode.

The means of detecting that an attendant or attendant group is in night mode is an implementation matter for the PTNX concerned. Possibilities include:

- an attendant controlled switch, an attendant group being deemed to be in night mode when all individual attendants have switched to night mode;
- automatic switching depending on time of day, day of the week, holidays, etc.;
- PTN management action.

When an attendant or attendant group is in night mode calls will be treated according to supplementary service Night Service. This may involve forwarding to a Night Answer Point, which may be another attendant or attendant group, an ordinary PTN user, or simply an audible alerting device which can be answered by means of the Call Pick Up supplementary service.

7.3 Handling of calls by attendants

An attendant will typically provide assistance to an incoming call by placing the call on hold (Call Hold supplementary service), establishing a call to the destination required by the calling user, and transferring the two together (Call Transfer supplementary service). Transfer is typically invoked while still in the alerting state, requiring recall of the attendant in the event of no reply (Network Interception supplementary service).

Especially when centralized attendants are employed, the transfer of a call by an attendant can often result in inefficient routeing through the PTN of the final call. This can be overcome by using the Path Replacement ANF or the Re-routeing variant of Call Transfer.

If the required destination is busy, the attendant will typically cause the calling user to wait at the busy destination, using the Call Offer supplementary service followed by the Call Transfer supplementary service. Again, in the event of the busy user failing to respond to the waiting call, the attendant will be recalled (Network Interception supplementary service).

Alternatively, the attendant can use the Intrusion supplementary service if a busy destination is encountered.

If a caller wishes to be returned to the attendant after one call so that the attendant can provide assistance in establishing a further call, the attendant can invoke the Serial Call supplementary service.

An attendant is frequently given the authority to override supplementary services at calling or called PTN users, e.g. Do Not Disturb, Call Forwarding, Call Deflection, Calling/Connected Line Identification Restriction, Calling/Connected Name Identification Restriction.

Attendants are sometimes required to establish conferences involving three or more users (Add-On Conference supplementary service).

7.4 Allocation of charges

The normal PTN method of allocating charges incurred by outgoing calls to a public network is to debit the calling user. In the event of the outgoing call being transferred to another user, the charging of the first user stops at the instant of transfer, when charging of the second user begins.

Although the allocation of charges is an implementation matter, it is common practice for any charges incurred by the attendant prior to transfer of an outgoing call to be passed to the transferred user, who will continue to be debited for that call until it terminates or is transferred elsewhere.

7.5 Attendant activation and deactivation of supplementary services

An attendant is frequently given the authority to activate, deactivate and interrogate supplementary services at other PTN users, e.g. Call Forwarding supplementary services, Do Not Disturb supplementary service. More complex management functions may be performed by an attendant but are outside the scope of this Technical Report.

Annex A

Applicability of supplementary services to attendants

This annex lists those supplementary services where applicability to attendants merits special comment. Those supplementary services not listed here are regarded as having equal applicability to attendants and ordinary PTN users.

A.1 Number and name identification services (SS-CLIP, SS-COLP, SS-CNIP, SS-CONP)

An attendant may be granted the ability to override any restriction on the presentation of the number or name.

A.2 Call Forwarding Unconditional (SS-CFU)

Although this supplementary service can be applied to attendants, supplementary service Night Service may be more appropriate.

Calls originated by attendants can be subject to call forwarding. Calls can be forwarded to attendants.

Attendants can be authorised to perform activation, deactivation and interrogation on behalf of served users.

A.3 Call Forwarding on Busy (SS-CFB)

It is anticipated that this supplementary service will not normally be applied to attendants, which normally use call queueing techniques when busy.

Calls originated by attendants can be subject to call forwarding. Calls can be forwarded to attendants.

Attendants can be authorised to perform activation, deactivation and interrogation on behalf of served users.

A.4 Call Forwarding on No Reply (SS-CFNR)

Although this supplementary service can be applied to attendants, supplementary service Night Service may be more appropriate.

Calls originated by attendants can be subject to call forwarding. Calls can be forwarded to attendants.

Attendants can be authorised to perform activation, deactivation and interrogation on behalf of served users.

A.5 Call Deflection (SS-CD)

An attendant is unlikely to be granted the ability to use this supplementary service.

Calls originated by attendants can be subject to call deflection. Calls can be deflected to attendants.

A.6 Controlled Diversion (SS-CDIVI and SS-CDIVC)

These services are particularly useful for attendants, but can also be granted to ordinary PTN users.

A.7 Night Service (SS-NS)

This service is particularly aimed at attendants having the ability to switch to night mode.

Calls originated by attendants can be subject to SS-NS at destinations able to activate night mode, e.g. other attendants. Calls can be forwarded to attendants as a result of SS-NS.

A.8 Network Interception (SS-NI)

This service is particularly useful for attendants, but can also apply to ordinary PTN users. Various categories of failed calls can be intercepted to attendants. SS-NI can also provide the recall of attendants when transferred calls fail to be answered.

A.9 Do Not Disturb (SS-DND)

An attendant is unlikely to be granted the ability to use this supplementary service.

Calls originated by attendants may encounter a do not disturb condition.

Attendants may be authorised to activate, deactivate and interrogate the service on behalf of ordinary PTN users.

A.10 Do Not Disturb Override (SS-DNDO)

This supplementary service will typically be used by attendants, although it can also be used by ordinary PTN users.

A.11 Serial Call (SS-SC)

The service is typically used by attendants when a caller asks to speak to a number of PTN users in turn.

A.12 Completion of Calls to Busy Subscriber (SS-CCBS)

This service can be used by attendants as well as ordinary PTN users. It is anticipated that this service will not normally be applicable to calls to attendants, which normally use call queueing techniques when busy.

A.13 Completion of Calls on No Reply (SS-CCNR)

This service can be used by attendants as well as ordinary PTN users. Applicability to calls to attendants needs further investigation during stage 1.

A.14 Call Waiting (SS-CW)

Although, in principle, SS-CW can apply to attendants, in practice more sophisticated queueing arrangements are likely to be required in some situations, e.g. a greater number of queued calls, distribution of queued calls between attendants in a group, prioritisation of calls, attendant control over order of answering.

A.15 Call Offer (SS-CO)

As well as applying to ordinary PTN users, this supplementary service is of fundamental importance to attendants, particularly in conjunction with SS-CT.

It is anticipated that this service will not normally be applicable to calls to attendants, which normally use call queueing techniques when busy.

A.16 Intrusion (SS-INTR)

This service is particularly useful for attendants, but can also be granted to ordinary PTN users.

It is anticipated that this service will not normally be applicable to calls to attendants, which normally use call queueing techniques when busy.

A.17 Call Hold (SS-HOLD)

As well as applying to ordinary PTN users, this supplementary service is of fundamental importance to attendants.

A.18 Call Transfer (SS-CT)

As well as applying to ordinary PTN users, this supplementary service is of fundamental importance to attendants.

Calls can be transferred to an attendant.

A.19 Add-On Conference (SS-CONF)

This service can be used by attendants as well as ordinary PTN users, e.g. to converse with two users simultaneously prior to transfer, or to establish a multi-party conference on behalf of the participating users.

A.20 Call Park (SS-CPK)

As well as applying to ordinary PTN users, this supplementary service is particularly useful for attendants.

A.21 User Status (SS-UST)

This service is particularly useful for attendants, e.g. to investigate reports of problems.

A.22 Call Distribution (SS-DIST)

This supplementary service can be used to distribute calls between members of an attendant group.

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ECMA
114 Rue du Rhône
CH-1204 Geneva
Switzerland

Fax: +41 22 849.60.01
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