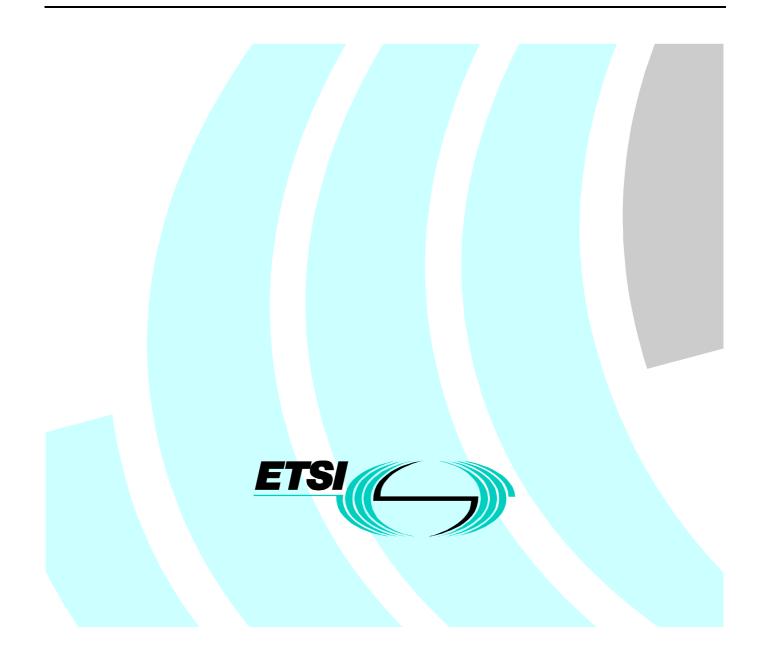Draft **ETSI EN 301 479** V1.1.2 (1999-12)

European Standard (Telecommunications series)

Integrated Services Digital Network (ISDN);
Line Hunting (LH) supplementary service;
Service description

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

In accordance with CCITT Recommendation I.130 [1], the following three level structure is used to describe the supplementary telecommunications services as provided by European public telecommunications operators under the pan-European Integrated Services Digital Network (ISDN):

-   Stage 1: is an overall service description, from the user's standpoint;

-   Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1; and

-   Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

The present document details the stage 1 aspects (overall service description) for the Line Hunting (LH) supplementary service. Stage 2 will be specified later in the ETS 300 356 [8] series. Stage 3 aspects are detailed in EN 301 484-1 [7].

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

The present document defines the stage one of the Line Hunting (LH) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications operators. Stage one is an overall service description from the user's point of view (see CCITT Recommendation I.130 [1]), but does not deal with the details of the human interface itself.

The present document defines the interworking requirements of private ISDNs with the public ISDN.

In addition the present document specifies the base functionality where the service is provided to the user by a private ISDN.

The present document does not specify the additional requirements where the service is provided to the user via a telecommunications network that is not an ISDN but does include interworking requirements of other networks with the public ISDN.

Interactions with (supplementary) services not listed in clauses 8 and 9 are outside the scope of the present document.

Charging principles are outside the scope of the present document.

The LH supplementary service enables calls to a single ISDN number to be offered to a free access in a group of accesses to which terminals are connected to an end-user's multiple access group (S/T reference point).

The principles for the selection of a free channel within an access are a network provider matter as part of the basic call procedures and so are outside the scope of the present document.

The LH supplementary service is applicable to all circuit-switched telecommunications services with the exception of services requiring the use of more than one B-channel.

The present document is applicable to the stage two and stage three standards for the ISDN LH supplementary service. The terms "stage two" and "stage three" are also defined in CCITT Recommendation I.130 [1]. Where the text indicates the status of a requirement, (i.e. as strict command or prohibition, as authorization leaving freedom, as a capability or possibility), this shall be reflected in the text of the relevant stage two and stage three standards.

Furthermore, conformance to the present document is met by conforming to the stage three standards with the field of application appropriate to the equipment being implemented. Therefore no method of testing is provided for the present document.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[2] ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".

[3] ITU-T Recommendation I.210 (1993): "Principles of telecommunication services supported by an ISDN and the means to describe them".

[4]   ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".

[5]   ITU-T Recommendation I.221 (1993): "Common specific characteristics of services".

[6]   EN 300 089: "Integrated Services Digital Network (ISDN) and Public Switched Telephone Network (PSTN); Calling Line Identification (CLI) supplementary services; Service description; Network enhancements for presentable numbers".

[7]   EN 301 484-1: "Integrated Services Digital Network (ISDN); Line Hunting (LH) supplementary service; Digital Subscriber Signalling System No. one (DSS1); Part 1: Protocol specification".

[8]   ETS 300 356: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface".

3   Definitions

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

access: general term, used in the present document, denoting basic accesses and as a network provider option, primary rate accesses

access identity: means of identifying an individual access belonging to a hunt group; the access identity consists of the hunt group number plus a sequence number identifying the individual access within the hunt group

Integrated Services Digital Network (ISDN): see ITU-T Recommendation I.112 [2], subclause 2.3, definition 308

service; telecommunications service: see ITU-T Recommendation I.112 [2], subclause 2.2, definition 201

supplementary service: see ITU-T Recommendation I.210 [3], subclause 2.4

ISDN number: number conforming to the numbering plan and structure specified in ITU-T Recommendation E.164 [4]

basic access: see ITU-T Recommendation I.112 [2], subclause 2.4, definition 425

primary rate access: see ITU-T Recommendation I.112 [2], subclause 2.4, definition 426

free access: access to which the call can be offered without exceeding the number of used B-channels specified for this access

hunt group: number of accesses over which the LH supplementary service applies for the assigned ISDN number. A hunt group may consist of a single access

hunt group number: ISDN number, to which the LH supplementary service is allocated and to which ISDN basic services and supplementary services relating to the hunt group are allocated.

hunt group withdrawal: request by an access of the hunt group in order to temporarily prevent this access from receiving calls to the hunt group (existing calls are not affected)

individual number: (in the context of the present document) ISDN number which is not a hunt group number, but which can be associated with an access that belongs to a hunt group in order to identify one or more terminals connected to the access

served user: user to whom the LH supplementary service is provided

basic call procedures: procedures by which a call (as an instance of a basic telecommunications service) is established and terminated

network determined user busy: see ITU-T Recommendation I.221 [5], subclause 2.1.4

user determined user busy: see ITU-T Recommendation I.221 [5], subclause 2.1.4

sequential hunting: selection of a free access always starts with the same access and then follows a fixed order until all accesses in the hunt group have been searched or a free access is found

cyclic hunting: selection of a free access always starts at the next access after the one used last, and follows a fixed order. When the last access in the group is reached, the search continues from the beginning of the group until all accesses in the group have been searched

default number: defined for the CLIP service in EN 300 089 [6]

 In order to provide consistency from a customer perspective the same default number may be associated with all the accesses that go to a user installation. In this situation the default number is a Hunt Group Number and the Hunt Group it relates to contains all the accesses that go to a user installation.

end-user: user who is connected at the S/T-reference point

S/T-reference point: see ITU-T Recommendation I.221 [5]

4   Abbreviations

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

BA	Basic Access
ISDN	Integrated Services Digital Network
LH	Line Hunting
PRA	Primary Rate Access

5   Description

The LH supplementary service is intended for use on accesses at the S/T-reference point.

The LH supplementary service shall be available to users who are connected to the network via:

- a basic access and/or as a network operator option a PRA.

The LH supplementary service enables calls to an ISDN number (i.e. the hunt group number) to be offered to a free access in a hunt group. The hunt group can comprise basic accesses, primary rate accesses, or a mixture of these types of accesses.

The LH supplementary service applies to accesses within a hunt group that are connected to the same exchange. As a network operator option the LH supplementary service can be used to create a multi-nodal service that allows line hunting across accesses on multiple exchanges. The specification of the multi-nodal service is outside the scope of the present document, however annex A considers some of the implications of this service.

NOTE 1: The individual accesses that are members of the hunt group can also have individual numbers (e.g., with the multiple subscriber number supplementary service) allocated.

NOTE 2: For some networks, calls made to an individual number (see note 1) may be offered on the corresponding access without being subject to hunting procedures (channel hunting may be performed within the access itself).

It is the user's responsibility to ensure compatibility of the equipment connected to an access in a hunt group.

The served user can determine at subscription for each access how many B-channels shall be available for the hunt group. A call to the hunt group can only be presented to an access, if the number of used B-channels specified for an access will not be exceeded (independent of the required telecommunications service).

NOTE 3: In order to minimize the user determined user busy condition after the call has been presented to an access, the user should only allocate as many B-channels for each access of the hunt group, as compatible terminals are connected to that access. An access may only be a member of one hunt group.

The method of selecting an access shall be either sequential or cyclic hunting.

An access in a hunt group can activate "hunt group withdrawal" to be temporarily prevented from receiving calls to the hunt group, if this option is subscribed to.

As a subscription option the served user can receive an indication that the served user's access is currently withdrawn from the hunt group. This indication shall be provided when the served user originates a call on the access, which is withdrawn from the hunt group.

Services can be subscribed to on the hunt group identified by the hunt group number. Some supplementary services on the hunt group number which need special authorization can only be activated and deactivated from an access which is a member of the hunt group and on which the option "activation allowance" is subscribed to. These supplementary services are listed in clause 8.

NOTE 4: Services can also be subscribed to on an individual access defined by its individual number (e.g., with the multiple subscriber number supplementary service).

6   Procedures

6.1   Provision and withdrawal

The LH supplementary service shall be provided after prior arrangement with the service provider. To establish the hunt group, a list of the accesses shall be provided to identify the members of the hunt group. It shall be possible to allocate more access interfaces to a multiple access group when the LH supplementary service is already activated.

As a service provider option, the LH supplementary service can be offered with a number of subscription options. The subscription option applying to the whole hunt group is shown in table 1. The subscription options applying to each access in a hunt group are summarized in table 2.

Table 1: Subscription option applying for the whole hunt group

Subscription Option	Values
Selection Method	- sequential hunting - cyclic hunting

If the LH supplementary service is provided without the subscription option "selection method", the service provider shall determine the selection method.

Table 2: Subscription options applying to each access in a hunt group

Subscription option	Values
Number of B-channels available for the hunt group	value 1 or 2 for BA and 1 to 30 for PRA
Activation allowance (for supplementary services related to the hunt group)	- yes - no
Hunt group withdrawal	- available - not available
User receives notification, that his access is currently withdrawn from one or more hunt groups	- yes - no

If the service provider does not offer the subscription option "number of B-channels available for the hunt group", then all B-channels of the access shall be available for the hunt group.

If the service provider does not offer the subscription option "activation allowance", then the supplementary services subscribed for the whole hunt group can be activated and deactivated from all accesses which are member of the hunt group.

If the service provider does not offer the subscription option "hunt group withdrawal", then the accesses can not be withdrawn from the hunt group.

If the service provider does not offer the subscription option "user receives notification, that his access is currently withdrawn form one or more hunt groups", then the user will receive no notification if his access is withdrawn from a hunt group.

The LH supplementary service shall be withdrawn by the service provider upon request of the subscriber or for service provider reasons.

6.2 Normal procedures

6.2.1 Activation, deactivation and registration

The LH supplementary service shall be activated on provision and deactivated on withdrawal. The LH supplementary service requires no registration.

According to the value of the subscription option "Hunt group withdrawal", a user whose access is in a hunt group, can, by means of control procedures associated with the access, request that calls to the hunt group shall not be presented to that user's access. After a user has requested that an access shall temporarily be withdrawn from the hunt group, invocation of the LH supplementary service shall not select that access for the presentation of calls.

A withdrawal request on an access that already has been withdrawn from the hunt group shall be accepted and a positive response shall be given.

After a user has temporarily prevented an access which is a member of a hunt group from receiving calls, that user can cancel this arrangement by means of control procedures. As a result of this cancellation, calls to the hunt group can be presented to this access once again.

A request for cancellation of a withdrawal on an access that has not been withdrawn from the hunt group shall be accepted and a positive response shall be given.

When the served user originates a call and if his access is withdrawn from the hunt group, according to the subscription option he will be informed about that.

6.2.2 Erasure

Not applicable.

6.2.3 Invocation and operation

The LH supplementary service shall be invoked automatically by the network on calls to a hunt group number. A free access in the hunt group shall be selected according to the selection method provided to the user.

Once an access is selected, the network shall indicate the arrival of an incoming call to users on that access including the hunt group number as the called party number.

The served user's ability to originate calls shall be unaffected by the LH supplementary service.

6.2.4 Interrogation

In response to an interrogation request the served user shall be given the status of the access for the hunt group that the access belongs to.

6.3 Exceptional procedures

6.3.1 Activation, deactivation and registration

If the service provider cannot comply with the request for hunt group withdrawal, the service provider shall reject the request and give the reason for rejection. Possible reasons for rejection are:

- when the served user requests withdrawal on an access that is not allowed to be withdrawn from the hunt group; or

- when hunt group withdrawal is not supported by the service provider.

If the service provider cannot comply with the request to cancel hunt group withdrawal, the service provider shall reject the request and give the reason for rejection. Possible reasons for rejection are:

- when hunt group withdrawal is not supported by the service provider.

6.3.2 Erasure

Not applicable.

6.3.3 Invocation and operation

If no free access is available, the LH supplementary service shall be considered unsuccessful and the call establishment shall be ceased. This shall be indicated to the calling user according to the basic call procedures.

Once the network has indicated the arrival of the incoming call to the users on an access, then failures due to called user state shall be reported by means of basic call procedures.

If all accesses have been withdrawn from a hunt group, the hunt group shall be considered as network determined user busy and call establishment shall be ceased. This shall be indicated to the calling user according to the basic call procedures.

If a user determined user busy condition results from presenting a call to an access, then the selection mechanism shall make only one more attempt to select another free access. If hunting has already been continued once, then the call shall be treated as user determined user busy according to the basic call procedures.

6.3.4 Interrogation

If the request to interrogate the LH supplementary service includes a hunt group number and that number is not allocated to the access on which the request is made, the request for the interrogation of the LH supplementary service shall be rejected.

7 Intercommunication considerations

7.1 Interworking with non-ISDNs

The LH supplementary service can be invoked on calls which originate in non-lSDNs.

7.2 Interworking with private ISDNs

Not applicable.

8 Interaction with other supplementary services

Distinction can be made between:

1) provisioning of the supplementary service to the whole LH-group defined by its group number; and

2) provisioning of the supplementary service to an individual access defined by its individual number.

This will be clarified per supplementary service starting from clause 8.7. The supplementary service can be provisioned to both the individual access and to the LH-group if the text indicates that there is no impact.

The following supplementary services on the hunt group number which need special authorization can only be activated and deactivated from an access which is a member of the hunt group and on which "activation allowance" is subscribed to:

- call forwarding unconditional supplementary service;

- call forwarding busy supplementary service;

- call forwarding no reply supplementary service;

- selective call forwarding supplementary service;

- outgoing call barring - user controlled supplementary service.

The subclauses below detail the interaction between the LH supplementary service and other supplementary services provided for this hunt group number.

For incoming calls to the hunt group number, any supplementary services provided to an access related individual ISDN number shall not be considered.

When the user on an access of the hunt group originates a call, then only the supplementary services provided to the calling party number given by that user shall apply. If no calling party number is given by that user or if he gives an invalid calling party number, then the supplementary services provided to the default number (i.e., either a hunt group number or a individual number) of that access shall apply.

In order to activate, deactivate or interrogate supplementary services allocated to a hunt group number, this number has to be indicated as the served user's number. If the served user's number is invalid or missing, the request for activation, deactivation or interrogation shall be rejected.

NOTE: If a supplementary service allocated to an individual number shall be activated, deactivated or interrogated, that number has to be indicated as the served user's number by the user.

8.1 Advice of charge services

8.1.1 Advice of charge at call set-up time

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.1.2 Advice of charge during the call

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.1.3 Advice of charge at the end of a call

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.2 Call waiting

The call waiting supplementary service shall not be provided for a hunt group number.

8.3 Call hold

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.4 Explicit call transfer

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.5   Number identification services

8.5.1   Calling line identification presentation

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

> NOTE 1:   In order to provide consistency from a user perspective the same default number may be associated with all the accesses that are in all of the hunt groups that go to a user installation.

> NOTE 2:   If the calling user does not supply a number and does not activate CLIR then the calling line identification restriction supplementary service activation status against the default number for the access on which the call originated shall apply.

8.5.2   Calling line identification restriction

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.5.3   Connected line identification presentation

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

> NOTE: If the connected user supplies a number, then the connected line identification restriction supplementary service subscribed to the number, that is sent to the calling user, applies. If the connected user does not supply any number, then the default number (i.e., either a hunt group number or a individual number) applies.

8.5.4   Connected line identification restriction

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.6   Closed user group

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.7   Call completion services

8.7.1   Completion of calls to busy subscriber

The completion of calls to busy subscriber supplementary service can be activated on calls towards a hunt group, or to the individual access defined by its individual number. A hunt group member who originates a call with the individual number as the calling party number will be able to activate the CCBS supplementary service if it is subscribed to. It should not be possible to subscribe a hunt group number to the CCBS supplementary service.

> NOTE: If completion of calls on busy supplementary service is invoked from a hunt group member and the hunt group number is given as the calling party number then the CCBS recall may not be returned to the originator of the CCBS request.

8.7.2   Completion of calls on no reply

The completion of calls on no reply supplementary service can be activated on calls towards a hunt group, or to the individual access defined by its individual number. A hunt group member who originates a call with the individual number as the calling party number will be able to activate the CCNR supplementary service if it is subscribed to. It should not be possible to subscribe a hunt group number to the CCNR supplementary service.

NOTE: If completion of calls on no reply supplementary service is invoked from a hunt group member and the hunt group number is given as the calling party number then the CCNR recall may not be returned to the originator of the CCNR request.

8.8   Conference services

8.8.1   Conference call, add-on

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.8.2   Conference call, meet-me

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.9   Direct dialling in

Not applicable.

8.10   Diversion services

8.10.1   Call forwarding unconditional

When the call forwarding unconditional supplementary service has been activated, then the call forwarding unconditional supplementary service shall take precedence over the LH supplementary service.

If the call forwarding unconditional supplementary service has been activated, a notification that the call has been forwarded shall not be given to the served user.

8.10.2   Call forwarding busy

When the call forwarding busy supplementary service has been activated, then the call forwarding busy supplementary service shall be invoked, when:

-   all accesses are either network determined user busy or withdrawn form the hunt group; or

-   the selected access is user determined user busy.

If the call forwarding busy supplementary service has been activated as result of network determined user busy, a notification that the call has been forwarded shall not be given to the served user.

If the call forwarding busy supplementary service has been activated as result of user determined user busy, a notification that the call has been forwarded shall be sent to the access to which the call has been presented.

8.10.3   Call forwarding no reply

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

If the call forwarding no reply supplementary service has been activated, a notification that the call has been forwarded shall be sent to the access to which the call has been presented.

8.10.4   Call deflection

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.10.5   Selective call forwarding

When the selective call forwarding supplementary service has been activated unconditionally and if an incoming call matches the selection conditions, then the selective call forwarding supplementary service shall take precedence over the LH supplementary service.

When the selective call forwarding supplementary service has been activated on busy and if an incoming call matches the selection conditions, then the selective call forwarding supplementary service shall be invoked, when:

-   all accesses are either network determined user busy or withdrawn form the hunt group; or

-   the selected access is user determined user busy.

If the selective call forwarding supplementary service has been activated on busy as result of network determined user busy, a notification that the call has been forwarded shall not be given to the served user.

If the selective call forwarding supplementary service has been activated on busy as result of user determined user busy, a notification that the call has been forwarded shall be sent to the access to which the call has been presented.

When the selective call forwarding supplementary service has been activated on no reply, then there is no impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.11   Freephone

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.12   Malicious call identification

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.13   Multiple subscriber number

The individual basic or primary rate accesses that are members of the hunt group can also have individual numbers by using the multiple subscriber number supplementary service.

8.14   Subaddressing

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.15   Terminal portability

A call can be retrieved only from the BA on which it was suspended.

   NOTE: Provision to the number of an individual access is required only for BAs.

8.16   Three party

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.17   User-to-user signalling

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.18   Hunting services

8.18.1   Line hunting

Not applicable.

8.18.2   Trunk hunting

Not applicable.

8.19   Call barring services

8.19.1   Outgoing call barring-fixed

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.19.2   Outgoing call barring-user controlled

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

9   Interaction with other services

9.1   Universal access number

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

9.2   Virtual card calling

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary `service`.

9.3   Premium rate

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

9.4   Universal personal telecommunication

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

   NOTE: Interaction with incoming UPT call: UPT incoming calls may be directed toward accesses where the UPT user is not available.

9.5   Remote control

The LH supplementary service can be remotely controlled. The access identity shall be used to identify the access within a hunt group.

Annex A (informative):
Consideration Of A Multi-Nodal Line Hunting Service.

As an option network operators can use the LH supplementary service to create a line hunting service that offers calls to a number of geographically separate locations via multiple nodes. This service can be considered as a higher layer service (i.e. a service that exists in the Intelligent Network) that makes use of a number of instances of the LH supplementary services that are on the different nodes.

Some aspects of the LH supplementary service have an impact on the multi-nodal service and these are considered in this annex. It should be noted that this annex is not considered to be an exhaustive assessment of the impact on the multi-nodal service and providers of this service should carry out their own studies.

Hunt Group Withdrawal

When a user invokes Hunt Group Withdrawal the number of accesses available at the local node is reduced. If the higher layer service contains a list of the accesses available on the local node then the use of the Hunt Group Withdrawal feature may need to be communicated to the higher layer service in order to keep the list up to date.

No Free Accesses Available At A Local Node

The multi-nodal line hunting service will be aware of the calls that it is offering to the local nodes and hence can track the number of channels that are being used by the calls it has offered to the Hunt Group. The availability of accesses is dependent upon both the terminating traffic, the originating traffic and the use of the Hunt Group Withdrawal feature.

It is possible that calls could be offered by the multi-nodal service when the local node doesn't have a free access. In this situation the call will be treated as Network Determined User Busy by the basic call procedures. The higher layer service could have accesses available on other nodes and so will need to intercept the Network Determined User Busy signal in order to re-invoke the multi-node service.

Bibliography

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

- ITU-T Recommendation I.411 (1993): "ISDN user-network interfaces - Reference configurations".

History

Document history			
V1.1.2	December 1999	Public Enquiry	PE 200016: 1999-12-22 to 2000-04-21