INTERNATIONAL TELECOMMUNICATION UNION

# CCITT

# I.255.1

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

(08/92)

## INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

## GENERAL STRUCTURE AND SERVICE CAPABILITIES

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## CLOSED USER GROUP

**Recommendation I.255.1**

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Geneva, 1992

## FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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Recommendation I.255.1 was revised by Study Group I and was approved under the Resolution No. 2 procedure on the 4th of August 1992.

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CCITT NOTES

1) In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized private operating agency.

2) A list of abbreviations used in this Recommendation can be found in Annex A.

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**Recommendation I.255.1**

# CLOSED USER GROUP

*(revised 1992)*

## 1 Definition

The **Closed User Group** 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 specific Closed User Group can communicate among themselves but not, in general, with users outside the group. Specific Closed User Group members can have additional capabilities that allow them to originate calls outside the group, and/or to receive calls from outside the group. Specific Closed User Group members can have additional restrictions that prevent them from originating calls to other members of the Closed User Group, or from receiving calls from other members of the Closed User Group.

*Note* – When defining the ISDN networking service, its relationship with Closed User Group needs to be studied.

## 2 Description

### 2.1 *General description*

A Closed User Group (CUG) is a group of users who may be members of one or several public networks; each ISDN member of a CUG is identified by an ISDN number.

A CUG may be defined independently of any basic service, or in relation with one, or a number of basic services.

*Note* – In the case of integrated services private branch exchange (ISPBXs) some Administrations will accept ISPBX extensions as CUG members. Other Administrations will consider the whole ISPBX as a CUG member. In the former case, it is possible for an ISPBX to establish relations between subsets of its users and public CUGs, but this is not perceived at the user-network interface.

#### 2.1.1 *Access arrangements*

A user may be a member of several CUGs. Each service provider may define the maximum number of CUGs which can be allocated to an individual subscriber. When subscribed to at least one CUG, a user may subscribe to one of the following access arrangements:

– Closed User Group (c);

– Closed User Group with incoming access (c + i);

– Closed User Group with outgoing access (c + o);

– Closed User Group with incoming and outgoing access (c + i + o).

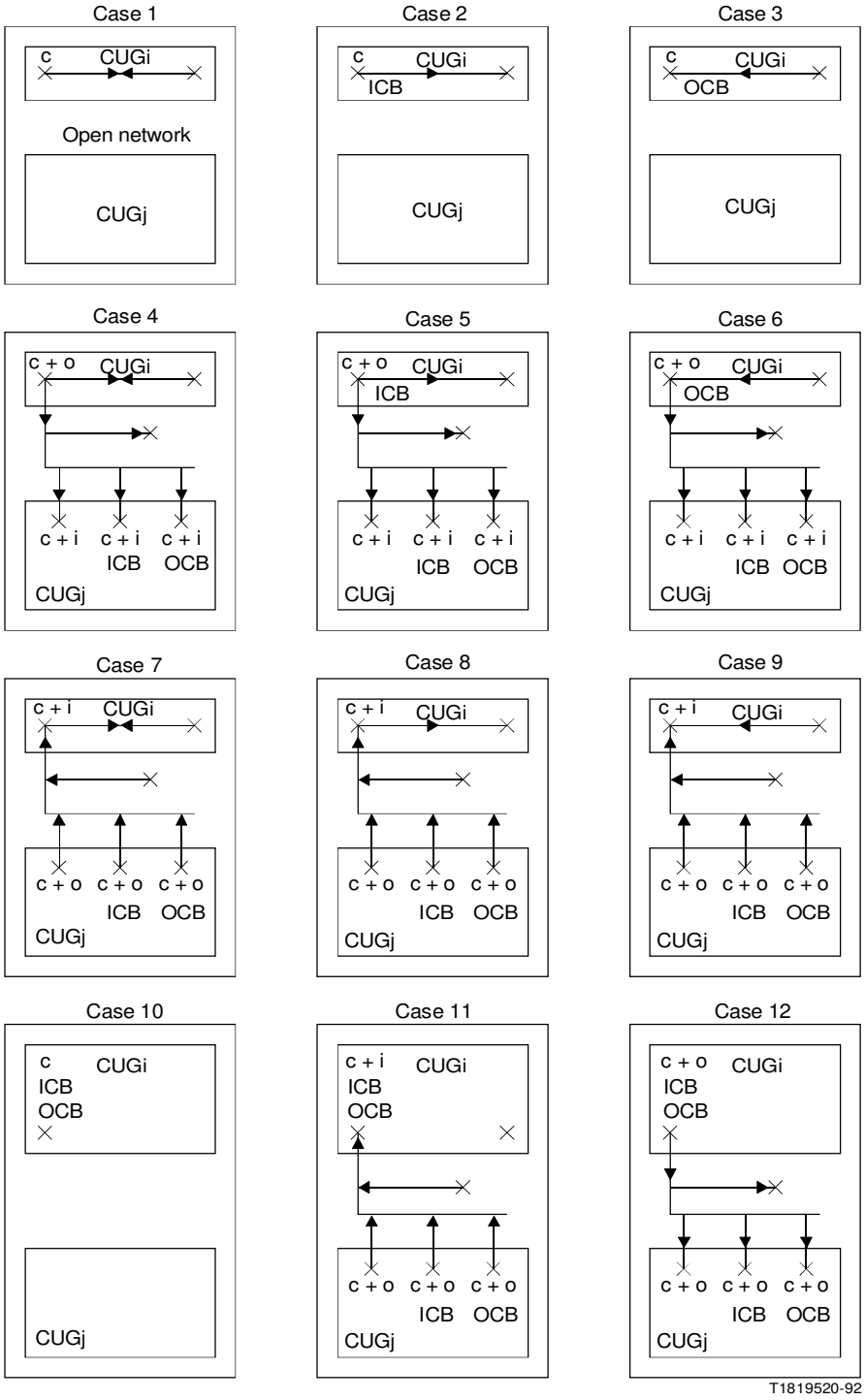
A user may subscribe to one of two additional access restrictions within each particular CUG:

– incoming calls barred within a CUG (ICB);

– outgoing calls barred within a CUG (OCB).

*Note* – This information is held by the provider of this service.

All of these cases are illustrated in Figure 1/I.255.




c CUG
c + o CUG with outgoing access
c + i CUG with incoming access
ICB Incoming calls barred within CUG
OCB Outgoing calls barred within CUG

FIGURE 1/I.255.1

**Access arrangements in CUG**

2.1.1.1 *CUG only capabilities*

The user may make calls to, and receive calls from members of those CUGs of which the user is a member (see case 1 in Figure 1/I.255.1).

An exception to this is when either incoming calls barred within the CUG or outgoing calls barred within the CUG applies.

a) *Incoming calls barred within the CUG:* This access restriction means that a CUG user is prohibited from receiving calls from users subscribed to the same CUG. This access restriction is given per CUG-user and CUG (see case 2 in Figure 1/I.255.1).

b) *Outgoing calls barred within the CUG:* This access restriction means that a CUG-user is prohibited from making calls to users subscribed to the same CUG. This access restriction is given per CUG user and CUG (see case 3 in Figure 1/I.255.1).

The network shall provide a preferential CUG option whereby one of the user's CUGs (or the only one if a single CUG applies) is used as a preferential CUG. If the user sets up a call with no CUG facility request, the network assumes that the preferential CUG is requested (i.e., preferential CUG is the default).

2.1.1.2 *CUG with outgoing access*

The user may make and receive calls in the same way, with the same exception as in § 2.1.1.1. In addition, this user can make calls to all other non-CUG users, and to those other CUG users who allow incoming access. Incoming calls are only allowed from members of the user's CUG(s) (see cases 4, 5, and 6 in Figure 1/I.255.1).

2.1.1.3 *CUG with incoming access*

The user may make and receive calls in the same way with the same exceptions as in § 2.1.1.1. In addition, this user may receive calls from any non-CUG user and also from other CUG users who have outgoing access. Outgoing calls are only allowed to members of the user's CUG(s) (see cases 7, 8, and 9 in Figure 1/I.255.1).

2.1.1.4 *CUG with incoming and outgoing access*

The outgoing access and incoming access can be offered simultaneously to the user by the service provider.

2.1.2 *Interaction between the options "Preferential CUG" and "Outgoing Access"*

Both options imply that no subscriber procedures are needed to invoke either of them when placing a call. When a user subscribes to both options, the service provider does not know which option the user is invoking, if no additional subscriber procedures are used when placing the call.

Three ways of operating are recommended:

1) the user has to indicate if a call is intended to be an outgoing access call. If no information (CUG request or outgoing call request) is given, the preferential CUG is assumed;

2) the combination of the options is not allowed, i.e. a user cannot have both options allocated at the same time;

3) the caller may make a call and the network will route the call with the preferential CUG and an outgoing access request. The call will therefore be connected if the called number is a member of the preferential CUG or is a member of a different CUG and has incoming access, or is a non-CUG user.

The choice of operation is a national option.

2.2 *Specific terminology*

None.

2.3 *Qualifications on the applicability to telecommunication services*

None identified.

## 3 Procedures

3.1 *Provision/withdrawal*

The CUG service is provided on a subscription basis. As a network provider option, CUG can be offered with several subscription options. The subscriber options may apply separately to each ISDN number and basic service, or apply to a particular ISDN number for a set of basic services (see Tables 1A/I.255.1 and 1B/I.255.1).

TABLE 1A/I.255.1

**General subscription options**

| Subscription option | Value |
|---|---|
| Closed User Groups | List of one or more CUGs |
| Intra-CUG restrictions (for each CUG) | None<br>Incoming (terminating) calls barred<br>Outgoing (originating) calls barred |
| Applicability to basic services | List of one or more basic services<br>All basic services |

TABLE 1B/I.255.1

**Per service subscription options**

| Subscription option | Value |
|---|---|
| Preferential CUG | None designated (see Note 1)<br>CUG value |
| Type of inter-CUG access (in/out of CUG) | None<br>Outgoing access<br>Incoming access<br>Outgoing and incoming access |

*Note 1* – The user should specify a preferential CUG when the type of inter-CUG access option is set to "none" or "incoming access"

*Note 2* – The combination of preferential CUG and outgoing calls barred with the preferential CUG is not a valid combination.

3.2 *Normal procedures*

3.2.1 *Activation/deactivation/registration*

The CUG supplementary service shall be activated on provision and deactivated on withdrawal by the service provider.

3.2.2 *Invocation and operation*

Normal call set-up procedures will apply to all CUG calls. In addition, the network shall carry out internal checks to determine whether or not the particular call is allowed between the two parties concerned.

3.2.2.1 *Outgoing (originating) calls*

At the time of call set-up the user specifies a CUG index to indicate that service to a particular CUG is requested. The user includes a request for a CUG service and the relevant CUG index in the setting up of the call. The CUG indices are allocated by prior arrangements with the service provider. Withdrawal of the CUG service, or indices will be an action of the service provider at the request of the user or due to service provider reasons.

When requesting an outgoing access capability, the user makes a normal call.

If the user sets up a call without requesting the CUG service and the user has a preferential CUG, the network assumes that the preferential CUG is requested.

The choice of preferential CUG will only be alterable by service provider action.

If a user has subscribed to the CUG supplementary service and has the outgoing access capability, then if this user explicitly requests the outgoing access capability without indicating a Closed User Group, the information will be discarded and a normal call will result.

If a user requests the CUG supplementary service with both a closed user group index and a request for the outgoing access capability, then the network will use the Closed User Group provided and the outgoing access information will be discarded. Note that in the case of a network supporting option 3) in Section 2.1.2, both the Closed User Group and the outgoing access information may be conveyed through the network.

If the user does not provide their number, provides an invalid number, or the user provides an unscreened number (see the Calling Line Identification Presentation (CLIP) supplementary service special arrangement), the network will use the default number for the purposes of the CUG supplementary service.

3.2.2.2 *Incoming (terminating) calls*

An incoming call from another CUG member will be indicated to the called CUG user with a CUG indication and the appropriate CUG index.

An incoming call from a non-CUG user, assuming that the called CUG user has incoming access allowed, will contain no CUG related information in the call offering message.

An incoming call from a CUG user using outgoing access, to a CUG user subscribed to a different CUG but with incoming access, will contain no CUG related information in the call offering message.

3.3 *Exceptional procedures*

3.3.1 *Activation/deactivation/registration*

None identified.

3.3.2 *Invocation and operation*

If a request for the CUG supplementary service does not contain a CUG index, then the CUG part of the call request shall be discarded.

Upon receipt of a request for CUG service the network shall check its validity in conjunction with the access capabilities contained in the user profile. If a non-valid request is received or the checks cannot be performed, then the network shall reject the call and return an appropriate indication to the calling user.

If, due to an interworking situation, signalling in the network is not able to carry the information required to provide the service, the call attempt is terminated and an appropriate cause is given to the calling user.

The network will reject calls to a user who has subscribed to the restriction of incoming calls barred within a Closed User Group for the CUG requested on those calls. The network offers this access restriction per CUG user and per CUG.

The network will reject calls from a user who has subscribed to the restriction of outgoing calls barred within a Closed User Group for the CUG requested on those calls. The network offers this access restriction per CUG user and per CUG.

### 3.4 *Alternative procedures*

#### 3.4.1 *Activation/deactivation/registration*

None identified.

#### 3.4.2 *Invocation and operation*

None identified.

## 4 Network capabilities for charging

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information.

It shall be possible to charge the subscriber accurately for the service.

## 5 Interworking requirements

If, due to an interworking situation, the network is not able to respect the restrictions required to provide the service, the network shall terminate the call attempt and return an appropriate indication to the calling user.

In the case of interworking between public ISDNs, if a call is received which contains a Closed User Group index and indicates that the outgoing access capability is also required, some networks which cannot convey both indications may discard the indication that the outgoing access capability is required, i.e. the call will continue as a CUG call.

### 5.1 *Interworking with non-ISDNs*

A CUG may span over several networks. In this case the responsibility for the management of this CUG is in one of these networks; in addition there is a need for a CUG identification mechanism that would be accepted by all of the encompassed networks. One such mechanism presently exists for CUGs spanning over data networks having Recommendation X.121 as the numbering plan (see Recommendation X.180, Administrative arrangements for international closed user groups). An equivalent mechanism should be defined for CUGs on networks using the E.164 numbering plan, or on networks which do not use the same numbering plan.

### 5.2 *Interworking with private ISDNs*

The public ISDN treats all accesses in the same way. For example, this means that a whole private ISDN belongs to one or more Closed User Groups and that the public ISDN has no knowledge of whether a restriction applies for a certain private ISDN user.

Interworking occurs if a CUG application covers both the public ISDN and private ISDN users. To cover this case, both the public ISDN and the private ISDN will establish individually a corresponding CUG related to that application. Each network treats the other networks' CUG as a single member of its own CUG, by correlating the relevant CUG assigned to the access at the network boundary.

Each ISDN will only be responsible for managing the members of its own CUG and has no knowledge of the restrictions and membership in the corresponding CUG in the other ISDN.

## 6 Interaction with other supplementary services

The intention of CUG is to allow some connections and prohibit others. No supplementary service interaction should be allowed which could compromise this intention.

Calls which are made using incoming or outgoing access arrangements are treated as ordinary calls, i.e. calls on which the CUG supplementary service was not invoked, and originated using the basic call procedures. Therefore normal procedures for supplementary services apply in these cases.

### 6.1 *Call Waiting*

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

### 6.2 *Call Transfer*

The CUG-restrictions must be met:

– between the calling/called party and the transferring party;

– between the transferring party and the transferred-to-party;

– between the calling/called party and the transferred-to-party.

If, and only if, all the above statements are fulfilled, the transfer of the call is allowed.

### 6.3 *Connected Line Identification Presentation*

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

### 6.4 *Connected Line Identification Restriction*

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

### 6.5 *Calling Line Identification Presentation*

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

### 6.6 *Calling Line Identification Restriction*

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

### 6.7 *Closed User Group*

Not applicable.

### 6.8 *Conference Calling*

When the first call is added to the conference, then the conference assumes the CUG of the call. In order to add a subsequent call to the conference, the CUG of that call should be checked against the CUG of the conference.

### 6.9 *Direct-Dialling-In*

Closed User Group membership should not be available on a per Direct-Dialling-In (DDI) number basis, but instead should be on the basis of entire range of ISDN numbers applicable at the access or group of accesses.

6.10 *Call diversion services*

6.10.1 *Call Forwarding Busy*

See § 6.10.3.

6.10.2 *Call Forwarding No Reply*

See § 6.10.3.

6.10.3 *Call Forwarding Unconditional*

CUG restrictions between the calling user and the forwarding user must be met. In the case of multiple forwarding, CUG restrictions between the calling user and the forwarding user have to be met at each intermediate forwarding point. In addition, CUG restriction between the calling and forwarding-to user must be met end-to-end.

*Called user/forward-to user:* When a call is forwarded, a new check of the CUG restrictions between the calling user and forwarded-to user is made at the "forwarded-to" destination. The CUG information sent to the "forwarded-to" destination is the same calling user CUG information that was sent from the originating network.

6.10.4 *Call Deflection*

CUG restrictions between the calling user and the deflecting user must be met. In the case of multiple diversions, CUG restrictions between the calling user and the diverting user have to be met at each intermediate diverting point. In addition, CUG restrictions between the calling and diverted-to user must be met end-to-end.

*Called user/diverted-to user:* When a call is diverted, a new check of the CUG restrictions between the calling user and diverted-to user is made at the "diverted-to" destination. The CUG information sent to the "diverted-to" destination is the same calling user CUG information that was sent from the originating network.

6.11 *Line Hunting*

When a free line of a hunting group has been found, any CUG condition must be met before the connection will be established.

6.12 *Three-Party Service*

For the successful invocation of the Three-Party supplementary service any CUG restrictions applied to one call shall match with any CUG restrictions applied to the other call.

6.13 *User-to-User Signalling*

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

6.14 *Multiple Subscriber Number*

Different closed user groups can be assigned to each multiple subscriber number. The network cannot guarantee that a given Closed User Group matches beyond the access towards the user. As the Closed User Group assignment to the multiple subscriber numbers is the full responsibility of the user, this may lead to restricted applicability of a combination of the Closed User Group and Multiple Subscriber Number (MSN) supplementary services.

6.15 *Call Hold*

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

6.16 *Advice of Charge*

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

6.17 *Multi-Level Precedence and Preemption*

No interaction – Multi-Level Precedence and Preemption (MLPP) does not override CUG restrictions.

6.18 *Priority*

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

6.19 *Malicious Call Identification*

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

6.20 *Outgoing Call Barring*

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

6.21 *Reverse Charging*

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

6.22 *Sub-addressing*

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

## 7 Dynamic description

The dynamic description of this service is shown in Figure 2/I.255.1.

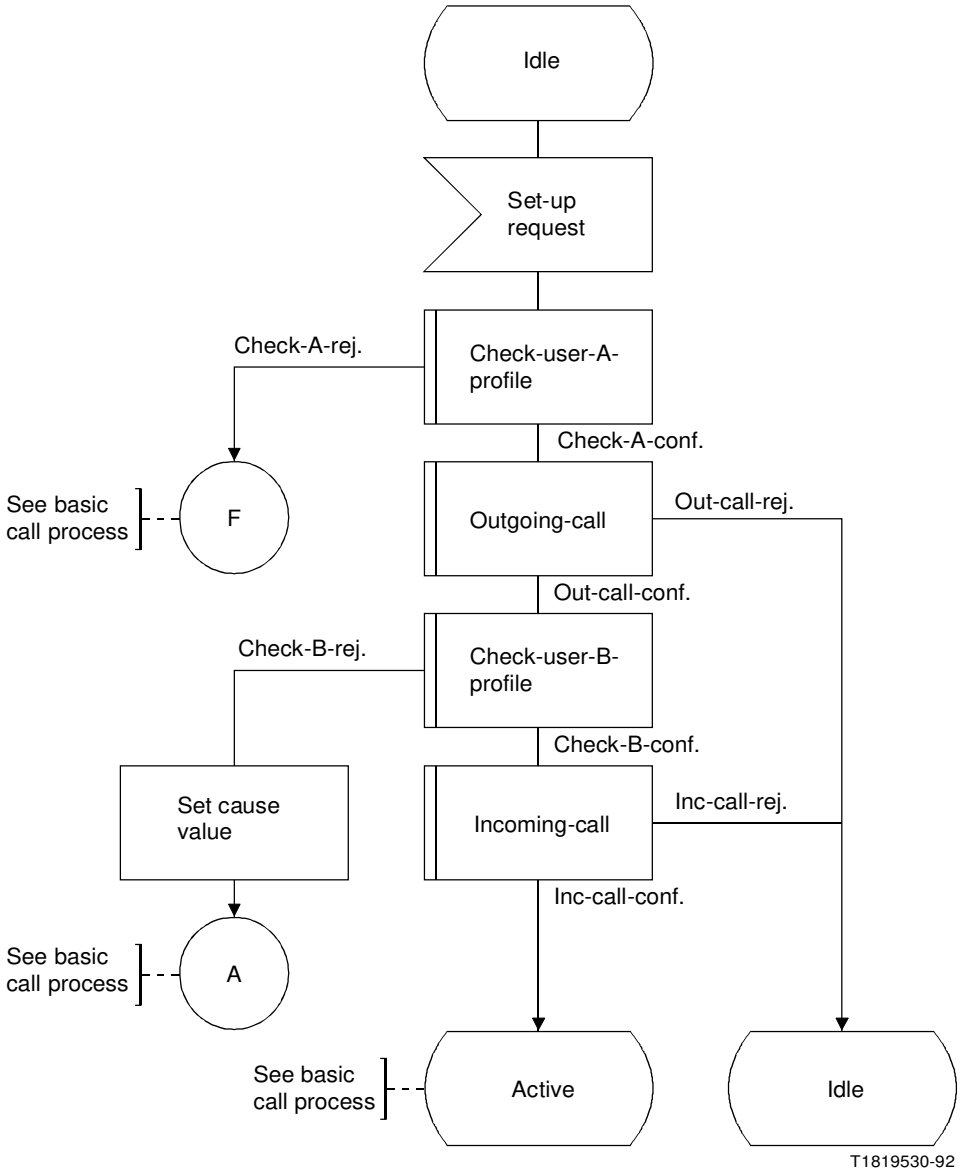



FIGURE 2/I.255.1 (sheet 1 of 4)

**Closed User Group**

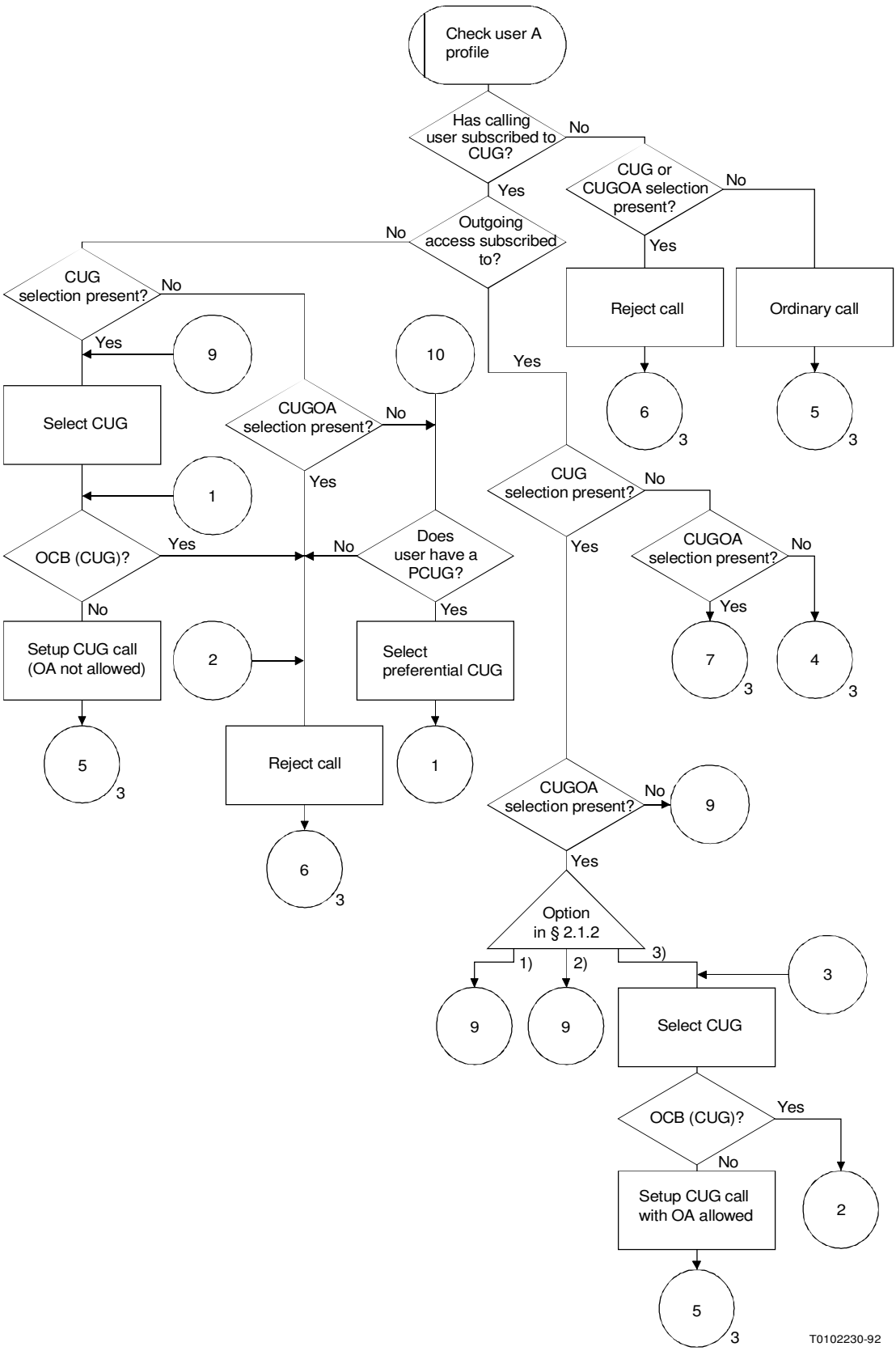
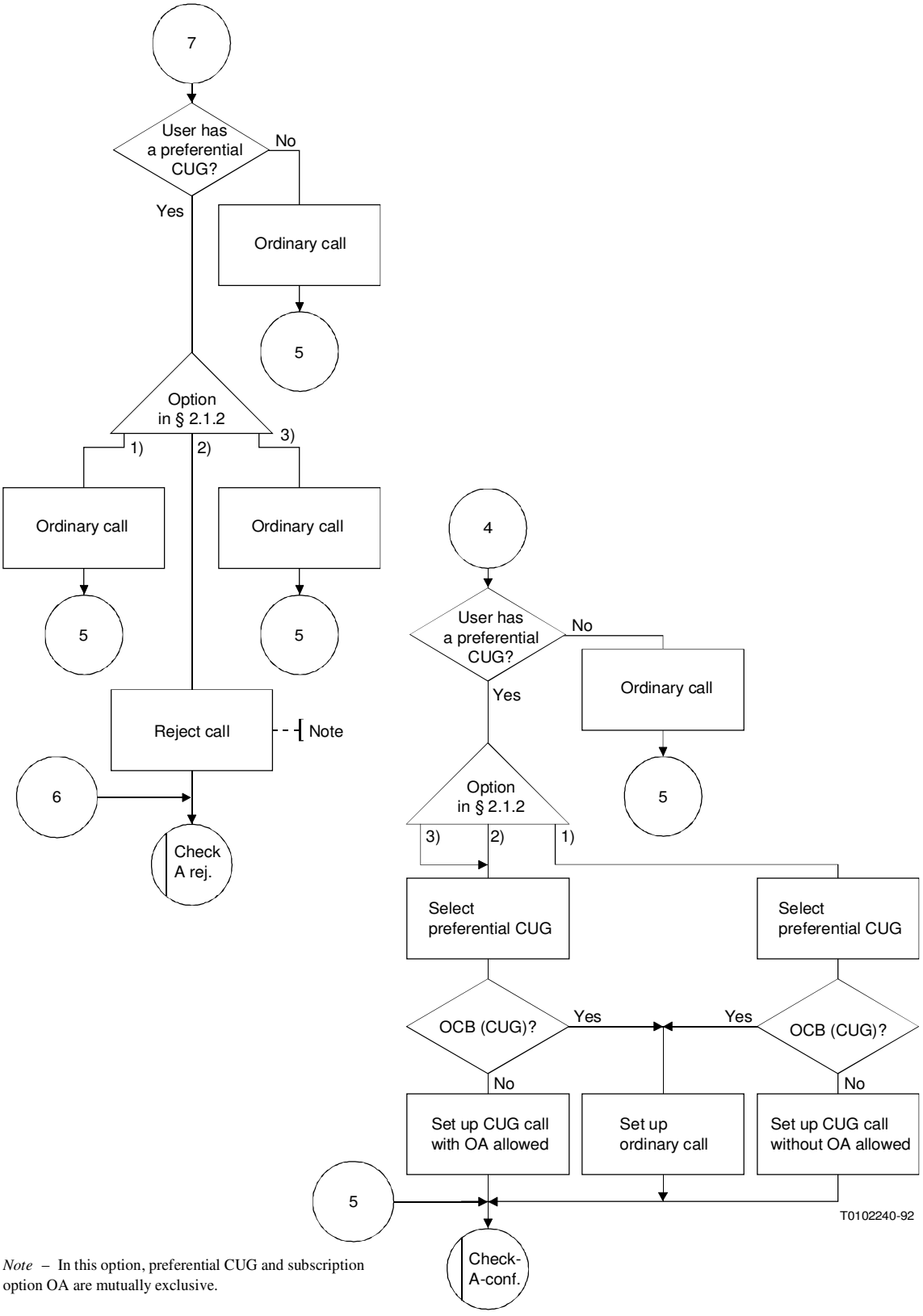



FIGURE 2/I.255.1 (sheet 2 of 4)

**Closed User Group**




*Note* – In this option, preferential CUG and subscription option OA are mutually exclusive.

FIGURE 2/I.255.1 (sheet 3 of 4)

**Closed User Group**

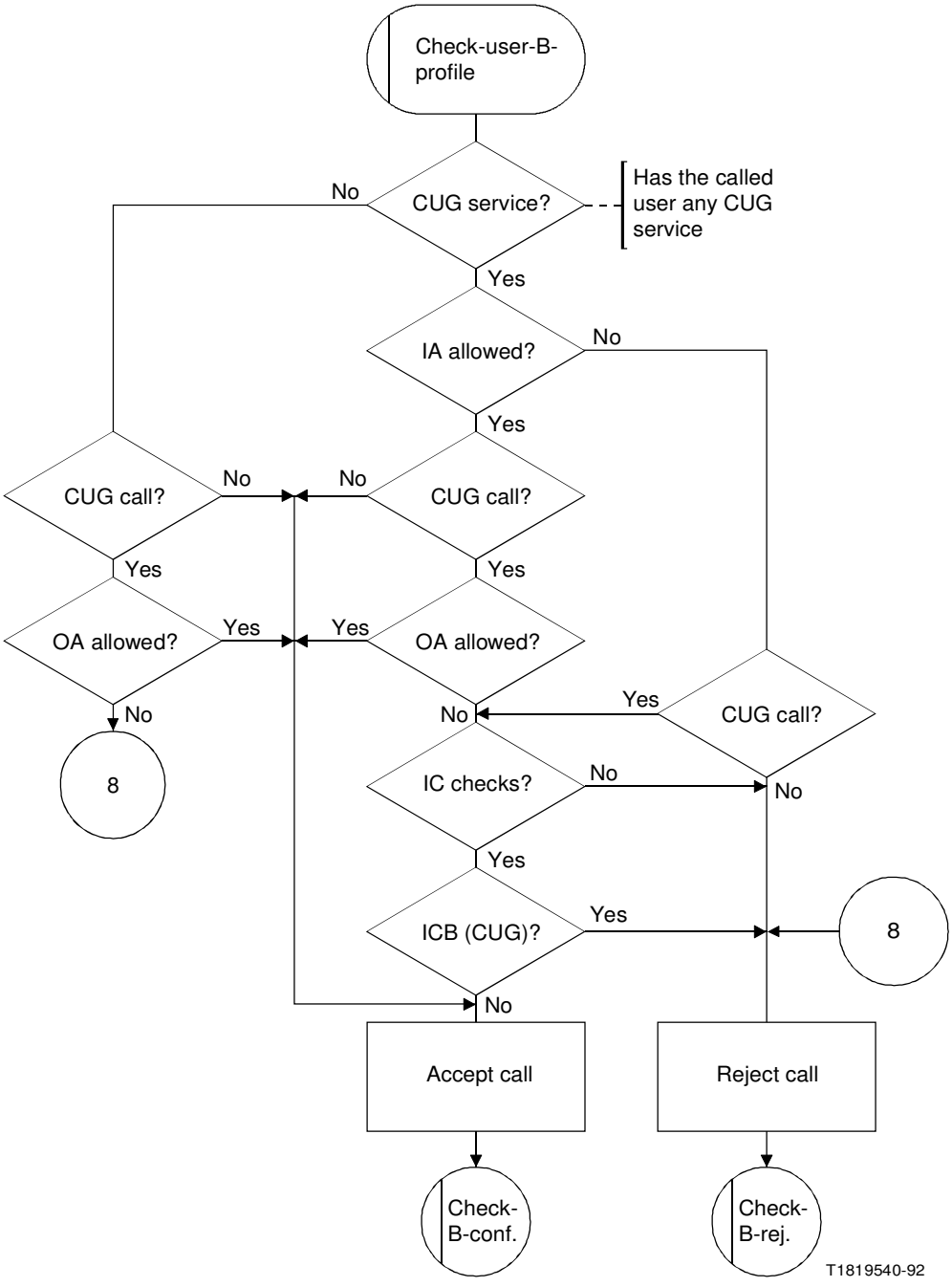



FIGURE 2/I.255.1 (sheet 4 of 4)

**Closed User Group**

ANNEX A

(to Recommandation I.255.1)

**Alphabetical list of abbreviations used in this Recommandation**

| | |
|---|---|
| CLIP | Calling line identification presentation |
| CUG | Closed user group |
| CUGOA | Closed user group with outgoing access |
| DDI | Direct-dialling-in |
| IA | Incoming access |
| IC | Interlock code |
| ICB (CUG) | Incoming calls barred within the CUG |
| ISDN | Integrated services digital network |
| ISPBX | Integrated services private branch exchange |
| MLPP | Multi-level precedence and preemption |
| MSN | Multiple subscriber number |
| OA | Outgoing access |
| OCB (CUG) | Outgoing calls barred within the CUG |
| PCUG | CUG preferential |