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Foreword

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

1 Scope

The present document specifies the stage three, Protocol Description of the network feature Operator Determined Barring (ODB) of IMS Multimedia Telephony Services. It is based on the requirements described in 3GPP TS 22.041 [11]. It provides the protocol details in the IP Multimedia (IM) Core Network (CN) subsystem based on the Session Initiation Protocol (SIP) and the Session Description Protocol (SDP).). In addition, it provides protocol details for XCAP for barring of supplementary services configuration.

The present document is applicable to:

- the Application Server (AS) intended to support Operator Determined Barring for communications;
- the AS that provides the XCAP based interface for manipulation of the settings for a supplementary service as defined in 3GPP TS 24.623 [9]; and
- the AS that supports the SIP based configuration for a supplementary service as defined in 3GPP TS 24.238 [8].

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3.

[3] IETF RFC 3261 (June 2002): "SIP: Session Initiation Protocol".

[4] IETF RFC 3264 (June 2002): "An Offer/Answer Model with Session Description Protocol (SDP)".

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

[6] 3GPP TS 24.628: "Common Basic Communication procedures using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[7] IETF RFC 4566: "SDP: Session Description Protocol".

[8] 3GPP TS 24.238: "Session Initiation Protocol (SIP) based user configuration; stage 3".

[9] 3GPP TS 24.623: "Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating Supplementary Services".

[10] 3GPP TS 24.604: "Communication Diversion (CDIV); using IP Multimedia (IM)Core Network (CN) subsystem; Protocol specification".

[11] 3GPP TS 22.041: "Operator Determined Barring (ODB)".

[12] 3GPP TS 29.329: "Sh interface based on the Diameter protocol; Protocol detail".

[13] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents".

[14] 3GPP TS 23.228: "IP multimedia subsystem; Stage 2".

[15] 3GPP TS 24.629: "Explicit Communication Transfer (ECT) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

B2BUA, **dialog**, **header**, **header field**, **SIP response**, **SIP request**, **session**: definitions in IETF RFC 3261 [3] apply.

incoming initial request: all requests intended to initiate either a dialog or a standalone transaction terminated by the served user

incoming communication: communication destined to the served user

in progress communication: outgoing or incoming communication for which the initiating request has been forwarded to the terminating UE.

outgoing communication: communication outgoing from the user side of the interface

supplementary service: see ITU-T Recommendation I.210 [5], clause 2.4.

3.2 Abbreviations

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

AS	Application Server
CB	Communication Barring
CDIV	Communication DIVersion services
ECT	Explicit Communication Transfer
HPLMN	Home Public Land Mobile Network
HSS	Home Subscriber Server
IP	Internet Protocol
ODB	Operator Determined Barring
SDP	Session Description Protocol
SIP	Session Initiation Protocol
UE	User Equipment

4 Operator Determined Barring Service Description

The network feature Operator Determined Barring (ODB) as specified 3GPP TS 22.041 [11] and in this specification allows a network operator or service provider to regulate access to IM CN subsystem services, by the barring of certain categories of incoming or outgoing communications, the barring of certain categories of roaming and the barring of certain categories of supplementary services configuration and invocation. When barring of an incoming or outgoing category of communications is configured all in progress communications belonging to that category are released.

The SIP related procedures for support of ODB of Communication Barring are realized in an Application Server (AS) as defined in 3GPP TS 24.229 [2], which depending on the use case, is to be provided on the originating side or the terminating side.

The SIP related procedures for support of ODB of the SIP based configuration of a supplementary service, as defined in 3GPP TS 24.238 [8], are realized by the AS which provides the function of SIP based configuration for that supplementary service.

The XCAP related procedures for support of ODB of the XCAP based configuration of a supplementary service, as defined in 3GPP TS 24.623 [9], are realized by the AS which provides the function of XCAP based configuration for that supplementary service.

ODB based barring is applied to a subscription by administrative action in the HSS. In order to get the information about the ODB settings for a subscriber an AS can subscribe to notification on such changes via Sh interface as specified in 3GPP TS 29.329 [12]. The HSS contains the ODB categories that apply to the subscriber. The URIs for premium numbers for entertainment, the URIs for premium numbers for information and the conditions for operator specific categories are locally configured in the AS providing the ODB services. It shall be possible for the operator to use patterns and regular expression to configure the URIs for premium numbers in the AS.

ODB categories cannot be configured by the user.

5 Barring of Communication

5.1 Barring of outgoing Communication

5.1.1 General

Barring of outgoing communication is invoked in the AS performing ODB service.

Barring of outgoing communication includes one of the following categories:

- barring outgoing communication;
- barring outgoing international communications;
- barring outgoing international communications except those directed to the home PLMN country; or
- barring of outgoing communications when roaming outside the home PLMN country;

and one or more of the following categories:

- barring of outgoing Premium Rate Communications (Information);
- barring of outgoing Premium Rate Communications (Entertainment);
- barring of outgoing Premium Rate Communications (Information) when roaming outside the home PLMN country; or
- barring of outgoing Premium Rate Communications (Entertainment) when roaming outside the home PLMN country.

and one or more of the following categories:

- when registered in the HPLMN, Operator Specific Barring (Type 1);
- when registered in the HPLMN, Operator Specific Barring (Type 2);
- when registered in the HPLMN, Operator Specific Barring (Type 3); or
- when registered in the HPLMN, Operator Specific Barring (Type 4).

Editor"s Note: Blocking of Premium Rate Communications for roaming subscriber requires further study.

5.1.2 Procedures in the Application Server

The AS providing the ODB service shall operate as a routeing B2BUA as specified in subclause 5.7.5 of 3GPP TS 24.229 [2]. An AS providing the ODB service and rejecting a request shall operate as a terminating UA, as specified in subclause 5.7.2 of 3GPP TS 24.229 [2].

On reception of an initial SIP INVITE request or SIP MESSAGE request initiated by the UE an AS providing the ODB service needs to determine whether ODB is applied to the SIP request. In order to do so the AS providing the ODB service shall:

1) identify the served user as specified in 3GPP TS 24.229 [2] for communication initiated by the UE;

2) determine whether the subscription profile for the served user contains ODB categories as listed in subclause 5.1.1; and

3) use the rules defined in subclause 5.1.3 to determine whether any of the categories apply to the communication.

When a barring category applies to a communication, the AS shall either:

1) reject the SIP request, and send an indication to the originating UE by sending a SIP 603 (Decline) response. In addition, based on configuration prior to terminate the communication the AS can provide an announcement to the originating user. The procedure of invoking an announcement is described within 3GPP TS 24.628 [6]; or

2) forward the SIP request to a pre-configured destination using normal SIP procedures as defined in 3GPP TS 24.229 [2].

Editor"s Note: How the AS determines the action to be performed for an outgoing call (i.e. rejection vs forwarding to pre-defined destination is FFS. Also, the level of granularity for configuration of action for the case where a request is barred requires further study.

When a new barring category is set for a user, the AS providing the ODB shall determine whether the category applies to any communication of the served user using the rules defined in subclause 5.1.3. When a barring category applies to a communication, the AS providing ODB shall:

1) if two dialogs have been established, then simultaneously send a SIP BYE request for both dialogs managed by the AS, as specified in subclause 5.7.5.3 of 3GPP TS 24.229 [2]; or

2) if a communication is currently being established, then simultaneously send a SIP 603 (Decline) response to the served user and a SIP CANCEL request towards the called user, as specified in 3GPP TS 24.229 [2].

NOTE: In order to get the information about the ODB settings for a subscriber an AS subscribes to notification on such changes via Sh interface as specified in 3GPP TS 29.329 [12].

5.1.3 Determining whether a category applies to a communication

In order to determine whether an ODB category applies for a communication the following applies:

1) outgoing communication: this evaluates to true for all outgoing communication.

2) outgoing international communications: this evaluates to true when the request URI of the outgoing SIP request:

   a) corresponds to a telephone number, i.e. a SIP URI with a "user" URI parameter set to "phone" or a tel URI; and

   b) does not point to a destination served by a network within the country where the originating user is located when initiating the call.

3) outgoing international communications except those directed to the home PLMN country: this evaluates to true when the request URI of the outgoing SIP request:

   a) corresponds to a telephone number, i.e. a SIP URI with a "user" URI parameter set to "phone" or a tel URI;

   b) does not point to a destination served by a network within the country where the originating user is located when initiating the call; and

c) does not point to a destination served within the served users home network.

4) outgoing communications when roaming outside the home PLMN country: this evaluates to true when the served user is registered from an access network other than the served user home network and when the access network is outside the home PLMN country.

NOTE: Whether the served user is registered from another network then the served users home network can be determined from the P-Visited-Network-ID header field specified in IETF RFC 3455 [x] and the P-Access-Network-Info header field specified in IETF RFC 3455 [x] both are provided during the registration process, see 3GPP TS 24.229 [2], subclause 5.7.1.3.

5) outgoing Premium Rate Communications (Information): this evaluates to true when the canonical form of the request URI of the outgoing SIP request matches an entry in the locally configured list of URIs for premium rate communications for information.

6) outgoing Premium Rate Communications (Entertainment): this evaluates to true when the when the canonical form of request URI of the outgoing SIP request matches an entry in the locally configured list of URIs for premium rate communications for entertainment.

7) outgoing Premium Rate Communications (Information) when roaming outside the home PLMN country: this evaluates to true when

   a) the canonical form of the request URI of the outgoing SIP request matches an entry in the locally configured list of URIs for premium rate communications for information; and

   b) the served user is registered from an access network other than the served user home network and when the access network is outside the home PLMN country.

8) outgoing Premium Rate Communications (Entertainment) when roaming outside the home PLMN country: this evaluates to true when

   a) the canonical form of the request URI of the outgoing SIP request matches an entry in the locally configured list of URIs for premium rate communications for entertainment; and

   b) the served user is registered from an access network other than the served user home network and when the access network is outside the home PLMN country.

9) when registered in the HPLMN, Operator Specific Barring (Type 1): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 1.

10) when registered in the HPLMN, Operator Specific Barring (Type 2): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 2.

11) when registered in the HPLMN, Operator Specific Barring (Type 3): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 3.

12) when registered in the HPLMN, Operator Specific Barring (Type 4): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 4.

The Operator specific barring definition for type 1, type 2, type 3, and type 4 is locally configured in the AS providing the ODB service. For operator specific barring the criteria that can be used by the operator to define conditions that are used to determine whether the category applies may be based on any signalling information from the incoming request. Examples of such criteria are:

1) destination type e.g. international numbers or specific numbers;

2) media used in the communication, e.g. audio, video, or text.

When any of the items 1) to 12) evaluates to true then the ODB category applies for a communication.

5.2 Barring of incoming Communication

Barring of incoming communication is invoked in the AS performing the ODB service.

Barring of incoming communication includes one of the following categories:

- barring incoming communications;
- barring incoming communications when roaming outside the home PLMN country;

and one or more of the following categories:

- when registered in the HPLMN, Operator Specific Barring (Type 1);
- when registered in the HPLMN, Operator Specific Barring (Type 2);
- when registered in the HPLMN, Operator Specific Barring (Type 3);
- when registered in the HPLMN, Operator Specific Barring (Type 4).

5.2.2 Procedures in the Application Server

The AS providing the ODB service shall operate as a routeing B2BUA, as specified in subclause 5.7.5 of 3GPP TS 24.229 [2]. An AS providing the ODB service and rejecting a request shall operate as a terminating UA, as specified in subclause 5.7.2 of 3GPP TS 24.229 [2].

On reception of an initial SIP INVITE request or SIP MESSAGE request terminated at the UE an AS providing the ODB service needs to determine whether the SIP request is rejected due to ODB. In order to do so the AS providing the ODB service shall:

1) identify the served user as specified in 3GPP TS 24.229 [2] for terminating communication; and
2) determine whether the subscription profile for the served user contains ODB categories as listed in subclause 5.2.1; and
3) use the rules in subclause 5.2.3 to determine whether any of the categories apply to the communication.

When a barring category applies to a communication, the AS shall either:

1) reject the SIP request, and send an indication to the originating UE by sending a SIP 603 (Decline) response. In addition, based on configuration prior to terminate the communication the AS can provide an announcement to the originating user. The procedure of invoking an announcement is described within 3GPP TS 24.628 [6]; or
2) forward the SIP request to a pre-configured destination using normal SIP procedures as defined in 3GPP TS 24.229 [2].

Editor"s Note: How the AS determines the action to be performed for a terminating call (i.e. immediate rejection vs playing an announcement before rejection) is FFS. Also, the level of granularity for configuration of action for the case where a request is rejected barred further study.

When a new barring category is set for a user, the AS providing the ODB shall determine whether the category applies to any communication of the served user using the rules defined in subclause 5.2.3. When a barring category applies to a communication, the AS providing ODB shall:

1) if two dialogs have been established, then send simultaneously a SIP BYE request for both dialogs managed by the AS as specified in subclause 5.7.5.3 of 3GPP TS 24.229 [2]; or
2) if a communication is currently being established, then simultaneously send a SIP 603 (Decline) response to the served user and a SIP CANCEL request towards the called user, as specified in 3GPP TS 24.229 [2].

NOTE: In order to get the information about the ODB settings for a subscriber an AS subscribes to notification on such changes via Sh interface as specified in 3GPP TS 29.329 [12].

5.2.3 Determining whether a category applies to a communication

When determining whether an ODB category applies for a communication the following applies:

1) incoming communication: this evaluates to true for all incoming requests.

2) incoming communications when roaming outside the home PLMN country: this evaluates to true when the served user is registered from an access network other than the served user home network and when the access network is outside the home PLMN country.

3) when registered in the HPLMN, Operator Specific Barring (Type 1): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 1.

4) when registered in the HPLMN, Operator Specific Barring (Type 2): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 2.

5) when registered in the HPLMN, Operator Specific Barring (Type 3): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 3.

6) when registered in the HPLMN, Operator Specific Barring (Type 4): this evaluates to true when the request matches the locally configured conditions for operator specific barring type 4.

The Operator specific barring definition for type 1, type 2, type 3, and type 4 is locally configured in the AS providing the ODB service. For operator specific barring the criteria that can be used by the operator to define conditions that are used to determine whether the category applies may be based on any signalling information from the incoming request. Examples of such criteria are:

1) destination type e.g. specific numbers;

2) media used in the communication, e.g. audio, video, or text.

When any of the items 1) to 6) evaluates to true then the ODB category applies for a communication.

6 Barring of Roaming

6.1 General

Barring of roaming as specified in 3GPP TS 22.041 [11]. Technical realization is outside the scope of the current specification.

NOTE: Barring of roaming is performed at IMS registration as defined in 3GPP TS 29.228 [13] and 3GPP TS 23.228 [14].

7 Barring of Supplementary Services Configuration and Invocation

7.1 Barring of Management of supplementary service settings and invocation

7.1.1 General

Barring of supplementary services access is invoked in the AS that provides the supplementary service and include management of settings of a supplementary service and user invocation of supplementary services.

Barring of Supplementary Services Access includes the following category:

- Barring of supplementary services management.

NOTE: Supplementary services management can utilize mechanisms such as web-based provisioning which are not standardized in 3GPP. Application of ODB to such mechanisms is out of the scope of this specification.

7.1.2 XCAP Procedures in the Application Server

When an AS that provides an XCAP based interface for configuration of a supplementary service as described in 3GPP TS 24.623 [9], and supporting ODB receives an XCAP request it needs to determine whether the XCAP request is to be rejected due to ODB. In order to do so, the AS shall:

1) identify the served user as specified in 3GPP TS 24.623 [9]; and

2) determine whether the subscription profile for the served user contains the ODB category for barring of supplementary services configuration access.

When the AS decides to reject the XCAP request, the AS shall send a HTTP 403 (Decline) response.

7.1.3 SIP Procedures for service configuration in the Application Server

When an AS that provides a SIP based interface for configuration of a supplementary service, and supporting ODB receives an INVITE SIP request for service configuration set as specified in 3GPP TS 24.238 [8], it needs to determine whether the SIP request is to be rejected due to ODB. In order to do so, the AS shall:

1) identify the served user as specified in 3GPP TS 24.229 [2]; and

2) determine whether the subscription profile for the served user contains the ODB category for barring of supplementary services configuration access.

When the AS decides to reject the SIP request, the AS shall send an indication to the originating UE by sending a SIP 603 (Decline) response.

7.1.4 Barring of user invocation of supplementary service

Except for the barring of the invocation of certain kinds of communication transfer described in subclause 7.3, the barring of user invocation of supplementary services is out of the scope of this specification.

NOTE: The Barring of invocation of a supplementary service can be achieved through the deactivation of the subscription of the user to that service. ODB cannot apply to a supplemantary service that is not subject to user subscription (i.e. the service is provided to all users).

7.2 Barring of manipulation of communication diversion settings

7.2.1 General

Barring of manipulation of communication diversion settings is provided in an AS that provides the communication diversion services as described in 3GPP TS 24.604 [10].

Barring of manipulation of communication diversion comprises the following categories:

- Barring of registration of any communication diverted-to address;
- Barring of registration of any international communication diverted-to address;
- Barring of registration of any international communication diverted-to address except to an address within the HPLMN country.

When determining whether an ODB category applies for a request for setting the registration of a communication diversion, following applies:

1) registration of any communication diverted-to address: this evaluates to true for all registrations for a communication diversion.

2) registration of any international communication diverted-to address: this evaluates to true when the diverted-to address:

a) corresponds to a telephone number, i.e. a SIP URI with a "user" URI parameter set to "phone" or a tel URI; and

b) does not point to a destination served by a network within the country where the originating user is located when initiating the call.

3) registration of any international communication diverted-to address except to an address within the HPLMN country: this evaluates to true when the diverted-to address

a) corresponds to a telephone number, i.e. a SIP URI with a "user" URI parameter set to "phone" or a tel URI;

b) does not point to a destination served by a network within the country where the originating user is located when initiating the call; and

c) does not point to a destination served within the served users home network.

When a barring category for communication diversion registration is set all the previously registered communication diversions that overlap with this category shall be deactivated.

7.2.2 XCAP Procedures in the Application Server

When an AS that provides an XCAP based interface for configuration of communication diversion as described in 3GPP TS 24.238 [8] and 3GPP TS 24.604 [10], and supporting ODB receives an XCAP request it needs to determine whether the XCAP request is to be rejected due to ODB. In order to do so, the AS shall:

1) identify the served user as specified in 3GPP TS 24.623 [9]; and

2) determine whether the subscription profile for the served user contains ODB categories as listed in subclause 7.2.1 and whether these categories apply to the received XCAP request.

When the AS decides to reject the XCAP request, the AS shall send a HTTP 403 (Decline) response.

7.2.3 SIP Procedures in the Application Server

When an AS that provides a SIP based interface for configuration of communication diversion as described in 3GPP TS 24.604 [10] and supporting ODB receives a SIP request it needs to determine whether the SIP request is to be rejected due to ODB. In order to do so, the AS shall:

1) identify the served user as specified in 3GPP TS 24.229 [2]; and

2) determine whether the subscription profile for the served user contains ODB categories as listed in subclause 7.2.1 and whether these categories apply to the received SIP request.

When the AS decides to reject the SIP request, the AS shall send an indication to the originating UE by sending a SIP 603 (Decline) response.

7.3 Barring of invocation of call transfer

7.3.1 General

Barring of invocation of communication transfer is provided in an AS serving that provides the explicit communication transfer service as described in 3GPP TS 24.629 [15].

Barring of invocation of communication transfer includes one of the following categories:

- Barring of invocation of communication transfer;

- Barring of invocation of communication transfer where at least one of the two communications is a communication charged to the served subscriber; i.e. the communication is either an outgoing communication or an incoming communication when the served subscriber roams outside the HPLMN;

- Barring of invocation of communication transfer where at least one of the two communications is a communication charged to the served subscriber at international rates, i.e. the communication is either an outgoing international communication or an incoming communication when the served subscriber roams outside the HPLMN country;

and one of the following categories:

- Barring of invocation of communication transfer where both communications are communications charged to the served subscriber, i.e. both communications are either outgoing communications or incoming communications when the served subscriber roams outside the HPLMN;

and one of the following categories:

- Barring of further invocation of communication transfer if there is already one ongoing transferred communication for the served subscriber.

7.3.2 SIP Procedures in the Application Server

When an AS that provides the explicit communication transfer service as described in 3GPP TS 24.629 [15], and supporting ODB receives a SIP REFER request for initiating a Call Transfer as defined 3GPP TS 24.629 [15] it needs to determine whether the SIP REFER request is to be rejected due to ODB. In order to do so, the AS shall:

1) identify the served user as specified in 3GPP TS 24.229 [2]; and

2) determine whether the subscription profile for the served user contains ODB categories as listed in subclause 7.3.1 and whether these categories apply to the received SIP REFER request.

When the AS decides to reject the SIP REFER request, the AS shall send an indication to the originating UE by sending a SIP 603 (Decline) response.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2012-10					Initial version- contains agreed P-CRs from CT1#80: C1-124219, C1-124220, C1-124108, C1-124109, C1-124221	0.0.0	0.0.1
2012-11					Contains agreed P-CRs from CT#81: C1-124512, C1-124857, C1-124858, C1-124859, C1-124860, C1-124861, C1-125011	0.0.1	0.1.0
2012-12	CT-58	CP-120708			Version 1.0.0 created by MCC for presentation for information and approval	0.1.0	1.0.0
2012-12	CT-58				Version 11.0.0 created by MCC after approval at CT-58	1.0.0	11.0.0

History

Document history		
V11.0.0	January 2013	Publication