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Call Offering Supplementary Services

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1. Reason for changes

No changes since the previously distributed version, though chapters 5 and 6 have been removed as these are not part of GSM Phase 1.

Note that the descriptions of "Interactions with other Supplementary Services" where 'other Supplementary Services' are others than Call Forwarding (sections x.6.82.1-4) or Call Barring (sections x.6.88.1-7) are for Further Study.

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CHAPTER 0

CALL OFFERING SUPPLEMENTARY SERVICES

0. GENERAL

This recommendation describes the supplementary services belonging to the group CALL OFFERING SUPPLEMENTARY SERVICES.

The general aspects, including definitions and recommended provision, of the description of the GSM supplementary services are given in recommendation GSM 02.04.

The group of supplementary services CALL OFFERING SUPPLEMENTARY SERVICES is divided into 6 different supplementary services:

- Call forwarding unconditional (chapter 1);
- Call forwarding on mobile subscriber busy (chapter 2);
- Call forwarding on no reply (chapter 3);
- Call forwarding on mobile subscriber not reachable (chapter 4);
- Call transfer (chapter 5);
- Mobile access hunting (chapter 6).

Note on the call forwarding supplementary services:

Service providers may offer all 4 call forwarding services as separate supplementary services. They may also offer packages of call forwarding services by combining 2 or more call forwarding services.

Although a service provider can choose its own set of call forwarding service packages which are offered to the subscribers, the ability to test on the conditions is mandatory in all GSM PLMNs, except for the condition "mobile subscriber not reachable" in GSM PLMNs in which deregistration does not take place. A mobile subscriber that roams in a VPLMN should use the same procedure as in the HPLMN, irrespective of a possible difference in call forwarding packages in the two PLMNs. The network has to perform a correct updating of call forwarding information in the VPLMN if the mobile subscriber performs any operation related to call forwarding.

Indication of active Call forwarding supplementary service.

An indication that a Call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made. There will be one indication for Unconditional call forwarding and another common indication for the Conditional call forwarding services.

Note on the use of the forwarded-to number at registration.

If the forwarded-to number is a number in the HPLMN country, it may be entered by the served mobile subscriber in three different formats, independent of her actual location, according to the schemes:

- 1) National (significant) number.
- 2) National (trunk) prefix plus national (significant) number.
- 3) International prefix*, country code, national (significant) number.

Scheme 3) Storage of numbers in this format is mandatory for all GSM PLMN operators.

If the forwarded-to number is a number in another country than the HPLMN country, it shall be entered by the served mobile subscriber, independent of her actual location, according to the following scheme:

- International prefix*, country code, national (significant) number.

* Note The MMI for entering of international prefix is defined in Recs. GSM 02.30 and 02.07.

Principles for interaction with the Barring of Outgoing Calls supplementary services.

Numbers allowed to call according to the Barring of Outgoing call service condition are allowed as forwarded-to numbers for the served mobile subscriber.

Numbers not allowed to call according to the Barring of Outgoing call service condition are not allowed as forwarded-to numbers for the served mobile subscriber.

For Unconditional Call Forwarding the forwarded leg is treated as an outgoing call from the HPLMN country.

For the Conditional Call Forwarding services the forwarded leg is treated as an outgoing call from the LPLMN (HPLMN or VPLMN) country.

Principles for interaction with the Barring of Incoming Calls supplementary services.

When Barring of all incoming calls is active for the served mobile subscriber - no Call forwarding services are allowed for her.

When Barring of all incoming calls when roaming outside the HPLMN country is active and operative - i.e. the served mobile subscriber is roaming outside the HPLMN country, the Conditional Call Forwarding services are not allowed.

Actions to be taken.

Registration/Activation of a Call Forwarding service shall be denied if a Call Barring service is already activated and the forwarded-to number conflicts with the barring condition (as described above). The served mobile subscriber shall be informed of this supplementary service incompatibility. The Call Barring service have to be deactivated by the mobile subscriber before registration of the Call Forwarding service is accepted.

Registration/Activation of a Call Barring service shall be denied if a Call Forwarding service is already activated and the barring condition conflicts with the forwarded-to number (as described above). The served mobile subscriber shall be informed of this supplementary service incompatibility. The Call Forwarding service have to be deactivated by the served mobile subscriber before registration of the Call Barring service is accepted.

If Barring of incoming calls when roaming outside the home PLMN country is active and quiescent - i.e. the served mobile subscriber is not roaming outside the HPLMN country - registration/activation of a Call Forwarding service is accepted for any forwarded-to number. If the service becomes operative - i.e. the served mobile subscriber roams outside the HPLMN country the Call Forwarding service, if conditional, shall be made quiescent. The indication that the Call Forwarding service is active will not be given during the quiescent period. If the Call Barring service subsequently becomes quiescent, i.e. the served mobile subscriber updates in the HPLMN country, the Call forwarding service will be automatically operative.

CHAPTER 1

CALL FORWARDING UNCONDITIONAL

1.1 DEFINITION

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service, addressed to the called mobile subscriber's directory number to another directory number. The ability of the served mobile subscriber to originate calls is unaffected. If this service is activated, calls are forwarded no matter what the condition of the termination.

1.2 DESCRIPTION

1.2.1 Description

For a given directory number, this service may be subscribed to for each Basic service to which the user(s) of the number subscribe(s), or collectively for all the Basic services to which the user(s) subscribe(s).

The served mobile subscriber can request a different forwarded-to number for each Basic service to which she has subscribed.

Note: A related supplementary service could allow the possibility for users to inhibit forwarded calls from terminating on their numbers.

1.2.2 Applicability to telecommunication services

Call forwarding unconditional is applicable to all telecommunication services except for the Short Message Service.

1.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to her number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber.

A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

1.3 NORMAL PROCEDURES WITH SUCCESSFUL OUTCOME

1.3.1 Provision

The supplementary service will be provided after pre-arrangement with the service provider.

The service can be offered with one subscription option. The option applies to all Basic services subscribed to. Only one value can be selected.

<u>Subscription options</u>	<u>Value</u>
Calling subscriber receives notification that the call has been forwarded	- No - Yes

1.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

1.3.3 Registration

The following information has to be registered in the network:

1. the forwarded-to number, which may be accompanied by a forwarded-to sub-address;
2. information as to whether all calls or all calls of a specific Basic service should be forwarded.

Note: If no Basic Service code is inserted by the user this is interpreted as All Basic Services.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber.

Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded-to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding unconditional, the service provider will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding unconditional is registered.

1.3.4 Erasure

A previous registration can be erased in either of three ways: Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure. Secondly, the subscriber can register information for call forwarding unconditional for the specific Basic service to another directory number, thus causing the previous registration of call forwarding unconditional to be overridden. Thirdly, all information is erased as a result of withdrawal of the service.

1.3.5 Activation

The supplementary service is activated for a Basic service if it is registered for that Basic service.

1.3.6 Deactivation

The supplementary service is deactivated for a Basic service if it is erased for that Basic service.

1.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service will be forwarded by network invocation.

1.3.8 Normal operation with successful outcome

When call forwarding unconditional is active and operative, incoming calls for the specified Basic Service(s) will be forwarded without being offered to the served mobile subscriber.

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition.

When multiple forwarding occurs the reason for forwarding given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding unconditional is active and operative, the ability of the served mobile subscriber to originate calls is not affected. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

1.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic services to which call forwarding unconditional is active and operative including the forwarded-to numbers;

- in response to a specific request concerning one particular Basic service, the served mobile subscriber should be informed whether or not call forwarding unconditional is active and operative for that Basic service, and if so, to what forwarded-to number.

1.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

1.4 EXCEPTIONAL PROCEDURES OR UNSUCCESSFUL OUTCOME

1.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding unconditional registration was not successful. Possible causes are:

- service not subscribed to;
- forwarded-to number is invalid directory number;
- use of an operator access prefix;
- insufficient information;
- forwarded-to number is a special service code (e.g. police);
- forwarded-to number is the directory number of the mobile subscriber herself;
- conflicting situation with other supplementary services (e.g. incoming call barring has been activated).
- basic service not provisioned.

The network is not required to validate information related to the forwarded-to number.

1.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding unconditional request is to be erased, the network will reject the erasure request with appropriate cause.

Note: If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

If the network erases call forwarding unconditional without the mobile subscriber having requested erasure (e.g. when an exceptional condition occurs), the served mobile subscriber will receive notification along with the cause. This notification should only be sent when a dedicated resource is available.

1.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call has already been reached, an unsuccessful call set up indication is sent backwards.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and an unsuccessful call set up indication is sent backwards.

Note: Call forwarding unconditional applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

1.5 ALTERNATE PROCEDURES

None identified

1.6 INTERACTIONS WITH OTHER SUPPLEMENTARY SERVICES

1.6.81.1 Calling number identification presentation

Called mobile subscriber: If subscribed to calling number identification presentation, the called mobile subscriber cannot receive the calling number identity of calls which have been forwarded.

Forwarded-to subscribers, who have subscribed to calling number identification presentation, may receive the calling subscriber's number if the calling subscriber has not activated calling number identification restriction. In addition, forwarded-to subscribers subscribing to calling number identification presentation may also receive the called subscriber's number and the last forwarding subscriber's number. If either the calling subscriber, the original forwarding subscriber or the final forwarding subscriber has activated calling number identification restriction, then that subscriber's number will not be presented to the forwarded-to subscriber (e.g., if A calls B1 who forwards A to B2 who forwards A to B3 who forwards A to C, then C will receive A, B1 and B3's number, unless A, B1 or B3 have restricted delivery).

1.6.81.2 Calling number identification restriction

Calling subscriber: When the calling number identification restriction is applicable and activated, the calling number identity will not be presented to the forwarded-to subscriber unless both the forwarding mobile and forwarded-to subscribers have an override category. This override category is a national option.

1.6.81.3 Connected number identification presentation

If the calling subscriber has connected number identification presentation activated, she would receive the connected number identity of the forwarded-to subscriber unless any of the forwarding subscribers has subscribed to connected number presentation restriction. In this case the calling subscriber will be informed that the connected number identification presentation supplementary service is not available. Any restriction defined in the connected number identification presentation supplementary service takes precedence over the call forwarding notifications.

1.6.81.4 Connected number identification restriction

When the forwarded call is finally answered, no connected number will be presented to the calling party unless this party has an override category. The latter is a national option.

1.6.81.5 Malicious call identification

Malicious call identification may also be invoked for forwarded calls. In this case the numbers of the calling and forwarding parties are registered.

1.6.82.2 Call forwarding on mobile subscriber busy

If Call forwarding unconditional is active, activation of Call forwarding on mobile subscriber busy is rejected. The served mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy is active, activation of Call forwarding unconditional will be accepted. Call forwarding on mobile subscriber busy will be quiescent during the active period of Call forwarding unconditional. If Call forwarding unconditional is subsequently deactivated, Call forwarding on mobile subscriber busy becomes operative again.

If Call forwarding unconditional is active for one particular basic service, activation of Call forwarding on mobile subscriber busy for all basic services is rejected. The served mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy is active for one particular basic service, activation of Call forwarding unconditional for all basic services will be accepted. Call forwarding on mobile subscriber busy will be quiescent during the active period of Call forwarding unconditional. If Call forwarding unconditional is subsequently deactivated, Call forwarding on mobile subscriber busy becomes operative again.

1.6.82.3 Call forwarding on no reply

Same as interaction between Call forwarding unconditional and Call forwarding on mobile subscriber busy.

1.6.82.4 Call forwarding on mobile subscriber not reachable

Same as interaction between Call forwarding unconditional and Call forwarding on mobile subscriber busy.

1.6.82.5 Call transfer

Assume that subscriber A has an established call with subscriber B and wishes to transfer the call with subscriber B to a subscriber C. If subscriber C has subscribed to call forwarding unconditional, then subscriber A's call will be routed to another subscriber D. For normal and explicit call transfers, subscriber A would, in general, be aware of the forwarding and could make a decision as to whether or not the transfer of subscriber B should be completed to the forwarded-to subscriber D. For single-step call transfer, subscriber B would be connected to the forwarded-to subscriber D.

1.6.82.6 Mobile access hunting

Mobile access hunt group number:

Simultaneous provision of call forwarding unconditional and mobile access hunting is not allowed.

Member of a mobile access hunt group:

If a member is scanned within mobile access hunting, call forwarding unconditional will not take place.

If the ISDN number of the member is not addressed through mobile access hunting, call forwarding unconditional takes place if activated.

1.6.83.1 Call waiting

Calling subscriber: No interaction

Called mobile subscriber: If call forwarding unconditional has been activated, then the execution of that forwarding condition takes precedence over call waiting. Call forwarding unconditional can be activated while a call is waiting without changing the state of the waiting call.

If the mobile subscriber attempts to activate call waiting when call forwarding unconditional has already been activated, the network shall refuse the attempt and inform the mobile subscriber of the incompatibility.

Forwarded-to subscriber: A forwarded call can invoke call waiting.

1.6.83.3 Completion of calls to busy subscribers

A CCBS recall that the called subscriber is now free, is directed to the activating station, regardless of whether call forwarding is active at that station.

Assume subscriber A calls mobile subscriber B at who's access call forwarding unconditional has already been activated or is activated to subscriber C.

Call forwarding unconditional activated at B prior to A requesting CCBS on B:

If a call to B is forwarded to C by call forwarding unconditional and C is busy, then a CCBS request by A will be rejected. A will be informed that the CCBS request has been rejected with Short Term Denial as the reason.

Call forwarding unconditional activated at B after A requesting CCBS on B:

If call forwarding unconditional has been activated at B after A has requested CCBS on B, then the CCBS request will be cancelled.

CCBS activated by B to other destination D:

If B activates CCBS to another destination D and call forwarding unconditional either has already been activated or is subsequently activated, CCBS recall at B that D is now free, will not be forwarded and will be given to subscriber B at her original mobile access.

1.6.84.2 Conference calling

Calling subscriber: If a calling subscriber attempts to establish a conference call to a subscriber with call forwarding unconditional active, and the appropriate forwarding conditions are met, the forwarded-to subscriber will be alerted and can be added to the conference.

Called mobile subscriber: No interaction

Forwarded-to subscriber: A forwarded-to subscriber can establish a conference using an existing forwarded call as one of the conference connections.

A call which has been forwarded can be added to a conference by the forwarded-to subscriber.

1.6.85.1 Closed user group

CUG restrictions must be met on each part of the call. In addition, CUG restrictions must be met end-to-end. If the call is forwarded multiple times, CUG restrictions have to be met between the calling subscriber and every intermediate forwarding subscriber.

Called subscriber/forwarded-to subscriber: When a call is forwarded a new check of the CUG restrictions is made at the forwarded-to destination. The CUG information sent to the forwarded-to destination is the same CUG information that was sent from the originating network.

1.6.86.1 Advice of charge

When a call is forwarded and the forwarding subscriber is charged for the forwarded part of the call, the charging information is not applicable for advice of charge.

1.6.86.2 Freephone service

Freephone calls arriving at a termination will not be subject to call forwarding unconditional in operation at the termination. Such calls will be offered at that termination in the normal manner. Forwarding of freephone calls shall be achieved by rerouting by the service centre.

1.6.86.3 Reverse charging

For further study

1.6.87.1 User-to-user signalling

Calls originated by a subscriber with call forwarding unconditional activated:
Since call forwarding unconditional does not affect the forwarding subscriber's ability to make outgoing calls, a subscriber with call forwarding unconditional activated can send and receive user-to-user information in association with an ongoing call or at the set-up of a new call.

Calls incoming to a subscriber with call forwarding unconditional activated:

During forwarding:

Any user-to-user information accompanies the set-up of the call will be forwarded along with the forwarded call if both the calling and forwarding (i.e. called) parties have subscribed to service 1.

After forwarding:

If the calling party has activated user-to-user signalling service(s) 1, 2 and/or 3 in their initial call set-up, and if the forwarding (i.e. called) party has subscribed to the same service(s), then the services will automatically be extended to be available for use between the calling party and the forwarded-to party. If the forwarding party does not subscribe to the same service (set of services), the calling party will be informed that they can no longer employ the service(s) on this call.

1.6.88.1 Barring of all outgoing calls

Served mobile subscriber: If barring of all outgoing calls is activated, the registration of call forwarding unconditional is denied. The mobile subscriber requesting for this call forwarding service shall be informed of this supplementary service incompatibility.

If Call forwarding unconditional is activated, activation of Barring of all outgoing calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

1.6.88.2 Barring of outgoing international calls

Served mobile subscriber: If barring of outgoing international calls is activated, the registration of an international forwarded-to number (from the home PLMN country) for call forwarding unconditional is denied. The mobile subscriber requesting for this call forwarding service shall be informed of this supplementary service incompatibility.

If Call forwarding unconditional has been activated to an international forwarded-to number (from the HPLMN country), activation of Barring of outgoing international calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

1.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Same as interaction between Call forwarding unconditional and Barring of outgoing international calls.

1.6.88.6 Barring of incoming calls

Calling subscriber: No interaction

Served mobile subscriber: If barring of incoming calls is activated, the registration of call forwarding unconditional is denied. The mobile subscriber requesting for call forwarding unconditional shall be informed of this supplementary service incompatibility.

If Call forwarding unconditional has been activated, activation of Barring of incoming calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

Forwarded-to subscriber: Calls forwarded to a subscriber having Barring of incoming calls activated, will be denied as any other incoming call to that subscriber.

1.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Call forwarding unconditional is always allowed irrespective of the status of barring of incoming calls when roaming outside the home PLMN country.

Forwarded to subscriber: Calls forwarded to a subscriber having Barring of incoming calls when roaming outside the HPLMN country activated and operative, will be denied as any other incoming call to that subscriber.

1.7 INTERWORKING CONSIDERATIONS

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

Note: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

1.8 DYNAMIC DESCRIPTION OF SERVICE

The served mobile subscriber does not experience anything while a call is being forwarded.

CHAPTER 2

CALL FORWARDING ON MOBILE SUBSCRIBER BUSY

2.1 DEFINITION

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service, addressed to the called mobile subscriber's directory number and which meet mobile subscriber busy to another directory number. The ability of the served mobile subscriber to originate calls is unaffected. If this service is activated, a call is forwarded only if the call meets mobile subscriber busy.

2.2 DESCRIPTION

2.2.1 Description

For a given directory number, this service may be subscribed to for each Basic service to which the user(s) of the number subscribe(s), or collectively for all the Basic services to which the user(s) subscribe(s).

The served mobile subscriber can request a different forwarded-to number for each Basic service to which she has subscribed.

Note: A related supplementary service could allow the possibility for users to inhibit forwarded calls from terminating on their numbers.

2.2.2 Applicability to telecommunication services

Call forwarding on mobile subscriber busy is applicable to all telecommunication services except for the Short Message Service.

2.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to her number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber.

A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

2.3 NORMAL PROCEDURES WITH SUCCESSFUL OUTCOME

2.3.1 Provision

The supplementary service will be provided after pre-arrangement with the service provider. At provision subscription options should be selected by the served mobile subscriber.

The service can be offered with several subscription options. Options apply to all Basic services subscribed to. For each subscription option, only one value can be selected. Subscription options are summarized below:

<u>Subscription options</u>	<u>Value</u>
Forwarding subscriber receives notification that the call has been forwarded	- No - Yes
Calling subscriber receives notification that the call has been forwarded	- No - Yes

2.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

2.3.3 Registration

The following information has to be registered in the network:

1. the forwarded-to number, which may be accompanied by a forwarded-to sub-address;
2. information as to whether all calls or all calls of a specific Basic service should be forwarded.

Note: If no Basic Service Code is inserted by the user this is interpreted as All Basic Services.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber. Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded-to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding on mobile subscriber busy, the service provider will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding on mobile subscriber busy is registered.

2.3.4 Erasure

A previous registration can be erased in either of three ways: Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure.

Secondly, the subscriber can register information for call forwarding on mobile subscriber busy for the specific Basic service to another directory number, thus causing the previous registration of call forwarding on mobile subscriber busy to be overridden.

Thirdly, all information is erased as a result of withdrawal of the service.

2.3.5 Activation

The supplementary service is activated for a Basic service if it is registered for that Basic service.

2.3.6 Deactivation

The supplementary service is deactivated for a Basic service if it is erased for that Basic service.

2.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service that meet mobile subscriber busy will be forwarded by network invocation.

2.3.8 Normal operation with successful outcome

When call forwarding on mobile subscriber busy is active and operative, incoming calls for the specified Basic Service(s) that meet mobile subscriber busy will be forwarded without being offered to the served mobile subscriber.

When an incoming call is forwarded on mobile subscriber busy the served mobile subscriber can, as a subscription option, receive notification (but will not be able to answer the incoming call).

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. When multiple forwarding occurs the reason for forwarding given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding on mobile subscriber busy is active and operative, the ability of the served mobile subscriber to originate calls is not affected. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

2.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic services to which call forwarding on mobile subscriber busy is active and operative including the forwarded-to numbers;
- in response to a specific request concerning one particular Basic service, the served mobile subscriber should be informed whether or not call forwarding on mobile subscriber busy is active and operative for that Basic service, and if so, to what forwarded-to number.

2.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

2.4 EXCEPTIONAL PROCEDURES OR UNSUCCESSFUL OUTCOME

2.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding on mobile subscriber busy registration was not successful. Possible causes are:

- service not subscribed to;
- forwarded-to number is invalid directory number;
- use of an operator access prefix;
- insufficient information;
- forwarded-to number is a special service code (e.g. police);
- forwarded-to number is the directory number of the mobile subscriber herself;
- conflicting situation with other supplementary services (e.g. incoming call barring has been activated).
- basic service not provisioned.

The network is not required to validate information related to the forwarded-to number.

2.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding on mobile subscriber busy request is to be erased, the network will reject the erasure request with appropriate cause.

Note: If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

If the network erases call forwarding on mobile subscriber busy without the mobile subscriber having requested erasure (e.g. when an exceptional condition occurs), the served mobile subscriber will receive notification along with the cause. This notification should only be sent when a dedicated resource is available.

2.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call has already been reached, an unsuccessful call set up indication is sent backwards.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and an unsuccessful call set up indication is sent backwards.

Note: Call forwarding on mobile subscriber busy applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

2.5 ALTERNATE PROCEDURES

None identified

2.6 INTERACTIONS WITH OTHER SUPPLEMENTARY SERVICES

2.6.81.1 Calling number identification presentation

Forwarded-to subscribers, who have subscribed to calling number identification presentation, may receive the calling subscriber's number if the calling subscriber has not activated calling number identification restriction. In addition, forwarded-to subscribers subscribing to calling number identification presentation may also receive the called subscriber's number and the last forwarding subscriber's number. If either the calling subscriber, the original forwarding subscriber or the final forwarding subscriber has activated calling number identification restriction, then that subscriber's number will not be presented to the forwarded-to subscriber (e.g., if A calls B1 who forwards A to B2 who forwards A to B3 who forwards A to C, then C will receive A, B1 and B3's number, unless A, B1 or B3 have restricted delivery).

2.6.81.2 Calling number identification restriction

Calling subscriber: When the calling number identification restriction is applicable and activated, the calling number identity will not be presented to the forwarded-to subscriber unless both the forwarding mobile and forwarded-to subscribers have an override category.

2.6.81.3 Connected number identification presentation

Same as the interaction between call forwarding unconditional and connected number identification presentation

2.6.81.4 Connected number identification restriction

Same as the interaction between call forwarding unconditional and connected number identification restriction

2.6.81.5 Malicious call identification

Malicious call identification may also be invoked for forwarded calls. In this case the numbers of the calling and forwarding parties are registered.

2.6.82.1 Call forwarding unconditional

If Call forwarding unconditional is active, activation of Call forwarding on mobile subscriber busy is rejected. The served mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy is active, activation of Call forwarding unconditional will be accepted. Call forwarding on mobile subscriber busy will be quiescent during the active period of Call forwarding unconditional. If Call forwarding unconditional is subsequently deactivated, Call forwarding on mobile subscriber busy becomes operative again.

If Call forwarding unconditional is active for one particular basic service, activation of Call forwarding on mobile subscriber busy for all basic services is rejected. The served mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy is active for one particular basic service, activation of Call forwarding unconditional for all basic services will be accepted. Call forwarding on mobile subscriber busy will be quiescent during the active period of Call forwarding unconditional. If Call forwarding unconditional is subsequently deactivated, Call forwarding on mobile subscriber busy becomes operative again.

2.6.82.5 Call transfer

Same as the interaction between call forwarding unconditional and call transfer.

2.6.82.6 Mobile access hunting

Same as the interaction between call forwarding unconditional and mobile access hunting.

2.6.83.1 Call waiting

Same as the interaction between call forwarding unconditional and call waiting.

2.6.83.3 Completion of calls to busy subscribers

A CCBS recall that the called subscriber is now free, is directed to the activating station, regardless of whether call forwarding is active at that station.

Assume subscriber A calls mobile subscriber B at who's access call forwarding on mobile subscriber busy has already been activated or is activated to subscriber C.

Call forwarding on mobile subscriber busy has been activated at B prior to A requesting CCBS on B:

If call forwarding on mobile subscriber busy has been activated at B and B is busy, and the forwarded-to subscriber C is also busy, the subscriber A may request CCBS. In this case, the CCBS request will be applied to the originally called mobile subscriber B.

Call forwarding on mobile subscriber busy activated at B after A requesting CCBS on B:

The CCBS request remains active to the originally called mobile subscriber B.

CCBS activated by B to other destination D:

If B activates CCBS to another destination D and call forwarding on mobile subscriber busy either has already been activated or is subsequently activated, CCBS recall that D is now free, will not be forwarded when B is busy, so it will be given to subscriber B at her original mobile access.

2.6.84.2 Conference calling

Same as the interaction between call forwarding unconditional and conference calling.

2.6.85.1 Closed user group

Same as the interaction between call forwarding unconditional and closed user group.

2.6.86.1 Advice of charge

Same as the interaction between call forwarding unconditional and advice of charge.

2.6.86.2 Freephone service

Call forwarding of freephone calls encountering busy will be done with reference to the service centre, and not according to the call forwarding on mobile subscriber busy service in operation at the called termination. The forwarding will be charged to the freephone subscriber.

2.6.86.3 Reverse charging

For further study

2.6.87.1 User-to-user signalling

Same as the interaction between call forwarding unconditional and user-to-user signalling, except that service 2 of user-to-user signalling cannot be guaranteed prior to completion of call forwarding on mobile subscriber busy.

2.6.88.1 Barring of outgoing calls

Same as the interaction between call forwarding unconditional and barring of outgoing calls

2.6.88.2 Barring of outgoing international calls

Served mobile subscriber: If barring of outgoing international calls is activated, the registration of an international forwarded-to number (from the visited PLMN country) for call forwarding on mobile subscriber busy is denied. The mobile subscriber requesting for this call forwarding service shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy has been activated to an international forwarded-to number (from the local PLMN country), activation of Barring of outgoing international calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

If Barring of outgoing international calls and Call forwarding on mobile subscriber busy are simultaneously active (i.e. the forwarded-to number is a local number seen from the local PLMN

country), Call forwarding on mobile subscriber busy will be made quiescent by the network as soon as the mobile subscriber updates in another PLMN country.

If barring of outgoing international calls is subsequently deactivated, or if the mobile subscriber updates in a PLMN where the forwarded-to number is not considered as an international number, call forwarding on mobile subscriber busy is automatically made operative.

2.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Served mobile subscriber: If Barring of outgoing international calls except those directed to the home PLMN country is activated, the registration of an international forwarded-to number (from the local PLMN country) except to the HPLMN country is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy has been activated to an international forwarded-to number (from the local PLMN country) except to the HPLMN country, activation of Barring of outgoing international calls except those directed to the home PLMN country is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

If Barring of outgoing international calls except those directed to the home PLMN country and Call forwarding on mobile subscriber busy are simultaneously active (i.e. the forwarded-to number is a local number seen from the local PLMN country or a number in the HPLMN country), Call forwarding on mobile subscriber busy will be made quiescent as soon as the mobile subscriber is updated in another PLMN country if the forwarded-to number is not a number in the HPLMN country.

If Barring of outgoing international calls except those directed to the home PLMN country is subsequently deactivated, or if the mobile subscriber updates in a PLMN where the forwarded-to number is not barred, Call forwarding on mobile subscriber busy is automatically made operative.

2.6.88.6 Barring of incoming calls

Same as the interaction between call forwarding unconditional and barring of incoming calls

2.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

If Barring of incoming calls when roaming outside the home PLMN country is active and operative (i.e. the mobile subscriber is roaming outside the home PLMN country) then the registration of

Call forwarding on mobile subscriber busy is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

If Barring of incoming calls when roaming outside the home PLMN country is active and quiescent (i.e. the mobile subscriber is in the home PLMN country), then the registration of Call forwarding on mobile subscriber busy is not denied.

If Barring of incoming calls when roaming outside the home PLMN country becomes operative after Call forwarding on mobile subscriber busy has been activated, Call forwarding on mobile subscriber busy is made quiescent.

If Barring of incoming calls when roaming outside the home PLMN country subsequently becomes quiescent, Call forwarding on mobile subscriber busy is automatically made operative.

Forwarded to subscriber: Calls forwarded to a subscriber having Barring of incoming calls when roaming outside the HPLMN country activated and operative, will be denied as any other incoming call to that subscriber.

2.7 INTERWORKING CONSIDERATIONS

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist. If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

Note: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

2.8 DYNAMIC DESCRIPTION OF SERVICE

Served mobile subscriber's side:

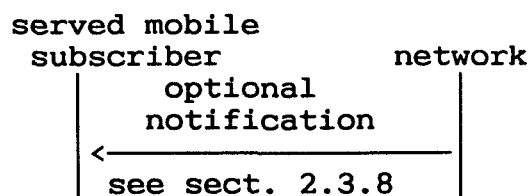


Figure 2.1/GSM 02.82: Dynamic description of call forwarding on mobile subscriber busy

CHAPTER 3

CALL FORWARDING ON NO REPLY

3.1 DEFINITION

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service, addressed to the called mobile subscriber's directory number and which meet no reply to another directory number. The ability of the served mobile subscriber to originate calls is unaffected. If this service is activated, a call is forwarded only if the call meets no reply.

3.2 DESCRIPTION

3.2.1 Description

For a given directory number, this service may be subscribed to for each Basic service to which the user(s) of the number subscribe(s), or collectively for all the Basic services to which the user(s) subscribe(s).

The served mobile subscriber can request a different forwarded-to number for each Basic service to which she has subscribed.

Note: A related supplementary service could allow the possibility for users to inhibit forwarded calls from terminating on their numbers.

3.2.2 Applicability to telecommunication services

Call forwarding on no reply is applicable to all telecommunication services except for the Short Message Service.

3.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to her number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber.

A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

3.3 NORMAL PROCEDURES WITH SUCCESSFUL OUTCOME

3.3.1 Provision

The supplementary service will be provided after pre-arrangement with the service provider. At provision subscription options should be selected by the served mobile subscriber.

The service can be offered with several subscription options. Options apply to all Basic services subscribed to. For each subscription option, only one value can be selected. Subscription options are summarized below:

<u>Subscription options</u>	<u>Value</u>
Forwarding subscriber receives notification that the call has been forwarded	- No - Yes
Calling subscriber receives notification that the call has been forwarded	- No - Yes

3.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

3.3.3 Registration

The following information has to be registered in the network:

1. the forwarded-to number, which may be accompanied by a forwarded-to sub-address;
2. information as to whether all calls or all calls of a specific Basic service should be forwarded;
Note: If no Basic Service Code is inserted by the user this is interpreted as All Basic Services.
3. the duration of the no reply condition timer.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber. If the duration of the no reply condition timer is not registered by the mobile subscriber then the previous value set by the mobile subscriber applies. If no previous value exists, a default value set by the service provider applies. The value is in between 5 and 30 seconds, in steps of 5 seconds.

Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded-to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding on no reply, the service provider will return notification of

acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding on no reply is registered and the duration of the no reply condition timer.

3.3.4 Erasure

A previous registration can be erased in either of three ways: Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure. Secondly, the subscriber can register information for call forwarding on no reply for the specific Basic service to another directory number, thus causing the previous registration of call forwarding on no reply to be overridden. Thirdly, all information is erased as a result of withdrawal of the service.

3.3.5 Activation

The supplementary service is activated for a Basic service if it is registered for that Basic service.

3.3.6 Deactivation

The supplementary service is deactivated for a Basic service if it is erased for that Basic service.

3.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service that are not answered within the period defined by the no reply condition timer, will be forwarded by network invocation.

3.3.8 Normal operation with successful outcome

When call forwarding on no reply is active and operative, incoming calls for the specified Basic Service(s) that are not answered within the period defined by the no reply condition timer, will be forwarded without being offered to the served mobile subscriber.

When an incoming call is forwarded on no reply the served mobile subscriber can, as a subscription option, receive notification (but will not be able to answer the incoming call).

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. When multiple forwarding occurs the reason for forwarding given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding on no reply is active and operative, the ability of the served mobile subscriber to originate calls is not affected. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

3.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic services to which call forwarding on no reply is active and operative including the forwarded-to numbers and the duration of the no reply timer;
- in response to a specific request concerning one particular Basic service, the served mobile subscriber should be informed whether or not call forwarding on no reply is active and operative for that Basic service, and if so, to what forwarded-to number and the duration of the no reply timer.

3.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

3.4 EXCEPTIONAL PROCEDURES OR UNSUCCESSFUL OUTCOME

3.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding on no reply registration was not successful. Possible causes are:

- service not subscribed to;
- forwarded-to number is invalid directory number;
- use of an operator access prefix;
- insufficient information;
- forwarded-to number is a special service code (e.g. police);
- forwarded-to number is the directory number of the mobile subscriber herself;
- conflicting situation with other supplementary services (e.g. incoming call barring has been activated).
- basic service not provisioned.

The network is not required to validate information related to the forwarded-to number.

3.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding on no reply request is to be erased, the network will reject the erasure request with appropriate cause.

Note: If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

If the network erases call forwarding on no reply without the mobile subscriber having requested erasure (e.g. when an exceptional condition occurs), the served mobile subscriber will receive notification along with the cause. This notification should only be sent when a dedicated resource is available.

3.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call is reached and an attempt is made to forward the call an additional time, then the forwarded call shall be treated as in the following paragraph.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and the calling subscriber will continue to alert the forwarding subscriber. The no reply condition timer will not be restarted by the network. (Note that during the activation of call forwarding on no reply, the calling subscriber shall continue to alert the forwarding subscriber until alerting commences at the forwarded-to subscriber.)

Note: Call forwarding on no reply applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

3.5 ALTERNATE PROCEDURES

None identified

3.6 INTERACTIONS WITH OTHER SUPPLEMENTARY SERVICES

3.6.81.1 Calling number identification presentation

Forwarded-to subscribers, who have subscribed to calling number identification presentation, may receive the calling subscriber's number if the calling subscriber has not activated calling number identification restriction. In addition, forwarded-to subscribers subscribing to calling number identification presentation may also receive the called subscriber's number and the last forwarding subscriber's number if neither has activated calling number identification restriction (e.g., if A calls B1 who forwards A to B2 who forwards A to B3 who forwards A to C, then C will receive A, B1 and B3's number, unless A, B1 or B3 have restricted delivery).

3.6.81.2 Calling number identification restriction

Calling subscriber: When the calling number identification restriction is applicable and activated, the calling number identity will not be presented to the forwarded-to subscriber unless both the forwarding mobile and forwarded-to subscribers have an override category.

3.6.81.3 Connected number identification presentation

Same as the interaction between call forwarding unconditional and connected number identification presentation

3.6.81.4 Connected number identification restriction

Same as the interaction between call forwarding unconditional and connected number identification restriction

3.6.81.5 Malicious call identification

Malicious call identification may also be invoked for forwarded calls. In this case the numbers of the calling and forwarding parties are registered.

3.6.82.1 Call forwarding unconditional

Same as interaction between Call forwarding unconditional and Call forwarding on mobile subscriber busy.

3.6.82.5 Call transfer

Same as the interaction between call forwarding unconditional and call transfer

3.6.82.6 Mobile access hunting

If call forwarding on no reply is activated on the mobile access hunt group number an incoming call will be forwarded when during the scanning of a free mobile access has been found and this mobile access does not reply.

If call forwarding on no reply is activated on a member's number and the member is scanned within mobile access hunting then the following occurs:

- if the member is free but does not reply, call forwarding on no reply does not take place according to the member's subscription, but, if applicable, to the subscription of the mobile access hunt group number.

3.6.83.1 Call waiting

Calling subscriber: No interaction

Called mobile subscriber: If call forwarding on no reply has been activated then a waiting call shall still be offered as described in GSM 02.83 (call waiting indication). If no answer is received to this call within the specified period (see GSM 02.83) then the call forwarding on no reply service becomes invoked and the call is forwarded as per that call forwarding on no reply service description.

Forwarded-to subscriber: A forwarded call can invoke call waiting.

3.6.83.3 Completion of calls to busy subscribers

A CCBS recall that the called subscriber is now free, is directed to the activating station, regardless of whether call forwarding is active at that station.

Assume subscriber A calls mobile subscriber B at who's access call forwarding on no reply has already been activated or is activated to subscriber C.

Call forwarding on no reply activated at B prior to A requesting CCBS on B:

If a call to B is forwarded on no reply to C and C is busy, then a CCBS request will be rejected. Subscriber A will be informed that the CCBS request has been rejected with Short Term Denial as the reason.

Call forwarding on no reply activated at B after A requesting CCBS on B:

If call forwarding on no reply has been activated at B after A has requested CCBS on B, then the CCBS recall will be connected to the forwarded-to party C when meeting no reply at B.

CCBS activated by B to other destination D:

If B activates CCBS to another destination D and call forwarding on no reply either has already been activated or is subsequently

activated, CCBS recall that D is now free, will not be forwarded when B does not reply, but it remains to be given to subscriber B at her original mobile access.

3.6.84.2 Conference calling

Same as the interaction between call forwarding unconditional and conference calling

3.6.85.1 Closed user group

Same as the interaction between call forwarding unconditional and closed user group

3.6.86.1 Advice of charge

Same as the interaction between call forwarding unconditional and advice of charge

3.6.86.2 Freephone service

Freephone calls arriving at a termination will not be subject to call forwarding on no reply in operation at the termination. Such calls will continue to be offered at that termination, i.e. the service is not available to freephone subscribers. Optionally, freephone calls encountering no reply may be forwarded with reference to the service centre.

3.6.86.3 Reverse charging

For further study

3.6.87.1 User-to-user signalling

Service 1: A mobile subscriber for whom call forwarding on no reply is activated should not respond by accepting or rejecting a user-to-user signalling service 1 request until they answer the call. If a call for which user-to-user signalling service 1 was activated undergoes call forwarding on no reply, user-to-user signalling service 1 will not be extended to the forwarded-to subscriber.

Service 2: An outgoing call which meets a called party with call forwarding on no reply activated cannot use user-to-user signalling service 2. On call forwarding on no reply, user-to-user signalling service 2 will not be extended to the forwarded-to subscriber.

Service 3: A mobile subscriber for whom call forwarding on no reply is activated should not respond by accepting or rejecting a user-to-user signalling service 3 request until they answer the call. If a call for which user-to-user signalling service 3

was activated undergoes call forwarding on no reply, user-to-user signalling service 3 may be extended to the forwarded-to subscriber if the forwarding party allows it.

3.6.88.1 Barring of outgoing calls

Same as the interaction between call forwarding unconditional and barring of outgoing calls.

3.6.88.2 Barring of outgoing international calls

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls.

3.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls except those directed to the home PLMN country.

3.6.88.6 Barring of incoming calls

Same as the interaction between call forwarding unconditional and barring of incoming calls.

3.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of incoming calls when roaming outside the home PLMN country.

3.7 INTERWORKING CONSIDERATIONS

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

Note: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

3.8 DYNAMIC DESCRIPTION OF SERVICE

Served mobile subscriber's side:

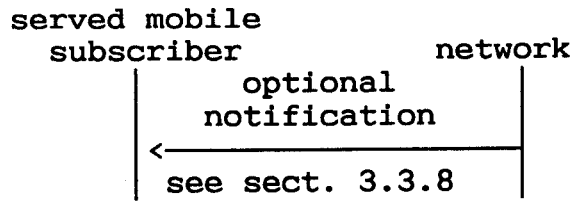


Figure 3.1/GSM 02.82: Dynamic description of call forwarding on no reply

CHAPTER 4

CALL FORWARDING ON MOBILE SUBSCRIBER NOT REACHABLE

4.1 DEFINITION

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service, addressed to the called mobile subscriber's directory number, but which is not reachable, to another directory number. The ability of the served mobile subscriber to originate calls is principally unaffected, but practically it is affected if the mobile subscriber is deregistered, if there is radio congestion or if the mobile subscriber for example is being out of radio coverage. If this service is activated, a call is forwarded only if the mobile subscriber is not reachable.

4.2 DESCRIPTION4.2.1 Description

For a given directory number, this service may be subscribed to for each Basic service to which the user(s) of the number subscribe(s), or collectively for all the Basic services to which the user(s) subscribe(s).

The served mobile subscriber can request a different forwarded-to number for each Basic service to which he has subscribed.

Note: A related supplementary service could allow the possibility for users to inhibit forwarded calls from terminating on their numbers.

4.2.2 Applicability to telecommunication services

Call forwarding on mobile subscriber not reachable is applicable to all telecommunication services except for the Short Message Service.

4.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to his number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber. A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

4.3 NORMAL PROCEDURES WITH SUCCESSFUL OUTCOME

4.3.1 Provision

The supplementary service will be provided after pre-arrangement with the service provider.

The service can be offered with one subscription option. The option applies to all Basic service subscribed to. Only one value can be selected.

<u>Subscription options</u>	<u>Value</u>
Calling subscriber receives notification that the call has been forwarded	- No - Yes

4.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

4.3.3 Registration

The following information has to be registered in the network:

1. the forwarded-to number, which may be accompanied by a forwarded-to sub-address;
2. information as to whether all calls or all calls of a specific Basic service should be forwarded.

Note: If no Basic Service Code is inserted by the user this is interpreted as All Basic Services.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber.

Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding on mobile subscriber not reachable the service provider will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding on mobile subscriber not reachable is registered.

4.3.4 Erasure

A previous registration can be erased in either of three ways: Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure. Secondly, the subscriber can register information for call forwarding on mobile subscriber not reachable for the specific Basic service to another directory number, thus causing the

previous registration of call forwarding on mobile subscriber not reachable to be overridden.

Thirdly, all information is erased as a result of withdrawal of the service.

4.3.5 Activation

The supplementary service is activated for a Basic service if it is registered for that Basic service.

4.3.6 Deactivation

The supplementary service is deactivated for a Basic service if it is erased for that Basic service.

4.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service when the mobile subscriber is not reachable, will be forwarded by network invocation.

4.3.8 Normal operation with successful outcome

When call forwarding on mobile subscriber not reachable is active and operative, all incoming calls for the specified Basic Service(s) when the mobile subscriber is not reachable, will be forwarded without being offered to the served mobile subscriber.

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. When multiple forwarding occurs the reason for forwarding given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding on mobile subscriber not reachable is active and operative, the ability of the served mobile subscriber to originate calls is principally not affected, but practically it is affected if the mobile subscriber is deregistered, on radio congestion or on no paging response. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

4.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic services to which call forwarding on mobile subscriber not reachable is active and operative including the forwarded-to numbers;
- in response to a specific request concerning one particular Basic service, the served mobile subscriber should be informed whether or not call forwarding on mobile subscriber not reachable is active and operative for that Basic service, and if so, to what forwarded-to number.

4.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

4.4 EXCEPTIONAL PROCEDURES OR UNSUCCESSFUL OUTCOME

4.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding on mobile subscriber not reachable registration was not successful. Possible causes are:

- service not subscribed to;
- forwarded-to number is invalid directory number;
- use of an operator access prefix;
- insufficient information;
- forwarded-to number is a special service code (e.g. police);
- forwarded-to number is the directory number of the mobile subscriber herself;
- conflicting situation with other supplementary services (e.g. incoming call barring has been activated).
- basic service not provisioned.

The network is not required to validate information related to the forwarded-to number.

4.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding on mobile subscriber not reachable request is to be

erased, the network will reject the erasure request with appropriate cause.

Note: If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

If the network erases call forwarding on mobile subscriber not reachable without the mobile subscriber having requested erasure (e.g. when an exceptional condition occurs), the served mobile subscriber will receive notification along with the cause. This notification should only be sent when a dedicated resource is available.

4.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call has already been reached, an unsuccessful call set up indication is sent backwards.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and an unsuccessful call set up indication is sent backwards.

Note: Call forwarding on mobile subscriber not reachable applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

4.5 ALTERNATE PROCEDURES

None identified

4.6 INTERACTIONS WITH OTHER SUPPLEMENTARY SERVICES

4.6.81.1 Calling number identification presentation

Called mobile subscriber: If subscribed to calling number identification presentation, the called mobile subscriber cannot receive the calling number identity of calls which have been forwarded.

Forwarded-to subscribers, who have subscribed to calling number identification presentation, may receive the calling subscriber's number if the calling subscriber has not activated calling number identification restriction. In addition, forwarded-to subscribers subscribing to calling number identification presentation may also receive the called subscriber's number and the last forwarding subscriber's number. If either the calling subscriber, the original forwarding subscriber or the final forwarding subscriber has activated calling number identification restriction, then that subscriber's number will not be presented to the forwarded-to subscriber (e.g., if A calls B1 who forwards A to B2 who

forwards A to B3 who forwards A to C, then C will receive A, B1 and B3's number, unless A, B1 or B3 have restricted delivery).

4.6.81.2 Calling number identification restriction

Calling subscriber: When the calling number identification restriction is applicable and activated, the calling number identity will not be presented to the forwarded-to subscriber unless both the forwarding mobile and forwarded-to subscribers have an override category.

4.6.81.3 Connected number identification presentation

The calling subscriber should always receive the forwarded-to number, unless the forwarded-to subscriber activated connected number identification restriction.

4.6.81.4 Connected number identification restriction

Same as the interaction between call forwarding unconditional and connected number identification restriction.

4.6.81.5 Malicious call identification

Malicious call identification may also be invoked for forwarded calls.

In this case the numbers of the calling and forwarding parties are registered.

4.6.82.1 Call forwarding unconditional

Same as interaction between Call forwarding unconditional and Call forwarding on mobile subscriber busy.

4.6.82.5 Call transfer

Same as the interaction between call forwarding unconditional and call transfer

4.6.82.6 Mobile access hunting

Call forwarding on mobile subscriber not reachable caused by "mobile subscriber not registered" cannot occur because the mobile access hunt group number can never be deregistered and ISDN numbers of members that are not registered are not part of the hunt group during that state. There is no interaction in this case.

If the cause for the call forwarding is "no paging response" then the interaction is the same as between call forwarding on no reply and mobile access hunting.

If the cause is "radio congestion" then the interaction is the same as between call forwarding unconditional and mobile access hunting.

4.6.83.1 Call waiting

Calling subscriber: No interaction.

Called mobile subscriber: No interaction (when the mobile subscriber is not reachable call waiting is not invoked because the called subscriber is not busy, so forwarding takes place).

Forwarded-to subscriber: A forwarded call can invoke call waiting.

4.6.83.3 Completion of calls to busy subscribers

A CCBS recall that the called subscriber is now free, is directed to the activating station, regardless of whether call forwarding is active at that station.

Assume subscriber A calls mobile subscriber B at who's access call forwarding on mobile subscriber not reachable has already been or is activated to subscriber C.

Call forwarding on mobile subscriber not reachable activated at B prior to A requesting CCBS on B:

If call forwarding on mobile subscriber not reachable has been activated at B and B is not reachable and the forwarded-to subscriber C is busy, then a CCBS request by A will be rejected. Subscriber A will be informed that the CCBS request has been rejected with Short Term Denial as the reason.

Call forwarding on mobile subscriber not reachable activated at B after A requesting CCBS on B:

If call forwarding on mobile subscriber not reachable has been activated at B after A has requested CCBS on B, then the CCBS recall will be connected to the forwarded-to party C when meeting the cause "not registered" at B.

If meeting the cause "no paging response" or "radio congestion" then the CCBS request will be cancelled.

CCBS activated by B to other destination D:

If B activates CCBS to another destination D and call forwarding on mobile subscriber not reachable either has already been activated or is subsequently activated, CCBS recall that D is now free, will not be forwarded when B encounters a situation of mobile subscriber not reachable, but the network defers the CCBS recall until the mobile subscriber can be reached again (as described in the note in GSM 02.83).

4.6.84.2 Conference calling

Same as the interaction between call forwarding unconditional and conference calling.

4.6.85.1 Closed user group

Same as the interaction between call forwarding unconditional and closed user group.

4.6.86.1 Advice of charge

Same as the interaction between call forwarding unconditional and advice of charge.

4.6.86.2 Freephone service

Same as the interaction between call forwarding on no reply and freephone service.

4.6.86.3 Reverse charging

For further study

4.6.87.1 User-to-user signalling

Same as the interaction between call forwarding unconditional and user-to-user signalling.

4.6.88.1 Barring of outgoing calls

Same as the interaction between call forwarding unconditional and barring of outgoing calls.

4.6.88.2 Barring of outgoing international calls

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls.

4.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls except those directed to the home PLMN country.

4.6.88.6 Barring of incoming calls

Same as the interaction between call forwarding unconditional and barring of incoming calls.

4.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of incoming calls when roaming outside the home PLMN country.

4.7 INTERWORKING CONSIDERATIONS

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party.

When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

Note: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

4.8 DYNAMIC DESCRIPTION OF SERVICE

The served mobile subscriber does not experience anything while a call is being forwarded.