GSM TECHNICAL SPECIFICATION

GSM 02.79

July 1996

Version 5.0.0

Source: ETSI TC-SMG

Reference: TS/SMG-010279Q

ICS: 33.060.50

Key words: Digital cellular telecommunications system, Global System for Mobile communications (GSM)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Digital cellular telecommunications system (Phase 2+); Support of Optimal Routeing (SOR); Service definition (Stage 1) (GSM 02.79)

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Foreword

This Global System for Mobile communications Technical Specification (GTS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This GTS specifies the stage 1 description of the first phase of Support of Optimal Routing (SOR) within the digital cellular telecommunications system (Phase 2/Phase 2+).

GTS are produced by TC-SMG to enable the GSM Phase 2+ specifications to become publicly available, prior to submission for the formal ETSI standards approval procedure to become European Telecommunications Standards (ETS). This ensures the earliest possible access to GSM Phase 2+ specifications for all Manufacturers, Network operators and implementors of the Global System for Mobile communications.

The contents of this GTS are subject to continuing work within TC-SMG and may change following formal TC-SMG approval. Should TC-SMG modify the contents of this GTS it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 5.x.y

where:

- y the third digit is incremented when editorial only changes have been incorporated in the specification;

- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

Reference is made within this GTS to GSM-TSs (note).

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETSs (Phase 1), or ETSs/ETSI Technical Reports (ETRs) (Phase 2). TC-SMG has also produced ETSI GSM TSs which give the technical specifications for the implementation of Phase 2+ enhancements of the digital cellular telecommunications system. These version 5.x.x GSM Technical Specifications may be referred to as GTSs.

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1 Scope

This Stage 1 description of the first phase of Support of Optimal Routing (SOR)

- compiles the basic service requirements for SOR;
- describes the interactions for Supplementary Services (SS) in order to cater for SOR;
- refers to modifications to network features required by SOR.

This specification does not address the following:

- There is no need for optimization of the routing of calls originally directed to a fixed network subscriber, because the physical address of a fixed network terminating line cannot differ from its logical address.

- SOR in non-GSM mobile networks is not a subject of this ETS, but might be possible by bilateral arrangement between GSM network operators and those non-GSM mobile network operators.

The purpose of SOR is to reduce the number of unnecessary inter-PLMN call legs.

The first phase of SOR applies to :

- OR performed within a country (i.e. Mobile to mobile calls where both mobile subscribers are located in the same country);

- OR performed towards the country where the call would have normally been routed without OR (e.g. Conditional Call Forwarding towards the Home Country of the called party).

The complete set of scenarios included in the phase 1 of OR is presented in the paragraph for normal procedures. All other scenarios are excluded from Phase 1 of OR.

Note that Optimal Routing is applicable to national roaming situations, that is to calls directed to a mobile subscriber roaming in her home country, but registered in a PLMN different from her HPLMN.

All further call scenarios, including multiple call forwarding, are left to subsequent phases of SOR. Subsequent phases of SOR shall be backwards compatible with this first phase.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] GSM 01.04 (ETR 100): "Digital cellular telecommunication system (Phase 2); Abbreviations and acronyms".

3 Definitions and abbreviations

Administrative PLMN: The complete set of all functional entities normally regarded as a single PLMN.

Basic OR : Routeing of a call by the direct route when no forwarding occurs.

Direct route: A call uses the direct route if it is routed from the serving network of the original calling party to the serving network of the ultimate called party without any intermediate PLMN.

Early Call Forwarding : Early Call Forwarding is Call Forwarding performed from the IPLMN before the call has been extended to the VPLMN of the forwarding subscriber (i.e. Call Forwarding Unconditional and Conditional Call Forwarding on Not Reachable known at the IPLMN before extension of the call)

Functional PLMN: For the purposes of this description the Administrative PLMN is divided into functional PLMNs that represent different aspects of the Optimal Routeing functionality.

HPLMN leg: The HPLMN leg is that part of the HPLMN route from the IPLMN to the HPLMN of the called party.

HPLMN route: A call uses the HPLMN route if the destination is deduced from the MSISDN of the called party. This forces the call to be routed via the HPLMN of the called party.

IPLMN: An IPLMN is a PLMN which interrogates the HPLMN of a called party in order to determine the whereabouts of that party.

Late Call Forwarding: Late Call Forwarding is Call Forwarding performed after the call has been extended to the VPLMN of the forwarding subscriber (i.e. Conditional Call Forwarding on Busy, Conditional Call Forwarding on No Reply and Conditional Call Forwarding on Not Reachable detected in the VPLMN of the forwarding subscriber). Late Call Forwarding may be invoked in the IPLMN or in the VPLMN of the forwarding subscriber.

Abbreviations are given in GSM 01.04 (ETR 100) [1].

4 Description of Optimal Routing

Support of Optimal Routing (SOR) is a network feature which enables the calls directed to a mobile subscriber to be routed directly to the mobile subscriber's actual location, or to her forwarded-to destination (instead of via the HPLMN or in the case of Late Call Forwarding via the VPLMN).

The IPLMN handling the call shall decide whether or not to optimize the routing of the call taking into account information provided by the called mobile subscriber's HPLMN. For given subscribers, as a network option, the HPLMN may permit or deny OR on a per call basis.

NOTE: References to the provision of Data Privacy supplementary services in case of OR have been deleted from MoU reference documents.

5 Functional requirements

5.1 General

SOR shall be provided for all circuit switched Telecommunication Services, except emergency calls, Dedicated PAD and Dedicated Packet Access (GPRS is for further study).

The network feature shall be applied automatically for all calls except for those calls for which the HPLMN of the called party denies the optimal routing.

5.2 Normal operation

In the first phase of SOR, the routes of calls will be optimized for the cases of OR being performed within a country or towards the country where the call would have been routed normally.

Under all other circumstances, the GSM basic call routing is applied:

- If the IPLMN detects that basic OR cannot be applied, the IPLMN routes the call according to the dialled number.

- If the IPLMN detects that OR for Late Call Forwarding cannot be applied, the Call Forwarding will be performed in the VPLMN of the forwarding subscriber.

If the serving network of the ultimate destination supports SOR, the serving network of the caller shall be able to indicate to the network visited by the ultimate destination that the call has been optimally routed and to indicate the originating PLMN of the optimally routed leg.

The complete set of scenarios included in phase 1 of SOR is described below.

The notation used for the scenario diagrams is defined in figure 1.

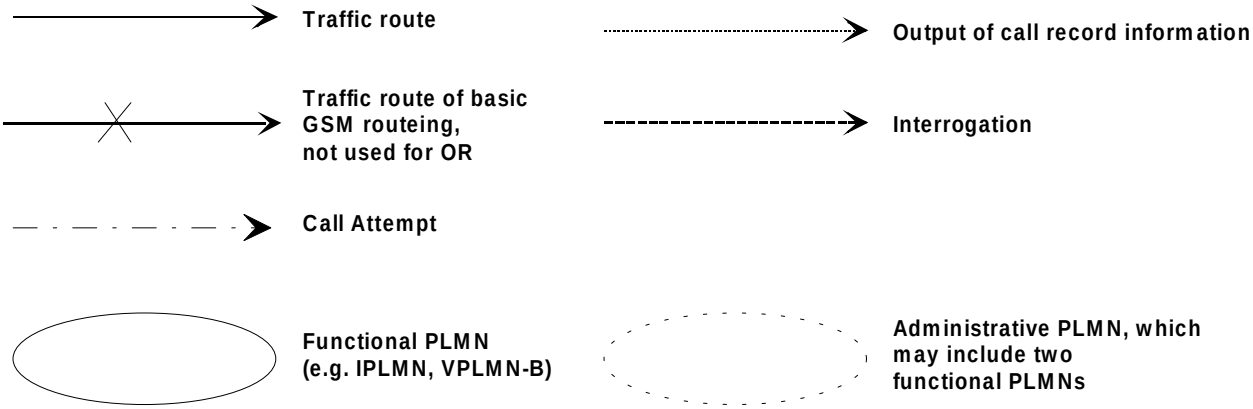


Figure 1: Notation used in scenario diagrams

If one of those scenarios occurs, SOR shall be invoked.

The assumptions taken are the following :

- A subscriber A sets up a call to a mobile subscriber B, who may have forwarded her calls to a subscriber C.

- The C subscriber may be either a fixed subscriber or a mobile subscriber.

If C is a mobile subscriber, the location of C taken into account in the following paragraphs is the location of HPLMN-C.

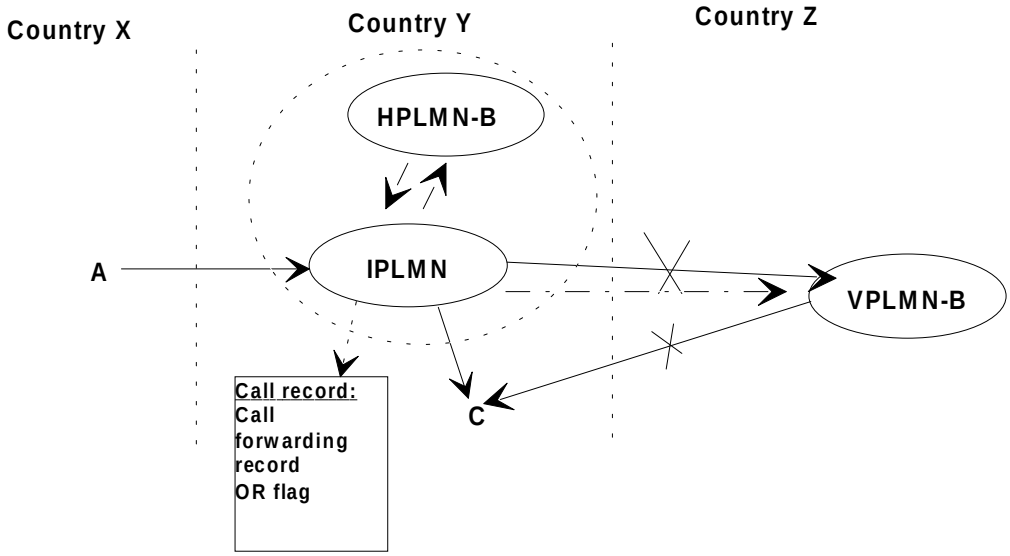
5.2.1 A is a fixed subscriber or a mobile subscriber who may not benefit from OR

As the originating network does not have the ability to interrogate the HPLMN of the B subscriber, the normal GSM call handling is applied.

Once the HPLMN of the B subscriber has the control of the call, the call may be optimized in the case of a forwarded call towards a party located in the Home Country of the B subscriber or in the country visited by the B subscriber.

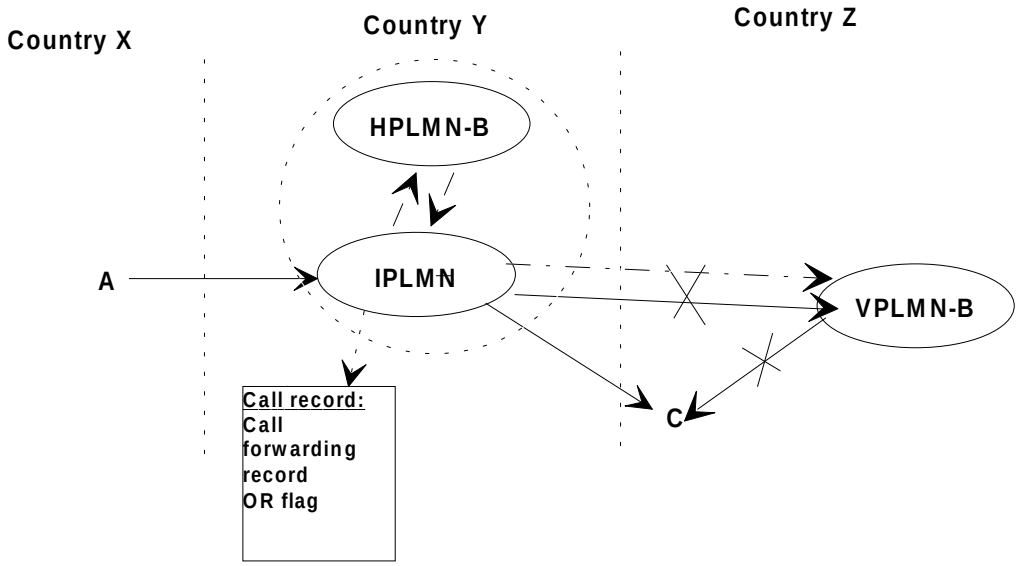
NOTE: - A may be in any country.

- In the two following cases, the IPLMN is HPLMN-B.



NOTE: Call records shown in the figure are for information only.

SCENARIO 1: OR for Late Call Forwarding, C is in the same country as HPLMN-B



NOTE: Call records shown in the figure are for information only.

SCENARIO 2: OR for Late Call Forwarding, C is in the same country as VPLMN-B

5.2.2 A is a mobile subscriber who may benefit from OR

5.2.2.1 Description of the call routing

If A sets up a call to B, then the originating PLMN shall interrogate the HPLMN of the mobile subscriber B in order to know how to route the call.

If B is registered in the same country as A, then the call shall be routed directly to B as described below.

If B has activated a Call Forward to a destination located in the Home Country of B or in the country where A is registered and this leads to the invocation of Early Call Forwarding, then the call shall be routed directly from A to the forwarded-to-party.

In any other cases, the call shall be routed to the mobile subscriber B via HPLMN(B).

If the call cannot be completed, the originating PLMN shall receive an indication of the reason of the failure of the call completion.

Thereafter, if the mobile subscriber B has activated a Conditional Call Forward to a destination located in her Home Country or to a destination in the country where A is registered and this leads to the invocation of Late Call Forwarding, then the originating PLMN shall route the call directly to the forwarded-to-party.

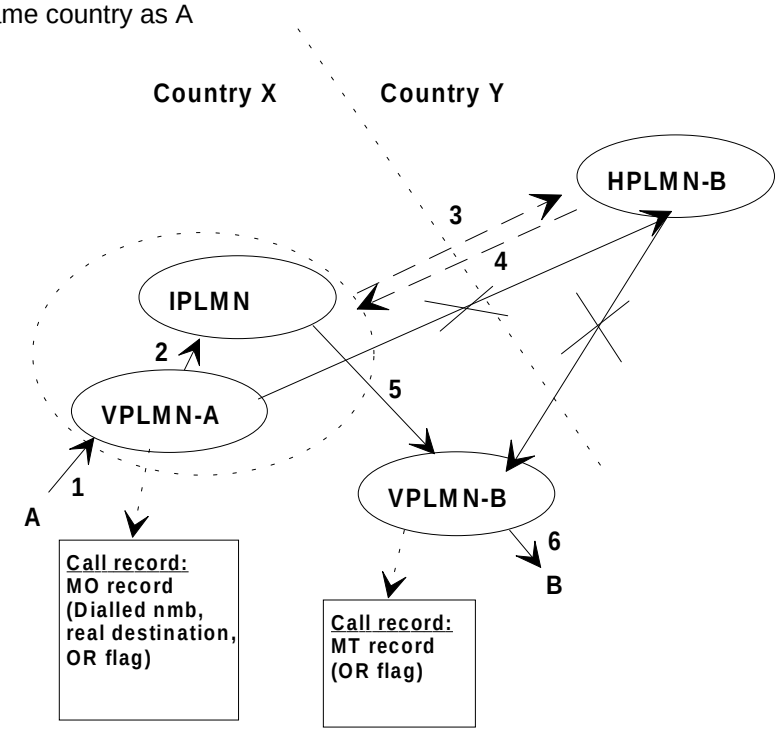
The remaining leg of the call from the intermediate point to the ultimate destination may be optimally routed.

5.2.2.2 Call scenarios handled in OR Phase 1

In the following scenarios, the IPLMN is VPLMN-A.

1) The call from the A subscriber to the B subscriber is completed (Basic OR)

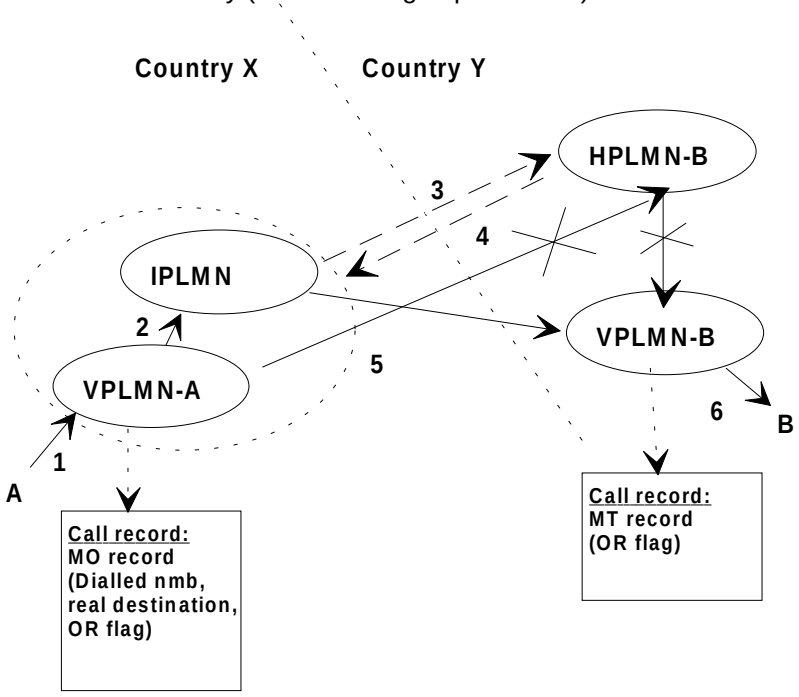
a) B is located in the same country as A



NOTE: Call records shown in the figure are for information only.

SCENARIO 3: BASIC OR, B in the same country as A

b) B is located in her Home Country (Network usage optimization)



NOTE: Call records shown in the figure are for information only.

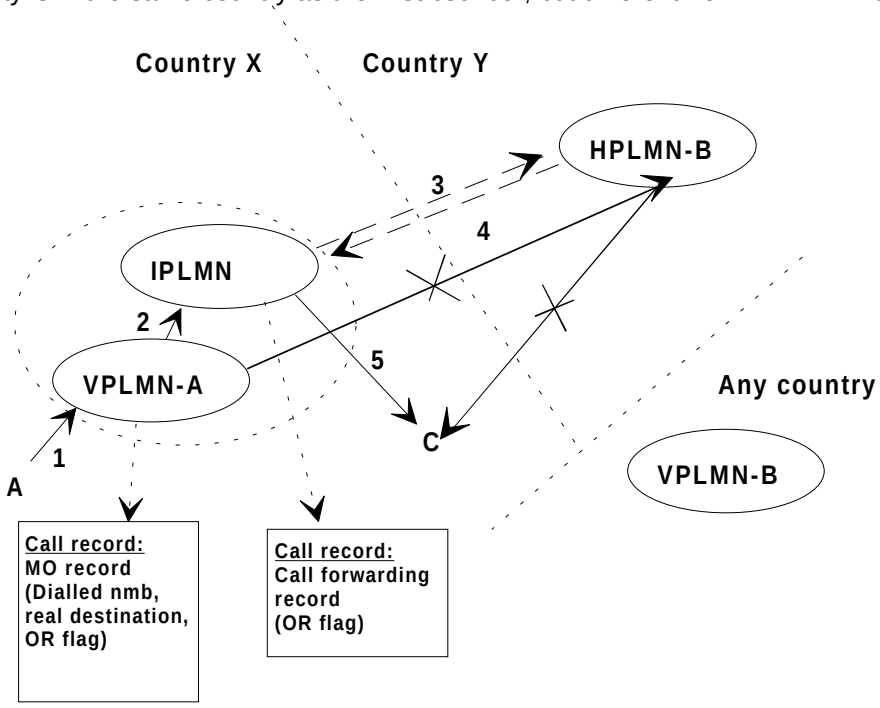
SCENARIO 4: BASIC OR, B in her home country

2) The call set up by the subscriber A is being forwarded to a C party

2.1) Early Call Forward

NOTE: For the two following scenarios, the location of B is not relevant.

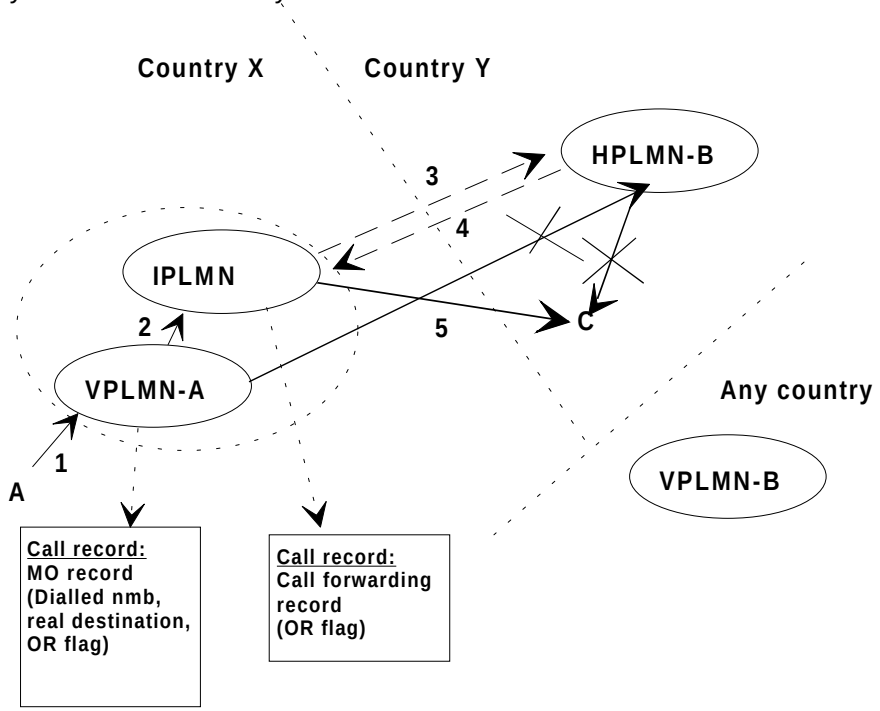
a) the C party is in the same country as the A subscriber, but different from HPLMN B country.



NOTE: Call records shown in the figure are for information only.

SCENARIO 5: Early CF, C in the same country as A

b) the C party is in the same country as HPLMN-B

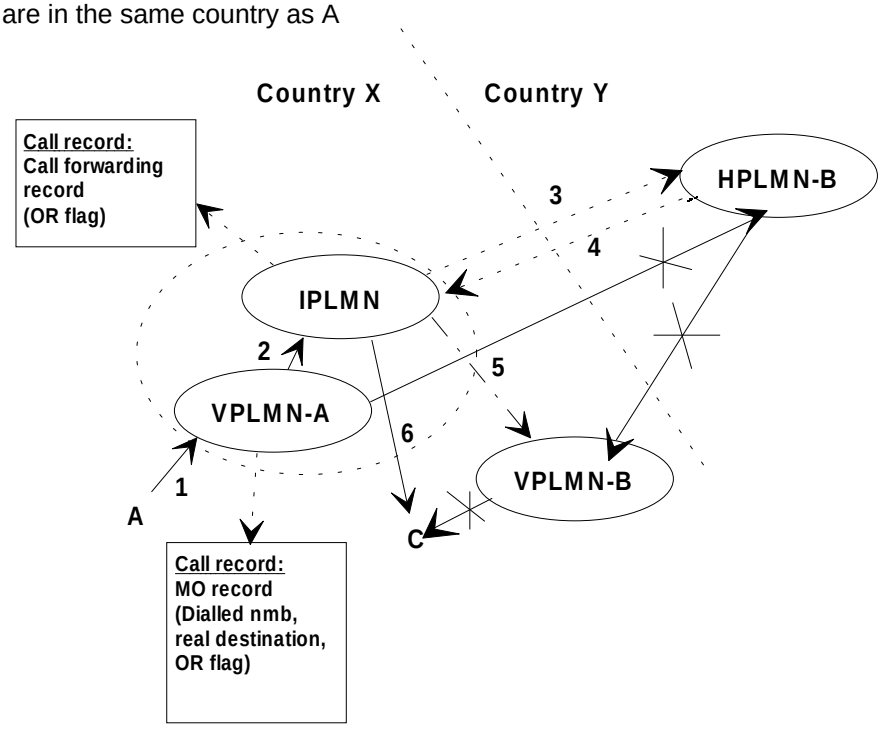


NOTE: Call records shown in the figure are for information only.

SCENARIO 6: Early CF, C in the same country as HPLMN-B

2.2) Late Call Forward

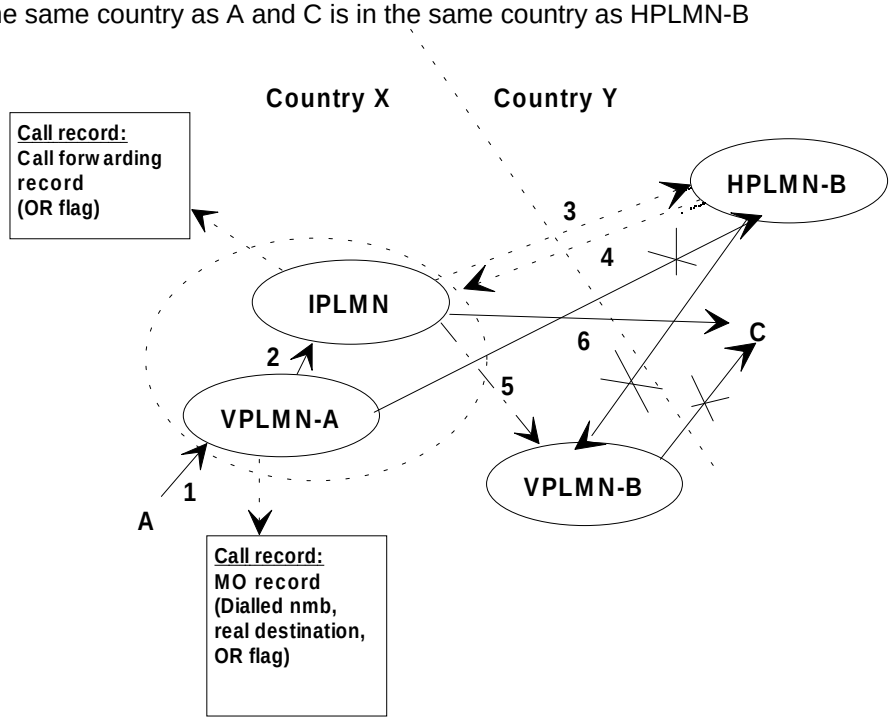
a) B and C are in the same country as A



NOTE: Call records shown in the figure are for information only.

SCENARIO 7: BASIC OR + OR for Late Call Forwarding, B in the same country as A, C in the same country as A

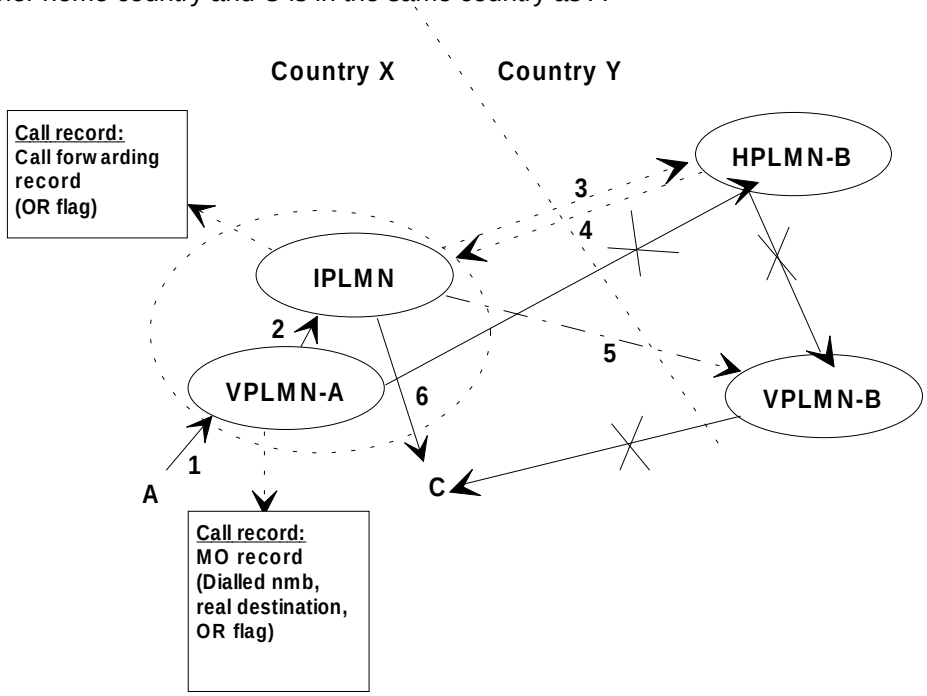
b) B is in the same country as A and C is in the same country as HPLMN-B



NOTE: Call records shown in the figure are for information only.

SCENARIO 8: BASIC OR + OR for Late Call Forwarding, B in the same country as A, C in the same country as HPLMN-B

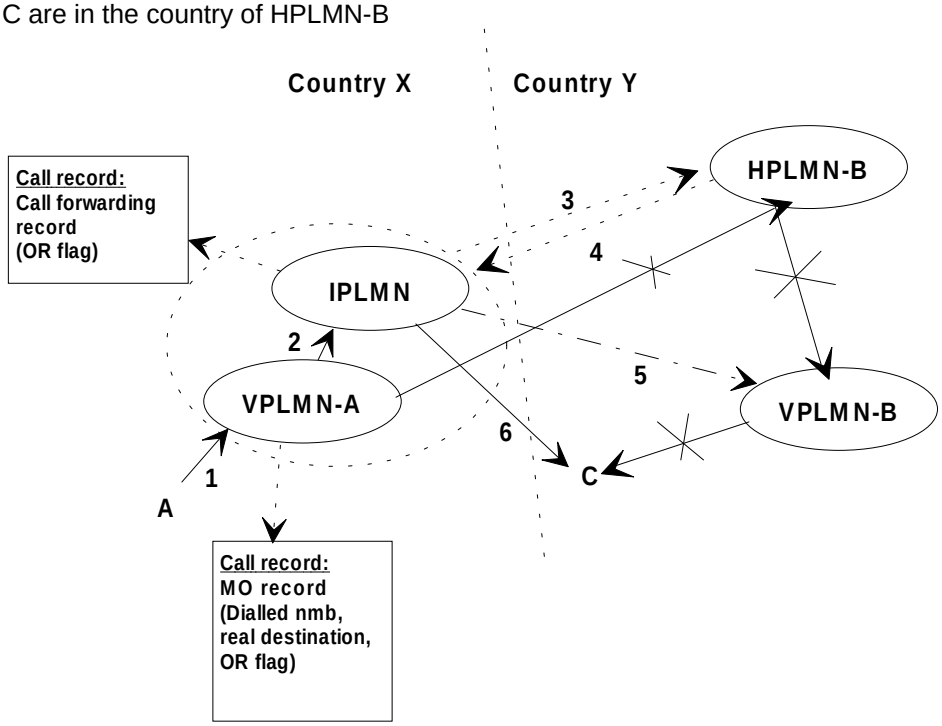
c) B is in her home country and C is in the same country as A



NOTE: Call records shown in the figure are for information only.

SCENARIO 9: BASIC OR + OR for Late Call Forwarding,
B in the same country as HPLMN-B, C in the same country as A

d) B and C are in the country of HPLMN-B



NOTE: Call records shown in the figure are for information only.

SCENARIO 10: BASIC OR + OR for Late Conditional Call Forwarding,
B in the same country as HPLMN-B, C in the same country as HPLMN-B

5.3 Exceptional procedures or unsuccessful outcome

5.3.1 Non-support of SOR in the VPLMN of the caller

If subscriber A roams into a network not supporting OR, she may not benefit from OR and only scenario 1 and scenario 2 of SOR are supported.

5.3.2 Non-support of SOR in the HPLMN of the B subscriber

If the HPLMN of the called party does not support SOR, SOR cannot be invoked and the route of the call as far as the called party's VPLMN cannot be optimized (the call would normally be routed via the HPLMN of the called party).

The same procedure shall be followed if the HPLMN operator denies OR on a subscriber basis.

5.3.3 Non support of SOR in the VPLMN of the B subscriber

If a subscriber whose HPLMN supports SOR registers in a VPLMN which does not support SOR, only the cases of Early Forwarded calls may be optimized.

6 Interactions of Optimal routing with supplementary services

No Interaction unless it is stated differently below.

6.1 Call Forwarding

Interactions between SOR and Call Forwarding are dealt with in section 5.0.

6.2 Call Barring

Outgoing Call Barring services are applied according to the dialled number.

Barring of Incoming calls when Roaming outside the HPLMN country will prevent calls to a mobile subscriber who has roamed outside her HPLMN country even if OR would result in no chargeable roaming leg.

The existing interactions between Call Forwardings and Call Barrings are not changed by the introduction of OR.

6.3 Call Transfer

A transferred call is considered as a set of two separate calls which may be separately optimally routed.

Optimal Routing shall not be invoked as a result of the invocation of Call Transfer.

6.4 Call Deflection

A deflected call is considered as a late forwarded call and as such may be optimally routed.

7 Interactions of Optimal Routing with Operator Determined Barring (ODB)

The principles for the interaction between operator determined barring and SOR are the same as those for the interaction between Supplementary Service Call Barring and SOR.

8 Interactions of Optimal Routing with CAMEL

If CAMEL has to be applied to any part of the call and if CAMEL modifies the destination of the call, the OR applies to any new destination introduced by CAMEL. This is applicable on all parts of the call, i.e. originating, terminating or forwarded leg.

If Barring services are also applicable to the call then they have to be handled first together with CAMEL before SOR is applied.

History

Change history					
SMG No.	**TDoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
SMG#19	366/96	None		2.0.0	Submitted for approval

Document history	
June 1996	Creation of Version 5.0.0
July 1996	Publication of Version 5.0.0

ISBN 2-7437-0805-0
Dépôt légal : Juilllet 1996