

Source: TSG SA1

Title: CR (R99) to 22.002 on 32 kbit/s UDI/RDI multimedia in GSM

Document for: Approval

Agenda Item: 7.1.3

Spec	CR	Rev	Phase	Cat	Subject	Vers	New Vers	SA1 Doc. No.
22.011	017		R99	F	Alignment with 23.122 on selection procedure	3.2.0	3.3.0	S1-000548
22.011	018		R00	F	Alignment with 23.122 on selection procedure	4.1.0	4.2.0	S1-000549

CHANGE REQUEST

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22.011 CR 017

Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: SA#9
list expected approval meeting # here ↑

for approval
for information

strategic
non-strategic (for SMG Use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects:
(at least one should be marked with an X)

(U)SIM ME UTRAN / Radio Core Network

Source: SA1 **Date:** 11/07/00

Subject: Alignment with 23.122 on selection procedure. The term used "other PLMNs" was not correct, the term "other PLMN/access technology combinations" shall be used instead.

Work item: TEI

Category:

F Correction
A Corresponds to a correction in an earlier release
B Addition of feature
C Functional modification of feature
D Editorial modification

Release:

Phase 2
Release 96
Release 97
Release 98
Release 99
Release 00

(only one category shall be marked with an X)

Reason for change:

Alignment with 23.122

Clauses affected: 3.2

Other specs

Other 3G core specifications → List of CRs:

Affected:

Other GSM core specifications → List of CRs:

MS test specifications → List of CRs:

BSS test specifications → List of CRs:

O&M specifications → List of CRs:

Other comments:



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<----- double-click here for help and instructions on how to create a CR.

3.2 Network selection

3.2.1 General

The UE shall support both manual and automatic network selection mechanisms (modes). The UE shall select the last mode used, as the default mode, at every switch-on.

NOTE: By defaulting to the last mode used, e.g. manual network selection, the undesired automatic selection of an adjacent PLMN instead of the desired HPLMN in border areas, can be avoided at switch-on.

The user shall be given the opportunity to change mode at any time.

Except as defined below, the MMI shall be at the discretion of the UE manufacturer.

The UE shall contain display functions by which Available PLMNs and the Selected PLMN can be indicated.

3.2.2 Procedures

3.2.2.1 General

In the following procedures the UE selects and attempts registration on PLMNs.

In this ETS, the term "PLMN Selection" defines an UE based procedure, whereby candidate PLMNs are chosen, one at a time, for attempted registration.

A User Controlled PLMN Selector data field exists on the USIM to allow the user to indicate a preference for network selection. It shall be possible for the user to update the User Controlled PLMN Selector data field, but it shall not be possible to update this data field over the radio interface, e.g. using SIM Application Toolkit.

It shall be possible to have an Operator Controlled PLMN Selector list and a User Controlled PLMN Selector list stored on the SIM/USIM card. Both PLMN Selector lists may contain a list of preferred PLMNs in priority order. It shall be possible to have an associated Access Technology identifier e.g., UTRA, or GSM associated with each entry in the PLMN Selector lists.

NOTE 1: A PLMN in a Selector list, including HPLMN, may have multiple occurrences, with different access technology identifiers.

If registration on a PLMN is successful, the UE shall indicate this PLMN (the "registered PLMN") and be capable of making and receiving calls on it. The identity of the registered PLMN shall be stored on the SIM/USIM. However, if registration is unsuccessful, the UE shall ensure that there is no registered PLMN stored in the SIM/USIM.

If a registration is unsuccessful because the IMSI is unknown in the home network, or the UE is illegal, then the UE shall not allow any further registration attempts on any network, until the UE is next powered-up or a SIM/USIM is inserted.

If the registration is unsuccessful due to the lack to service entitlement, specific behaviour by the UE may be required, see subclause 3.2.2.4.

To avoid unnecessary registration attempts, lists of forbidden PLMNs and LAs are maintained in the UE, see subclause 3.2.2.4 and TS 23.122 [3].

Registration attempts shall not be made by UEs without a SIM/USIM inserted.

An UE/ME which has not successfully registered shall nevertheless be able to make emergency call attempts on an available PLMN (which supports the emergency call teleservice), without the need for the user to select a PLMN. An available PLMN is determined by radio characteristics (TS 23.122 [3]).

3.2.2.2 At switch-on or recovery from lack of coverage

If the UE is within coverage (at switch-on) or returns to coverage of the PLMN on which it is already registered (as indicated by the registered PLMN stored in the SIM/USIM), the UE shall perform a location update to a new location area if necessary.

If there is no registered PLMN stored in the SIM/USIM, or if this PLMN is unavailable, or the attempted registration fails, the UE shall follow one of the following procedures for network selection:

A) Automatic network selection mode

The UE shall select and attempt registration on other PLMNs, if available and allowable and the location area is not in the list of "forbidden LSs for roaming" (see TS 23.122 [3]), in the following order:

- i) HPLMN for preferred access technologies in the order specified. It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;

NOTE: Allowance shall be made for cases where the HPLMN uses different network IDs for different access networks.

- ii) each PLMN in the "User Controlled PLMN Selector" data field in the USIM (in priority order) . It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;
- iii) each PLMN in the "Operator Controlled PLMN Selector" data field in the SIM/USIM (in priority order). It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;
- iiib) ~~other PLMN/access technology combinations~~~~other PLMNs~~ with sufficient received signal level (see TS 23.122 [3]) in random order;
- iv) ~~other PLMN/access technology combinations~~~~other PLMNs~~ with sufficient received signal quality (see TS 23.122 [3]) in random order. It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;
- v) ~~other PLMN/access technology combinations~~~~all other PLMNs~~ in order of decreasing signal quality. It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service.

An allowable PLMN is one which is not in the "Forbidden PLMN" data field in the SIM/USIM . This data field may be extended in the ME memory (see subclause 3.2.2.4).

If successful registration is achieved, the UE shall indicate the selected PLMN.

If registration cannot be achieved on any PLMN, the UE shall indicate "no service" to the user, wait until a new PLMN is detected, or new location areas of an allowed PLMN are found which are not in the forbidden LA list(s), and then repeat the procedure. When registration cannot be achieved, different (discontinuous) PLMN search schemes may be used in order to minimize the access time while maintaining battery life, e.g. by prioritizing the search in favour of BCCH carriers which have a high probability of belonging to an available and allowable PLMN.

B) Manual network selection mode

The UE shall indicate PLMNs, including "Forbidden PLMNs", which are available. If there are none, this shall also be indicated.

Any available PLMN's shall be presented in the following order:

- i) HPLMN;
- ii) PLMNs contained in the "User Controlled PLMN Selector" data field in the SIM/USIM (in priority order);
- iii) PLMNs contained in the "Operator Controlled PLMN Selector" data field in the SIM/USIM (in priority order);
- iv) ~~other PLMN/access technology combinations~~~~other PLMNs~~ with sufficient received signal level (see TS 23.122 [3]) in random order;
- v) ~~other PLMN/access technology combinations~~~~all other PLMNs~~ in order of decreasing signal strength.

If a PLMN does not support voice services then this shall be indicated to the user.

The user may select his desired PLMN and the UE shall attempt registration on this PLMN. (This may take place at any time during the presentation of PLMNs).

If the registration cannot be achieved on the selected PLMN, the UE shall indicate "No Service". The user may then select and attempt to register on another or the same PLMN following the above procedure. The UE shall not attempt to register on a PLMN which has not been selected by the user.

If a PLMN is selected but the UE cannot register on it because registration is rejected with the cause "PLMN not allowed", the UE shall not re-attempt to register on that network unless the same PLMN is selected again by the user.

If a PLMN is selected but the UE cannot register on it for other reasons, the UE shall, upon detection of a new LA (not in a forbidden LA list) of the selected PLMN, attempt to register on the PLMN.

If the UE is registered on a PLMN but loses coverage, different (discontinuous) carrier search schemes may be used to minimize the time to find a new valid BCCH carrier and maintain battery life, e.g. by prioritizing the search in favour of BCCH carriers of the registered PLMN.

3.2.2.3 User reselection

At any time, the user may request the UE to initiate reselection and registration onto an alternative available PLMN, according to the following procedures, dependent upon the operating mode.

A) Automatic Network Selection Mode

The UE shall select the HPLMN. If the HPLMN is not available, the UE shall follow the procedure defined in

subclause 3.2.2.2.A).

B) Manual Network Selection Mode

The procedure of subclause 3.2.2.2 B) is followed.

3.2.2.4 Mobile Station reactions to indications of service restriction from the network

Different types of UE behaviour is required to support, for example, national roaming, regionally provided service and temporary international roaming restrictions. The behaviour to be followed by the UE is indicated by the network.

3.2.2.4.1 "Permanent" PLMN restriction

When a registration attempt by the UE is rejected by a network with an indication of "permanent" PLMN restriction, the PLMN identity shall be written to a list of "Forbidden PLMNs" stored in a data field in the SIM/USIM.

If a successful registration (whilst in manual mode) is achieved on a PLMN in the "Forbidden PLMN" list, the PLMN shall be deleted from the list.

When in automatic mode, the UE may indicate any PLMNs which will not be selected due to their presence in the "Forbidden PLMN" list.

3.2.2.4.2 "Partial" and "temporary" PLMN restrictions

When a registration attempt by the UE is rejected by a network due to a "partial" or a "temporary" PLMN restriction, the UE shall perform one of the following procedures determined by the indication in the location update reject cause sent by the network (see TS 23.122 [3]):

- i) the UE shall store the location area identity in the list of "forbidden LAs for regional provision of service" and shall enter the limited service state and remain in that state until it moves to a cell in a location area where service is allowed;
- ii) the UE shall store the location area identity in the list of "forbidden LAs for roaming" and shall use one of the following procedures according to the PLMN selection Mode:

A) automatic network selection mode:

- the procedure of subclause 3.2.2.2. A).

B) manual network selection mode:

- the procedure of subclause 3.2.2.2.B).

3.2.2.5 Timer for return to HPLMN

If the UE in Automatic Mode has selected and registered on a VPLMN of its home country, it shall make periodic attempts to return to its HPLMN.

The interval between attempts shall be stored in the SIM/USIM. Only the service provider shall be able to set the timer value. The timer shall have a value between 6 minutes and 8 hours, with a step size of 6 minutes. One value shall be designated to indicate that no periodic attempts shall be made.

In the absence of a permitted value in the SIM/USIM, or the SIM/USIM is phase 1 and therefore does not contain the datafield, then a default value of 30 minutes, shall be used by the UE.

NOTE: Use of values less than 30 minutes may result in excessive ME battery drain.

3.2.2.6 Investigation PLMN Scan

The operator shall be able to control by SIM/USIM configuration whether an UE that is capable shall perform an investigation scan. This investigation scan shall be performed after each successful PLMN selection as well as during limited service state. The investigation scan shall search for a higher prioritised PLMN that does not offer GSM voice service. If such a PLMN is available, the user shall be informed. This enables the user to switch to such a PLMN using manual selection if the user so prefers. The investigation scan shall not be performed when no SIM/USIM is inserted.

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

22.011 CR 018

Current Version: **4.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **SA#9**
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strategic
non-strategic *(for SMG Use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: SA1 **Date:** 11/07/00

Subject: Alignment with 23.122 on selection procedure. The term used "other PLMNs" was not correct, the term "other PLMN/access technology combinations" shall be used instead.

Work item: TEI

Category: <i>(only one category shall be marked with an X)</i>	F Correction	<input checked="" type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	A Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	B Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	C Functional modification of feature	<input type="checkbox"/>		Release 98	<input type="checkbox"/>
	D Editorial modification	<input type="checkbox"/>		Release 99	<input type="checkbox"/>
			Release 00	<input checked="" type="checkbox"/>	

Reason for change: Alignment with 23.122

Clauses affected: 3.2

Other specs Affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:



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The user shall be given the opportunity to change mode at any time.

Except as defined below, the MMI shall be at the discretion of the UE manufacturer.

The UE shall contain display functions by which Available PLMNs and the Selected PLMN can be indicated.

3.2.2 Procedures

3.2.2.1 General

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NOTE 1: A PLMN in a Selector list, including HPLMN, may have multiple occurrences, with different access technology identifiers.

If registration on a PLMN is successful, the UE shall indicate this PLMN (the "registered PLMN") and be capable of making and receiving calls on it. The identity of the registered PLMN shall be stored on the SIM/USIM. However, if registration is unsuccessful, the UE shall ensure that there is no registered PLMN stored in the SIM/USIM.

If a registration is unsuccessful because the IMSI is unknown in the home network, or the UE is illegal, then the UE shall not allow any further registration attempts on any network, until the UE is next powered-up or a SIM/USIM is inserted.

If the registration is unsuccessful due to the lack to service entitlement, specific behaviour by the UE may be required, see subclause 3.2.2.4.

To avoid unnecessary registration attempts, lists of forbidden PLMNs and LAs are maintained in the UE, see subclause 3.2.2.4 and TS 23.122 [3].

Registration attempts shall not be made by UEs without a SIM/USIM inserted.

An UE/ME which has not successfully registered shall nevertheless be able to make emergency call attempts on an available PLMN (which supports the emergency call teleservice), without the need for the user to select a PLMN. An available PLMN is determined by radio characteristics (TS 23.122 [3]).

3.2.2.2 At switch-on or recovery from lack of coverage

If the UE is within coverage (at switch-on) or returns to coverage of the PLMN on which it is already registered (as indicated by the registered PLMN stored in the SIM/USIM), the UE shall perform a location update to a new location area if necessary.

If there is no registered PLMN stored in the SIM/USIM, or if this PLMN is unavailable, or the attempted registration fails, the UE shall follow one of the following procedures for network selection:

A) Automatic network selection mode

The UE shall select and attempt registration on other PLMNs, if available and allowable and the location area is not in the list of "forbidden LSs for roaming" (see TS 23.122 [3]), in the following order:

- i) HPLMN for preferred access technologies in the order specified. (Note: Allowance shall be made for cases where the HPLMN uses different network IDs for different access networks). It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;

- ii) each PLMN in the "User Controlled PLMN Selector" data field in the USIM (in priority order) . It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;
- iii) each PLMN in the "Operator Controlled PLMN Selector" data field in the SIM/USIM (in priority order). It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;ii) other PLMNs with sufficient received signal level (see TS 23.122 [3]) in random order;
- iv) ~~other PLMN/access technology combinations~~~~other PLMNs~~ with sufficient received signal quality (see TS 23.122 [3]) in random order. It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service;
- v) ~~other PLMN/access technology combinations~~~~all other PLMNs~~ in order of decreasing signal quality. It shall be possible to configure a voice capable UE so that it shall not attempt registration on a PLMN if all cells identified as belonging to the PLMN do not support the corresponding voice service.

An allowable PLMN is one which is not in the "Forbidden PLMN" data field in the SIM/USIM . This data field may be extended in the ME memory.(see subclause 3.2.2.4).

If successful registration is achieved, the UE shall indicate the selected PLMN.

If registration cannot be achieved on any PLMN, the UE shall indicate "no service" to the user, wait until a new PLMN is detected, or new location areas of an allowed PLMN are found which are not in the forbidden LA list(s), and then repeat the procedure. When registration cannot be achieved, different (discontinuous) PLMN search schemes may be used in order to minimize the access time while maintaining battery life, e.g. by prioritizing the search in favour of BCCH carriers which have a high probability of belonging to an available and allowable PLMN.

B) Manual network selection mode

The UE shall indicate PLMNs, including "Forbidden PLMNs", which are available. If there are none, this shall also be indicated.

Any available PLMN's shall be presented in the following order:

- i) HPLMN;
- ii) PLMNs contained in the "User Controlled PLMN Selector" data field in the SIM/USIM (in priority order);
- iii) PLMNs contained in the "Operator Controlled PLMN Selector" data field in the SIM/USIM (in priority order);
- iv) ~~other PLMN/access technology combinations~~~~other PLMNs~~ with sufficient received signal level (see TS 23.122 [3]) in random order;
- v) ~~other PLMN/access technology combinations~~~~all other PLMNs~~ in order of decreasing signal strength.

If a PLMN does not support voice services then this shall be indicated to the user.

The user may select his desired PLMN and the UE shall attempt registration on this PLMN. (This may take place at any time during the presentation of PLMNs).

If the registration cannot be achieved on the selected PLMN, the UE shall indicate "No Service". The user may then select and attempt to register on another or the same PLMN following the above procedure. The UE shall not attempt to register on a PLMN which has not been selected by the user.

If a PLMN is selected but the UE cannot register on it because registration is rejected with the cause "PLMN not allowed", the UE shall not re-attempt to register on that network unless the same PLMN is selected again by the user.

If a PLMN is selected but the UE cannot register on it for other reasons, the UE shall, upon detection of a new LA (not in a forbidden LA list) of the selected PLMN, attempt to register on the PLMN.

If the UE is registered on a PLMN but loses coverage, different (discontinuous) carrier search schemes may be used to minimize the time to find a new valid BCCH carrier and maintain battery life, e.g. by prioritizing the search in favour of BCCH carriers of the registered PLMN.

3.2.2.3 User reselection

At any time, the user may request the UE to initiate reselection and registration onto an alternative available PLMN, according to the following procedures, dependent upon the operating mode.

A) Automatic Network Selection Mode

The UE shall select the HPLMN. If the HPLMN is not available, the UE shall follow the procedure defined in clause 3.2.2.2.A) above.

B) Manual Network Selection Mode

The procedure of 3.2.2.2 B) is followed.

3.2.2.4 Mobile Station reactions to indications of service restriction from the network

Different types of UE behaviour is required to support, for example, national roaming, regionally provided service and temporary international roaming restrictions. The behaviour to be followed by the UE is indicated by the network.

3.2.2.4.1 "Permanent" PLMN restriction

When a registration attempt by the UE is rejected by a network with an indication of "permanent" PLMN restriction, the PLMN identity shall be written to a list of "Forbidden PLMNs" stored in a data field in the SIM/USIM.

If a successful registration (whilst in manual mode) is achieved on a PLMN in the "Forbidden PLMN" list, the PLMN shall be deleted from the list.

When in automatic mode, the UE may indicate any PLMNs which will not be selected due to their presence in the "Forbidden PLMN" list.

3.2.2.4.2 "Partial" and "temporary" PLMN restrictions

When a registration attempt by the UE is rejected by a network due to a "partial" or a "temporary" PLMN restriction, the UE shall perform one of the following procedures determined by the indication in the location update reject cause sent by the network (see TS 23.122 [3]):

- i) The UE shall store the location area identity in the list of "forbidden LAs for regional provision of service" and shall enter the limited service state and remain in that state until it moves to a cell in a location area where service is allowed.
- ii) The UE shall store the location area identity in the list of "forbidden LAs for roaming" and shall use one of the following procedures according to the PLMN selection Mode:

A) Automatic network selection mode:

The procedure of 3.2.2.2. A).

B) Manual network selection mode:

The procedure of 3.2.2.2.B).

3.2.2.5 Periodic network selection attempts

The UE shall make periodic network selection attempts in one or both of the following situations:

- If the UE is in Automatic Mode and has selected and registered on a VPLMN of its home country, it shall make periodic attempts to return to its HPLMN.
- If the UE is in Automatic Mode and has selected and registered on a VPLMN which is neither the HPLMN nor one of the PLMNs contained either in the "Operator Controlled PLMN Selector" data field or in the "User Controlled PLMN Selector", it shall make periodic attempts to return to one of the PLMNs of the same country contained either in the "Operator Controlled PLMN Selector" data field or in in the "User Controlled PLMN Selector".

The UE shall only make reselection attempts while in idle mode for circuit services.

The interval between attempts shall be stored in the SIM/USIM. Only the service provider shall be able to select for which of the previous situations, periodic network selection shall be attempted and to set the interval, which shall be between 6 minutes and 8 hours, with a step size of 6 minutes. One value shall be designated to indicate that no periodic attempts shall be made.

In the absence of a permitted value in the SIM/USIM, or the SIM/USIM is phase 1 and therefore does not contain the datafield, then a default value of 30 minutes, shall be used by the UE.

NOTE: Use of values less than 30 minutes may result in excessive ME battery drain.

3.2.2.6 Investigation PLMN Scan

The operator shall be able to control by SIM/USIM configuration whether an UE that is capable shall perform an investigation scan. This investigation scan shall be performed after each successful PLMN selection as well as during limited service state. The investigation scan shall search for a higher prioritised PLMN that does not offer GSM voice service. If such a PLMN is available, the user shall be informed. This enables the user to switch to such a PLMN using manual selection if the user so prefers. The investigation scan shall not be performed when no SIM/USIM is inserted.