**3GPP TSG-SA WG6 Meeting #50-e S6-22xxxx**

**e-meeting, 22nd – 31st August 2022 (was S6-222053)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.280** | **CR** | **0345** | **rev** | **1** | **Current version:** |  |  |
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| *For* ***HE******LP*** *on using this form: comprehensive instructions can be found at  http://www.3gpp.org/Change-Requests.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Description of Migration | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | FirstNet | | | | | | | | | |
| ***Source to TSG:*** | S6 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IRail | | | | |  | ***Date:*** | | | 2022-08-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP TR 21.900. | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | A succinct understanding of the migration process and procedures is needed. The addition of an informative annex to supply this information will provide a common understanding for the development of those procedures. | | | | | | | | |
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| ***Summary of change:*** | | An informative annex to describe migration is added. | | | | | | | | |
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| ***Consequences if not approved:*** | | There will not be a written reference to provide a common understanding of migration. | | | | | | | | |
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| ***Clauses affected:*** | | (new) X, X.1,X.1.1, X.1.2, X.1.3, X.1.3.1, X.1.3.2, X.1.4, X.1.5, X.1.6, X.1.7, X.1.7.1, X.1.7.2, X.1.7.3, X.1.7.4, X.1.7.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev 1:   * Created clause X.1.4.1 from the last paragraph of X.1.4 to allow general referencing to the "make-before-break" description. * Deleted the EN in X.1.4. * Added references to 3GPP TS 33.180. * Removed the discussion of on demand migration. * The third paragraph of X.1.3 was removed due to redundancy. * The second paragraph of X.1.3.2 was removed due to redundancy. * "MC UE" was changed to "MC service client(s)" in a number of places. * Reference to the procedure of 10.16.2.3 was added to X.1.7.4. * Terminology using the word "normal" was modified in several places by rewriting of the containing text. * In X.1.7.1, steps 7 and 8 were modified to be substeps of step 6, and mention of caching the current MC service ID of a user was explicitly referred to as "optional". | | | | | | | | |

#### \*\*\*\*\* BEGIN CHANGES \*\*\*\*\*

Annex X (informative):  
Migration

# X.1 Migration basic concepts

## X.1.1 General

This clause provides an informative description of the basic concepts of migration.

The goal of migration is to allow an MC client that is operating on one MC system to move to another MC system and receive services there. Different use cases exist that place restrictions on how migration is carried out. In one case, the MC client could be willing to have a call drop and be re-initiated as a result of migration as in clause 10.16.2.3, while in another case, the MC client could need to be assured that a call will not drop as a result of migration. If the make-before-break procedures discussed in clause X.1.4.1 are used, call drops due to migration can be avoided.

## X.1.2 Migration overview

Migration consists of:

1) preparation and provisioning of the primary and partner MC systems before the migration takes place;

a) preparation of all necessary profiles and configuration files;

b) assignment of MC service IDs at the partner MC system;

c) preparation of security material (see 3GPP TS 33.180); and

d) making all prepared profiles, configuration files, and security material available to the MC service client(s) prior to beginning migration, thus greatly reducing the time to actually accomplish the migration;

i) migration materials that do not have a specific expiration time can be prepared days, weeks and even months prior to migration taking place; and

ii) migration materials that have a specific expiration time, such as security material (see 3GPP TS 33.180), can often be prepared hours prior to migration taking place;

2) provisioning of the MC service client(s) is completed before migration by downloading needed migration material to the MC service client(s):

a) migration materials that do not have a specific expiration time can be provisioned days, weeks and even months prior to migration taking place, for example, MC service provisioning for rail applications can occur several hours or days prior to the beginning of the train's journey; and

b) migration materials that have a specific expiration time, such as security material (see 3GPP TS 33.180), can be provisioned as soon as they are prepared;

3) commanding/permitting the MC service client(s) to migrate;

a) commanding an MC service client(s) to migrate can be used when the primary MC system knows that the MC service client(s) is in geographic proximity of the partner MC system or has an administrative reason to be migrated, for example, a public safety user could be required to migrate to a neighbouring MC system to assist in a mutual aid situation; and

b) permitting the MC service client(s) to migrate can be either an explicit or an implicit permission:

i) explicit permission involves a request being sent by the MC service client(s) to the MC system and an affirmative response; and

ii) implicit permission involves pre-provisioning the MC service client(s) with the permission to migrate to particular MC systems;

4) authentication and authorization of the MC user via the partner MC system's IdMS and reception of access tokens;

a) per 3GPP TS 33.180 clause 5.1.4.2, the primary MC system and the partner MC system can exchange security material so that the MC user is known by the partner MC system and can thus register successfully;

5) the MC service client(s) contacts the partner MC system's IdMS using provisioned migration material and receives the access tokens it will need to obtain needed services on the partner MC system;

6) the MC service client(s) registers for MC services on the partner MC system; and

7) the MC service client(s) affiliate, as necessary, to groups in the partner MC system indicated in the user profile for the partner MC system.

UE roaming across PLMN boundaries can occur both with and without migration being needed, depending on whether the current serving MC system is accessible from the PLMN to which the UE moves. When the UE crosses the PLMN boundary, it will register on the new PLMN and establish APN/DN connections including connectivity to IMS. If the operator of the old PLMN and the operator of the new PLMN have arranged for SIP signalling to be relayed to the old PLMN, the MC service client(s) can continue to communicate with the MC system of the previous PLMN. If the MC UE also connects to a MC system of the new PLMN, the ability for using make-before-break connectivity to the MC systems exists, see clause X.1.4.1.

## X.1.3 Provisioning for migration

Provisioning is done at both the primary and partner MC systems. This is a set of coordinated actions so that both MC systems:

- know the MC user by the proper set of identities, and

- share a common understanding of what actions the MC user is permitted on the partner MC system.

### X.1.3.1 Provisioning at the primary MC system

At the primary MC system, actions can take place to share information about the MC user with the partner MC system. This sharing can take place a long period of time prior to migration to support pre-provisioning. A copy of the user profile from the primary MC system could be shared either in its entirety or with portions removed that are private to the primary MC system. Information from the service configuration and UE initial configuration documents could also be shared. These sets of information can be of use to the partner MC system in preparing the user profiles and UE initial configuration documents at the partner MC system.

It is expected that automated administrative procedures will be developed by agencies using the MC systems to perform the necessary provisioning. Such procedures are outside the scope of this specification.

As described in 3GPP TS 33.180 clause 5.1.4.2, the primary MC system IdMS can share the primary IdMS certificate(s) used to validate the MC user's credentials with the partner MC system IdMS using an out of band mechanism that is outside the scope of this specification. This prepares the partner MC system IdMS to be able to authenticate the MC user. If the primary IdMS certificate(s) were to be changed, the primary MC system can refresh the partner MC system.

The primary MC system can also receive from the partner MC system copies of the user profiles, configuration document and MC service client initial configuration documents that will be used by the MC service client when migrated to the partner MC system. At a minimum the primary MC system needs to be able to provide the address of the partner MC system's IdMS, KMS, CMS, and GMS. These addresses (URIs) will allow the MC service client(s) to authenticate on the partner MC system, retrieve necessary keys, profiles, configurations, etc.

### X.1.3.2 Provisioning at the partner MC system

At the partner MC system, the globally unique MC ID of the MC user is used as the MC user's basic identity. The partner MC system can receive copies of various configuration information from the primary MC system as noted in clause X.1.3.1. Whether to use this information in preparation of the user profiles, service configuration documents and UE initial configuration document is a choice of the partner MC system. These files that are received by the MC service client(s) during the MC registration process are needed for successful operation in the partner MC system.

The sharing of the primary IdMS certificate(s) used to validate the MC user's credentials mentioned in clause 5.2.9.4.2.1 provides the partner MC system with the ability to validate and authenticate the MC user that is migrating to the partner MC system.

## X.1.4 Process of migration

Once the primary MC system and partner MC system have in place the necessary information to allow the MC user to successfully migrate, the migration process can begin. Migration can be initiated by either the primary MC system giving a command to the MC UE to migrate to a specific partner MC system, by a request from the MC user to be permitted to migrate to a specific partner MC system, or by implicit permission to migrate being provisioned for the MC service client(s).

For example, the ability to provision an MC service client(s) with permission to perform migration to a partner MC system supports the ability of trains (and their crews) that have an MC ID and are supported in partner MC systems to initiate migration themselves into the next MC system as a natural part of their activities. The migration process will include the signalling from the partner MC system to the primary MC system that the MC user (the train in this example) has migrated, thus allowing the primary MC system to be kept informed that the partner MC system currently serves the MC user.

### X.1.4.1 "make-before-break" MC system registration

Registration in one MC system can be accomplished before de-registration from another MC system. This ability to be registered in two MC systems provides a "make before break" capability that can support service continuity. In particular, both private and group calls initiated on the first MC system can continue while the MC service client(s) register on the new MC system. In the case of a private call, de-registration from the first MC system can occur after the private call completes. In the case of a group call, if the group contains the MC service IDs of the MC user for both the first and the second MC systems, the MC service client(s) can complete registration in the second MC system and affiliate to the same group using the MC service ID of the second MC system prior to de-affiliation and de-registration on the first MC system.

The second MC system will notify the MC service client's primary MC system that the MC service client has migrated to the second MC system. This allows the primary MC system to always provide the current MC service ID needed to reach the MC user.

## X.1.5 Migration actions at the primary MC system

The MC service client(s) can be either commanded to migrate to a specific partner MC system or can request migration, unless implicit permission is already configured on the MC UE, to a specific partner MC system based on, for example, geographic location. If a command is sent to the MC user, it will contain information needed by the MC user to perform the migration. This information might be the identity of the user profiles, service configuration document and UE initial configuration document to be downloaded from the primary MC system before migration begins. The information needed by the MC user to perform the migration can be sent in a response to a migration request from the MC user, or can be configured in the MC UE when migration permission is pre-provisioned.

The user profiles, etc. that the MC service client(s) will need to download can be already pre-provisioned on the MC UE. The action of the MC service client(s) would then be to determine whether it already has the sets of information indicated by the primary MC system, thus allowing the migration to the partner MC system to complete more quickly.

## X.1.6 Migration actions at the partner MC system

When the MC user arrives at the partner MC system, MC authentication and registration take place. Since the partner MC system IdMS already has the primary IdMS certificate(s) used to validate the MC user's credentials, authentication and registration for MC services can proceed as normal. As part of the registration procedure, the MC UE can download any needed configuration files or profiles that it does not already have provisioned. The user profiles will provide information on which groups are available, as well as all other information needed to successfully use the MC services of the partner MC system.

As part of the authentication procedure, the MC service client(s) learns of the MC service IDs that it will use while operating in the partner MC system. Those MC service IDs are contained in the access token that the partner MC system IdMS returns to the MC service client(s). The MC service client(s) continues to remember the MC service IDs and the user profiles for the primary MC system. These are needed when communicating with other MC users that address the MC user with the primary MC system MC service IDs.

As part of the registration procedure the partner MC server determines that the MC service client(s) is migrated and stores the primary MC service IDs. The partner MC server uses this information to inform the primary MC system that the MC user has successfully migrated to the partner MC system and includes the partner MC service IDs that have been assigned, for example, as described in 3GPP TS 23.379 clause 10.6.3.3. In the case of pre-provisioning, the partner MC system and primary MC system may have determined and exchanged the MC service IDs prior to the migration.

## X.1.7 Operating while migrated

While operating in the partner MC system, the MC service client(s) uses the user profiles, service configuration and UE initial configuration information provided by the partner MC system. It also continues to remember the user profiles of the primary MC system and the primary MC system MC service IDs. Contact lists of the MC service IDs of other MC users will contain at least the MC service ID of the other MC user in their primary MC system. If the MC client is informed of a different current MC service ID for an MC user because that MC user is currently migrated, the MC client can store that current MC service ID along with the primary MC service ID for that MC user.

### X.1.7.1 Addressing the MC user while migrated

There are a number of considerations that concern addressing while migrated:

1) an MC user will have an MC service ID from their primary MC system,

2) an MC user will have an MC service ID from the partner MC system when the MC user is migrated to that partner MC system,

3) an MC user that is migrated can maintain its user profiles from both the primary MC system and the partner MC system, including all knowledge of MC service IDs from both user profiles,

4) an MC user that is migrated makes decisions based on the user profile from the partner MC system while migrated,

5) a migrated MC user can be addressed by either the MC service ID of the primary system or the MC service ID of the partner MC system,

6) when a migrated MC user is addressed by its primary MC service ID, signalling is sent to the primary MC system which will reject the signalling to the calling MC user along with the current partner MC service ID and a cause value that the MC user is migrated:

a) the calling user can optionally cache the current partner MC service ID to reduce subsequent signalling, and

b) should the called MC user migrate again, thus invalidating any caches of its partner MC service ID in other MC clients, the calling MC client can reinitiate the signalling using the primary MC service ID, and

7) the migrated MC user can determine from the signalling which MC service ID was used originally by the calling MC user to address the signalling and can then know what keying material can be used to decrypt that signalling per the procedures of 3GPP TS 33.180.

### X.1.7.2 Receiving calls while migrated

The call delivery signalling carries appropriate indications of what the original addressed MC service ID was to enable the called migrated MC user to properly handle the call, including decryption per the procedures of 3GPP TS 33.180.

### X.1.7.3 Making calls while migrated

When the MC service client(s) is migrated, call initiation signalling carries both the partner system MC service ID (as the calling user) and the primary system MC service ID as an additional piece of information. The receiver thus has both the current partner MC service ID and the primary MC service ID for identification, for further signalling and for optional caching.

### X.1.7.4 Processing calls while in the process of migrating

If a private call is ongoing when the MC service client(s) migrate to a new MC system, the call can be dropped and re-initiated per the procedure of clause 10.16.2.3. Alternatively, using the technique described in clause X.1.4.1, if the MC user is in the middle of a private MC call when it needs to migrate, the MC UE can maintain its registration on the previous MC system while being registered on the new MC system, thus allowing the MC user to complete the private call before de-registration from the previous MC system.

NOTE: The "previous" and "new" MC systems could be either the primary MC system of the MC user or a partner MC system, so that migration could be: primary to partner, partner to partner, or partner to primary.

If the MC user is involved in a group call, and the MC service client(s) de-affiliates from the group prior to affiliation on the new MC system, there will be a period when the media for that group call will not be available to the MC service client(s), alternatively, the MC UE can also maintain its registration until the current group call completes per clause X.1.4.1. If the MC user is included in the group definition using both the MC service ID of the current MC system and the MC service ID of the new MC system, the MC client can affiliate to the group in the new MC system prior to de-affiliation and de-registration in the old MC system. This "make before break" capability provides improved service continuity.

### X.1.7.5 Participating in groups while migrated

While the MC user is migrated, the user profile from the partner MC system will control the MC user's participation in MC groups. If the MC user is to participate in groups that it is a member of in the primary MC system, the group document for that group will contain the MC service ID from the partner MC system as well as the MC service ID from the primary MC system.

#### \*\*\*\*\* END CHANGES \*\*\*\*\*