MMTEL RCS NNI Overview

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1 Introduction

1.1 Overview

This Permanent Reference Document (PRD) discusses the technical and business requirements to provide the necessary interworking at the Network-Network Interface (NNI) between networks that have deployed different IMS (IP Multimedia Subsystem) architectures for the provision of Multimedia Telephony (MMTEL) and Rich Communication Suite (RCS) services respectively.

1.2 Scope

This PRD provides a brief overview of the different IMS architectures that have been deployed by Mobile Network Operators (MNOs) for the provision of MMTEL and RCS services, the resulting challenges that must be overcome in order to have ubiquitous interworking at the NNI between different architectures and a proposed solution based on an enhancement to Carrier ENUM. This PRD also discusses other potential mechanisms that could be used as a basis for a solution and reasons why they were discounted in favour of the Carrier ENUM based approach.

1.3 Definitions

Term	Description
Carrier ENUM	A private ENUM infrastructure to be used on the IPX network for inter-MNO services. Defined in GSMA PRD NG.105 [3].
Converged IP Communications	Multimedia Telephony, SMS over IP (SMSoIP) and RCS Services.
Converged IP Communications Device	A device that provides Converged IP Communications via a single (public) identity, which is typically a MSISDN
ENUM	A mechanism for converting E.164 numbers to an "IP friendly" address relevant to the service that the user wishes to use. The mapping of E.164 numbers to services using DNS is defined in IETF RFC 3761 [7].

1.4 Abbreviations

Term	Description
DNS	Domain Name Server
ENUM	E.164 NUMber Translation
IETF	Internet Engineering Task Force
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPX	IP eXchange
MMTEL	Multimedia Telephony
MCC	Mobile Country Code
MNC	Mobile Network Code
MNO	Mobile Network Operator

Term	Description
MSISDN	Mobile Station International Subscriber Directory Number
NNI	Network-to-Network Interface
OTT	Over The Top
POTS	Plain Old Telephone Service
PRD	Permanent Reference Document
RCS	Rich Communication Suite
RFC	Request For Comments
SIP	Session Initiation Protocol
SMSoIP	Short Messaging Service over IP
UCE	UE Capability Exchange
UE	User Entity
UNI	User-Network Interface
URI	Uniform Resource Identifier

1.5 References

Ref	Doc Number	Title
[1]	GSMA PRD NG.102	IMS Profile for Converged IP Communications
[2]	GSMA PRD IR.65 v31.0	IMS Roaming, Interconnection and Interworking Guidelines
[3]	GSMA PRD NG.105	ENUM Guidelines for Service Providers and IPX Providers
[4]	GSMA PRD IR.90	RCS Interworking Guidelines
[5]	IETF RFC 3764	enumservice registration for Session Initiation Protocol (SIP) Addresses-of-Records
[6]	GSMA PRD NG.118	NNI Parameter Forms
[7]	IETF RFC 3761	The E.164 to Uniform Resource Identifiers (URI); Dynamic Delegation Discovery System (DDDS) Application (ENUM)
[8]	GSMA PRD IR.67	DNS Guidelines for Service Providers and GRX and IPX Providers
[9]	GSMA PRD IR.34	Guidelines for IPX Provider networks
[10]	GSMA PRD IR.95	SIP-SDP Inter-IMS NNI Profile

2 Background for RCS Service Deployments

For historic reasons, MMTEL and RCS service deployments progressed independently of each other and utilised different IMS clients on the device side and different IMS core networks providing for the provision of services.

Subsequently, there was an initiative to provide both MMTEL and RCS services via a single IMS client to enable so-called Converged IP Communications device. This is described in GSMA PRD NG.102 [1]. Such a device is able to be deployed in either: -

Single registration mode, where the device registers to a single converged IMS core network for the provision of all (MMTEL & RCS) services, or

Dual registration mode, where the device registers twice. One registration is to an IMS core network providing only MMTEL services, and the second registration is to an IMS core providing only RCS services.

- It is also possible for both IMS registrations to be made to the same IMS core. In practice, this is a corner case. From an NNI interworking point of view, such a deployment can either expose a single NNI and look identical to a single converged IMS core network or can also expose two separate NNIs.

The mode of registration is controlled via configuration data on the device.

All services on such a device use the same single (public) identity (e.g. a Mobile Subscriber ISDN (MSISDN), for registration and addressing purposes.

The various RCS deployment architectures are discussed in section 2.1.

2.1 RCS Deployment Architectures

Whilst the fundamental difference between different RCS deployments is based on whether a single IMS registration is used or dual IMS registrations are used, there are also a number of additional differences within the dual registration use case which results in there being 5 identified RCS deployment architectures: -

- All services on a single converged IMS core network. This typically uses a single IMS registration but is also applicable to dual IMS registrations to the same IMS core network. Such a converged IMS core network is owned by the MNO.
- Dual IMS core networks (one for MMTEL and one for RCS services) whereby both core networks are owned by the MNO.
- Dual IMS core networks (one for MMTEL and one for RCS services) whereby the MMTEL IMS core network is owned by the MNO and the RCS IMS core network is owned by a 3rd party and the terms and conditions of the MNO apply.
- Dual IMS core networks (one for MMTEL and one for RCS services) whereby the MMTEL IMS core network is owned by the MNO and the RCS IMS core network is owned by a 3rd party providing a hosted RCS solution with MNO consent (i.e. using the 3rd party’s terms and conditions, but using standard Mobile Country Code/Mobile Network Code (MCC/MNC) based domain for provisioning).
- Dual IMS core networks (one for MMTEL and one for RCS services) whereby the MMTEL IMS core network is owned by the MNO and the RCS IMS core network is owned by a 3rd party providing a hosted RCS solution without MNO consent (i.e. using the 3rd party’s terms and conditions, and a proprietary domain for provisioning).

It is also observed that the architecture approach followed might be different for different subscribers of a single MNO, e.g. to cover transition from one approach to another, and result in a mixture of single and dual registrations.

Whilst the single or dual registration option is a consideration at the User-Network Interface (UNI) only, there is also a resulting impact on the NNI as discussed in section 3.

Whether the RCS services of the other party are provided via a MNO service, a service with MNO consent or an Over the Top (OTT) service has implications on address resolution and message routing. This is discussed in section 4.

3 NNI Considerations

It has long been recognised that there is an impact on the NNI due to interworking between a converged IMS core deployment and a dual IMS core deployment. The reasons for this are twofold: -

Message routing for service requests,

- When sending a service request (e.g. SIP INVITE) from a converged IMS core toward dual IMS core, the message must be delivered to the correct terminating IMS core (e.g. a SIP INVITE for RCS Chat must be delivered to the IMS core providing RCS services).

User Capability Exchange (UCE), i.e. the mechanism by which capability or service discovery is carried out. This mechanism enhances service usability by allowing a user to understand the subset of RCS services that are available to access with each of their contacts at certain points in time. The UCE mechanism underpins the RCS service experience.

- When sending a UCE request from a converged IMS core to dual IMS core networks, it is important that the request is delivered to both terminating IMS cores in order that a full set of service capabilities (i.e. both MMTEL & RCS) is returned in the UCE response. If this is not so, then the UCE response contains only a sub-set of services with a resulting impact on the user service experience. Such splitting of UCE requests and merging of UCE responses is termed “forking & aggregation”.
- When the originating MNO and terminating MNO have agreed to use a different UCE protocol on the NNI, i.e. Presence-based or OPTIONS-based, then for a particular request UCE protocol interworking is needed.

GSMA PRD IR.65 v31.0 [2] section 5.7 contains text relating to NNI interworking between a converged IMS core and dual IMS cores. Two solutions are described: -

A recommendation that a single IMS NNI is used for all IMS services. This avoids any impacts by MNOs having decided for a dual IMS core deployment on MNOs having decided for a single IMS core deployment for all IMS services.

- The above recommendation hides the fact that there is a dual IMS core behind a single NNI. All interworking issues are dealt with within the network of the MNO which has deployed the dual IMS core networks. This solution also uses forking & aggregation of UCE requests/responses – albeit hidden behind the single NNI.

In addition, and based on the bilateral agreement, MNOs may agree to have a dedicated IMS NNI for RCS services in parallel with the IMS NNI used for IMS MMTEL services.

- In this case, both MNOs have deployed dual IMS cores and have mutually agreed to have distinct and separate service specific NNIs.

Whilst both of the above options are valid solutions, it is asserted that there are limitations within the above approach. These limitations are discussed in section 3.1.

3.1 Limitations of IR.65 Text

The cited text in GSMA PRD IR.65 v31.0 [2] was fine at the time of writing but has been overtaken by events in real world deployments.

The vast majority of RCS deployments utilise the dual IMS core approach. In addition, the IMS core providing RCS services is often provided by a hosted 3rd party solution, e.g. to reduce time to market and/or upfront investment. The result of this is that the main recommendation of GSMA PRD IR.65 v31.0 [2] whereby the dual IMS core networks are hidden behind a single NNI is just simply not followed and does not reflect real world deployments.

In contrast, the text in GSMA PRD IR.65 v31.0 [2] that allows separate and service specific NNIs does reflect market reality in that the respective dual IMS cores manage their own routing and separate NNIs. In particular, most such NNIs are handled within the network of the (dominant) hosted solution provider. However, there are limitations in the separated NNI approach that mean that it is not a scalable solution in the general case, as it depends on: -

- Both ends having deployed dual IMS core networks, and
- There being a direct interconnect between the respective MNOs to enable a bilateral agreement, or
- Use of an RCS hub to interconnect between operators offering a dedicated RCS NNI.

Due to the limitations listed, and basing just on the solution described in GSMA PRD IR.65 v31.0 [2], it is not possible to have universal RCS service reach whereby any RCS capable device can initiate a session to any other RCS device (cf. voice telephony where a VoLTE smartphone can complete a voice call to a legacy Plain Old Telephone Service (POTS) phone). In practice, most current RCS deployments are interconnected, but pre-requisites are typically imposed for those interconnections, either on the services offered (e.g. no support for video calling) and/or on the architectures used (e.g. networks must use separate NNIs for RCS and VoLTE). Such imposed pre-requisites allow to work around the limitations inherent to the existing specifications.

4 Address Resolution & Message Routing

Irrespective of whether a MNO has deployed a converged IMS core network or dual IMS core networks, a single public identity is used to address a given user for all IMS based services. This public identity is typically an E.164 number.

For the case of initiating a message from a user registered on a converged IMS core network toward a user registered on dual IMS core networks, there is a need to be able to determine from the E.164 number of the target user that there are two possible IMS core networks managing the services of the target user. In addition, messages must then be routed to the correct terminating IMS core, typically over different NNIs.

Number translation is covered in GSMA PRD NG.105 [3] which describes Carrier ENUM. Carrier ENUM is the mechanism used to translate from an E.164 number to a Uniform Resource Identifier (URI). In turn, the URI can be resolved to an Internet protocol (IP) address via Domain Name Server (DNS). For IMS services, GSMA PRD NG.105 [3] defines a SIP URI to be used for IMS services and also recommends a standard URI domain structure based on MCC/MNC. The recommended URI structure can then be resolved to an IP address as described in GSMA PRD IR.67 [8].

However, the existing mechanisms in Carrier ENUM were defined prior to there being any notion of dual IMS registration and IMS services of a single user being split across more than one IMS core network. Therefore, the current mechanism allows a given telephone number to provide a single SIP URI to identify the (assumed) target IMS core network. The current ENUM infrastructure is simply not fit for purpose in world where a single telephone number can be resolved to more than one IMS core network.

In terms of message routing, since the ENUM response identifies only a single SIP URI, then it is not possible to route the message to more than one target IMS core network without some prior knowledge of the target user. Such prior knowledge may be appropriate and manageable in some cases but is not scalable in the general case.

In summary, there is a fundamental gap in existing specifications in that it is not possible to determine that a single telephone number is related to IMS services that are provided across more than one IMS core network.

In addition, the different deployment options for dual IMS core as described in section 2 also has an impact on telephone number resolution, as follows: -

- IMS core network for RCS is owned by the MNO.
  - In this case the target SIP URI must contain the MCC/MNC as for the existing IMS SIP (Session Initiation protocol) URI, but it must be possible to differentiate between the MMTEL SIP URI and the RCS SIP URI.
- IMS core network for RCS is owned by a 3rd party on behalf of the MNO.
  - In this case, the target SIP URI must contain the MCC/MNC but must also identify the 3rd party provider running the service on behalf of the MNO.
- IMS core network for RCS is a hosted RCS solution with MNO consent.
  - In this case, the target SIP URI must contain the MCC/MNC but must also identify the 3rd party provider of the hosted service.
- IMS core network for RCS is a hosted RCS solution without MNO consent.
  - In this case, the target SIP URI does not contain the MCC/MNC but must identify the 3rd party provider of the hosted service.

Any enhancement to specifications must take the above use cases into account.

5 Existing Specifications – Use Case Examples

This section provides some example use cases of interworking between a converged IMS core network and dual IMS core networks within the constraints of current specifications and without any prior knowledge relating to whether the target telephone number is associated with a user which performs single or dual registration for its IMS services.

The key difference is whether the user performs a single or dual IMS registration. This is shown in Table 1 and Table 2 below for UCE exchanges and service requests between the 2 user types.

Terminating User → Originating user ↓	Single Registration	Dual Registration
Single Registration	Full UCE exchange possible	Note 1
Dual Registration	Note 1	Note 2

Table 1 – UCE Exchanges

Note 1: A full UCE would be possible if the main recommendation of GSMA PRD IR.65 v31.0 [2] is enabled and a single NNI is present. Otherwise, the UCE request would be routed to only the MMTEL IMS core network. Therefore, the response would indicate that no RCS services are supported, resulting in no RCS services being possible between the 2 users.

Note 2: A full UCE is possible if there is a direct interconnect between the 2 networks or if a dedicated interconnect networks/hub is used for RCS. Otherwise, if a non-dedicated intermediate network (such as an Interwork Packet Exchange, IPX) is used, then a full UCE may be possible if the intermediate network is able to route to the appropriate terminating NNI. Otherwise, the UCE request would be routed to the MMTEL IMS core network and the response would indicate that no RCS services are supported. Once again, no RCS services would be possible between the 2 users.

Terminating User → Originating user ↓	Single Registration	Dual Registration
Single Registration	OK	Note 1
Dual Registration	OK	Note 2

Table 2 - Routing of Service Requests

Note 1: The service request is routed correctly if the main recommendation of GSMA PRD IR.65 v31.0 [2] is enabled and a single NNI is presented. Otherwise, the service request would likely be sent to the MMTEL SIP IMS core network and fail.

Note 2: A service request is routed successfully if there is a direct interconnect between the 2 networks or if dedicated interconnect networks/hubs are used for RCS and VoLTE. Otherwise, if there is a non-dedicated intermediate network (such as an IPX), then it may be possible for the intermediate network to route to the appropriate terminating NNI based on configuration data. Otherwise, the RCS service request would be routed to the MMTEL IMS core network and fail.

6 Requirements on the NNI

This section summarises the new requirements that need to be fulfilled in order to enable universal RCS interconnect and address the limitations of existing specifications.

The requirements for a NNI that supports both MMTEL and RCS are as follows: -

- It must be possible to determine whether a single public (E.164) identity is associated with a single IMS core network address or two IMS core network addresses for the purposes of routing SIP signalling requests targeted at that single public identity.
  - This enables the correct routing of SIP requests to the correct IMS core network.
- Any solution must be generic, scalable and be applicable to directly connected MNO networks and those connected via an intermediate network such as IPX.
- Any solution must take account of the different deployment options to enable correct message routing within the RCS eco-system.
  - This has implications on the URI structure used to identify the target IMS core network.
- RCS UCE exchanges must enable the full set of services to be exchanged between all RCS users, irrespective of the deployment architecture.
  - Otherwise, RCS-capable contacts appear as not being RCS-capable with resulting loss of RCS services between a pair of contacts.
  - There needs to be support for forking & aggregation of UCE requests/responses,
  - As a separate - but related – point, there is also a need for different UCE protocol choices (i.e. OPTIONS vs. Presence) to be interworked as described in GSMA PRD IR.90 [4].

Fulfilment of the above requirements enables universal service reach within the RCS eco-system. Existing RCS deployments would be able to interconnect without pre-requisites being imposed.

7 Solutions

This section discusses possible solutions to the requirements listed in section 6. In some cases, alternative solutions are discussed with pros and cons and reasons for selecting a preferred way forward.

7.1 E.164 Number Relation to Single/Dual IMS Core Networks

The fundamental requirement is to determine whether a single E.164 identity is associated with one or two IMS core networks for the provision of services. There are a couple of possible approaches that can be taken to achieve this: -

1. Enhance the existing number translation mechanism,
2. Use the DNS mechanism.

7.1.1 Enhanced Number Translation Mechanism (ENUM)

The existing (non-proprietary) number translation system is Carrier ENUM as described in GSMA PRD NG.105 [3]. The problem to be addressed is how to provide service related (i.e. MMTEL vs. RCS) resolution of a single E.164 number in the dual IMS core network scenario.

The ENUM mechanism does not permit any service specific parameters to be included in the ENUM Request, and any such addition would be a significant change to ENUM and is discounted.

In terms of the ENUM response, there are a variety of existing responses. In particular, there is an existing ENUM response for IMS services that returns a SIP URI to identify the target IMS core network. The SIP URI is recommended to conform to the format of “ims.mncXXX.mccXXX.3gppnetwork.org”. This ENUM result is a “Protocol Based Class” response of “Type:SIP” with no Subtype as defined in (Internet Engineering Task Force, Request For Comments) IETF RFC 3764 [5]. It has been confirmed by the ENUM Experts Group at the IETF that adding a Subtype to differentiate between MMTEL and RCS services is not permitted. Rather, it was recommended that a new “Application Based Class “ be defined. Such a new ENUM response would also enable a SIP URI to be returned and be distinguishable from the existing SIP URI response. The URI would be recommended to conform to a format which would be similar to the existing URI for IMS services, e.g. “rcs.ims.mncXXX.mccXXX.3gppnetwork.org” or “rcs.mncXXX.mccXXX.3gppnetwork.org”.

If such an enhancement to Carrier ENUM is made, then a single E.164 number would be able to return two SIP URIs, one for MMTEL and one for RCS. The recipient of the ENUM response would then determine which URI is appropriate given the context of the ENUM Request (i.e. MMTEL or/and RCS related). For reasons of backward compatibility, it is proposed that the existing SIP URI as defined in GSMA PRD NG.105 [3] denote an IMS core network providing either MMTEL-only services or both MMTEL and RCS services.

Finally, It is acknowledged that usage of Carrier ENUM is not as widespread as it could be and that both MNOs and IPX Providers often use their own private ENUM database for their routing capability and use Carrier ENUM as a source of data into that private ENUM database. However, any issues about current take-up of Carrier ENUM are orthogonal to any considerations regarding the addition of a new ENUM response.

7.1.2 Use DNS Mechanism

If ENUM is unchanged and can only return a single SIP URI corresponding to the E.164 number, then DNS could be considered as an alternative approach to recognise that there are two IMS core networks providing services to the user associated with the E.164 number.

Any DNS mechanism must rely on either i) prior knowledge that the target number is related to more than one IMS core network (which is not scalable), or ii) modifying the returned URI in a “standard” manner to realise a second URI and then checking if the modified URI can be resolved to an IP address.

As an example, consider the ENUM response returning the IMS SIP URI of “ims.mncXXX.mccXXX.3gppnetwork.org”. This URI could be modified in a “standard” manner such as appending “rcs” to the front of the string to see if it then resolves to an IP address. This approach could be made to work (at least in theory) if such a standard way of modifying the returned URI could be agreed as well as there being the overhead of checking whether the modified URI can be resolved or not. Notwithstanding these issues, the DNS based approach would not be able to deal with the use case of a mix of single and dual registration users within a single MNO.

All in all, this approach does not work in all cases and anyway seems a kludge in comparison to modifying Carrier ENUM to return an explicit result indicating that the target E.164 number corresponds to multiple IMS core networks for its compliment of services. As an additional point, it is also observed that ENUM feels the natural protocol to use when trying to ascertain the characteristics of a telephone number.

Therefore, it is recommended that an enhancement to Carrier ENUM be the chosen solution.

7.2 Routing of Service Requests

An ENUM based solution returns one or more SIP URIs to the requester. It is then a matter of the correct URI being selected to forward the message, as follows: -

- Single SIP URI returned
  - All requests forwarded to this URI
- Two SIP URIs returned
  - URI selected based on the context of the SIP request (i.e. MMTEL vs. RCS).

7.3 Direct Interconnect Vs Intermediate Network

The recommended ENUM based solution is general purpose, scalable and backwards compatible. It is equally applicable in the cases where MNO networks are connected directly and where they are connected via an intermediate IPX network.

7.4 Different RCS Deployment Options

The solution must take account of the different RCS deployment options as listed in section 2.1.

An ENUM based solution returns one or more SIP URIs to the requester. It is proposed that a number of additional URI strings be defined to cover all of the different deployment options that have been identified. Furthermore, it makes sense to use recommended structures for any new URIs and to align with and build on what is currently documented in GSMA PRD NG.105 [3].

Therefore, the following URI strings could be used for the identified deployment options: -

- Single IMS core network (MMTEL-only or MMTEL/RCS)
  - "ims.mncXXX.mccXXX.3gppnetwork.org"
- Dual IMS core networks (both core networks are owned by the MNO).
  - "ims.mncXXX.mccXXX.3gppnetwork.org" &
  - "rcs.mncXXX.mccXXX.3gppnetwork.org"

- Dual IMS core networks (MMTEL IMS core network is owned by the MNO and the RCS IMS core network is owned by a 3rd party on behalf of the MNO.
    - “ims.mncXXX.mccXXX.3gppnetwork.org” &
    - “<provider id>.rcs.mncXXX.mccXXX.3gppnetwork.org”
- Dual IMS core networks (MMTEL IMS core network is owned by the MNO and the RCS IMS core network is owned by a 3rd party providing a hosted RCS solution with MNO consent).
    - “ims.mncXXX.mccXXX.3gppnetwork.org” &
    - “<provider id>.rcs.mncXXX.mccXXX.3gppnetwork.org”
- Dual IMS core networks (MMTEL IMS core network is owned by the MNO and the RCS IMS core network is owned by a 3rd party providing a hosted RCS solution without MNO consent).
    - “ims.mncXXX.mccXXX.3gppnetwork.org” &
    - “<provider id>.rcs.3gppnetwork.org”

7.5 UCE Handling

An ENUM based solution enables recognition that a target E.164 number of associated with one or two IMS core networks for its service provision. Based on this knowledge, it is possible to determine whether a UCE request must be forked to be routed to both IMS core networks. The subsequent independent responses must then be aggregated prior to conveying to the requestor.

There is thus a need to implement a function in the network to i) recognise that a UCE request requires to be forked, ii) to perform the forking and iii) perform the aggregation of services from the subsequent UCE responses.

Aggregation comes with the disadvantage that inaccurate results may be provided for cases where one of the forked requests results in an error. Therefore, it's recommended that a device indicates the services on which it wants to obtain information in the UCE request, allowing the network to avoid the forking and aggregation and thus the potential for inaccurate results for requests that do not require information on the full set of services.

As an additional consideration, there is also a need for a function in the network to perform protocol interworking of OPTIONS and Presence based UCE signalling. It is noted that GSMA PRD NG.118 [6] has defined parameters relating to UCE protocol interworking which can form the basis for determining whether UCE protocol interworking is to be invoked.

It is noted that the UCE protocol interworking function is distinct from the Forking & Aggregation function. However, the two functions may be combined as a deployment consideration.

8 Summary

For universal reach of the RCS service whereby any RCS capable device can initiate a session to any other RCS device, it is recommended that Carrier ENUM be enhanced to enable a single E.164 number to be associated with one or more IMS core networks. As an initial step, and to expedite matters, it is proposed that the new ENUM response for the SIP URI for RCS services be formally defined in a normative annex in GSMA PRD NG.105 [3].

Having recognised whether there are one or two IMS core networks providing services to the related user, it is then possible to route terminating service requests toward the correct IMS core network and to trigger appropriate interworking functions within the network to profile Forking & Aggregation of UCE requests/responses and to trigger UCE protocol interworking.

The recommended solution is backwards compatible with and builds upon existing GSMA specifications.

The related CRs impact on GSMAPRDs NG.105 [3], IR.95 [10], IR.65 [2], IR.67 [8], IR.34 [9] and IR.90 [4].

Finally, it is stressed that the functionality described in this PRD can be realised within an MNO network and/or IPX. Such considerations are part of network deployment and out of scope for this PRD.

Annex A Document Management

A.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
0.1	28/05/2020	Initial draft version	NG/GERI	W.Cutler/GSMA
0.2	04/06/2020	Updated following GERI conference call on 3rd June.	NG/GERI	W.Cutler/GSMA
0.3	23/06/2020	Updated following the GERI#5 meeting on 23rd June	NG/GERI	W.Cutler/GSMA
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A.2 Other Information

Type	Description
Document Owner	NG/GERI
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