RCS Interworking Guidelines
V3.0
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Security Classification – NON-CONFIDENTIAL GSMA Material

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1 INTRODUCTION

1.1 Overview

This document illustrates the inter-Service Provider aspects of RCS (Rich Communication Suite). The aim is to minimize any interoperability issues when deploying RCS services between Service Providers by making sure guidelines for deployment options are documented. This is necessary for example due to the number of different possible implementation alternatives existing in the corresponding specifications. The intention is not to reinvent the wheel by creating new specifications, but instead to reuse those already existing by making sure Network-to-Network Interface (NNI) specific details of RCS are well documented.

The most relevant RCS document is the "Rich Communication Suite 5.0 Advanced Communications Services and Client Specification" [RCS5.0] which details the service features that define RCS Release and illustrates the technical details of different RCS services. In addition there are a number of endorsement documents, such as "RCS 5.0 Endorsement of OMA SIP/SIMPLE IM 1.0" [RCS5-SIMPLEIM-ENDORS] describing which sections of a particular specification are supported by RCS.

For further information about RCS, see www.gsma.com/rcs

User-to-Network Interface (UNI) specific issues are out of scope, since they do not directly impact NNI. Whatever UNI transport is used for accessing the home network RCS services (for example, 2G, 3G, Global Access Network (GAN) or ADSL) is transparent from the NNI point of view.

In general, the following RCS services are relevant for this document:

- Capability exchange based on Open Mobile Alliance (OMA) Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions (SIMPLE) Presence and Session Initiation Protocol (SIP) OPTIONS
- Social Presence Information based on OMA SIMPLE Presence and XML Document Management (XDM)
- Chat based on OMA SIMPLE IM and Converged IP Messaging (CPM)
- File Transfer based on OMA SIMPLE IM and CPM
- Video Share based on GSMA [IR.74] and [IR.84]
- Image Share based on GSMA [IR.79]
- Geo-location sharing based on OMA File Transfer and Location Application Programming Interface (API)
- Voice call based on [IR.92] and [IR.58]
- Video call based on [IR.94]

General GSMA interworking guidelines are fully applicable to RCS, so for example the guidance given in [IR.34], [IR.65], [IR.67] and [IR.77] related to issues such as addressing, routing, Quality of Service (QoS) and security need to be taken into account. They are not listed in detail within this document. See www.gsma.com/technical-documents for these recommendations.

It should be noted that in general within context of GSMA the term "interworking" means the same as "interconnection". Thus, for example "IM interworking" does not imply conversion between different messaging technologies, but interconnection of IM between Service Providers.

Annex A illustrates the mapping between NNI and UNI parameters, including recommended handling of the parameters per RCS service.

1.2 Roaming

For devices that are configured to use the IP Multimedia Subsystem (IMS) Access Point Name (APN), the IMS voice roaming architecture as specified in [IR.65] is applicable for all RCS services.

For devices that are configured to use an APN other than the IMS APN, it is assumed that the existing 2G/3G roaming is used to connect to the IMS in the Home Public Mobile Network (HPMN), and no roaming occurs from an IMS perspective. IP traffic for RCS services (for example SIP signalling, RTP video, and Message Session Relay Protocol (MSRP)) is carried inside the normal GPRS Tunneling Protocol (GTP) tunnel from the Visited Network Serving GPRS Support Node (SGSN) to the Home Network Gateway GPRS Support Node (GGSN).

Inter-Service Provider aspects associated with these RCS services are defined in later sections of this document.

1.3 Legacy

“Legacy” services including Circuit Switched (CS) voice, CS video, Short Message Service (SMS) and Multimedia Messaging Service (MMS) are expected to work as they do today, so there’s no need for additional guidelines for them in the RCS context.

Note: It is also possible to run CS based services over Packet Switched (PS) based inter-Service Provider network, using for example MSC-S/SIP-I and Signaling Transport (SIGTRAN) technologies. This, however, is transparent to RCS and is therefore out of scope for this particular document. See the corresponding IREG documentation (such as [IR.83]) for further details.

1.4 Terms

Term	Description
APN	Access Point Name
AS	Application Server
B2BUA	Back-to-Back User Agent
BG	Border Gateway
CPM	Converged IP Messaging
CS	Circuit Switched
IARI	IMS Application Reference Identifier
ICSI	IMS Communication Service Identifier
IBCF	Interconnection Border Control Function
IM	Instant Messaging
IMS	IP Multimedia Subsystem
IPX	IP eXchange
IWF	InterWorking Function
LBS	Location Based Services
LTE	Long Term Evolution
MSRP	Message Session Relay Protocol
NNI	Network-to-Network Interface
NVAS	Network Value Added Services
P2P	Peer-to-Peer

Term	Description
PS	Packet Switched
RCS	Rich Communication Suite
RTP	Real-time Transport Protocol
SIMPLE	Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions
SIP	Session Initiation Protocol
SPI	Social Presence Information
TrGW	Transition Gateway
URI	Uniform Resource Identifier
XCAP	XML Configuration Access Protocol
XDM	XML Document Management
XML	eXtensible Markup Language

1.5 References

Document	Name
[23.228]	3GPP TS 23.221 Release 10, 3rd Generation Partnership Project IP Multimedia Subsystem (IMS);Stage 2 http://www.3gpp.org
[24.229]	3GPP TS 24.229 Release 10, 3rd Generation Partnership IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) http://www.3gpp.org
[29.165]	3GPP TS 29.165 Release 10, 3rd Generation Partnership Project Inter-IMS Network to Network Interface http://www.3gpp.org
[AA.80]	GSMA PRD AA.80 – "IP Packet eXchange Service Agreement" Version 4.1 27 July 2011 http://www.gsma.com
[IR.34]	GSMA PRD 34 – "Inter-Service Provider IP Backbone Guidelines" Version 7.0 23 January 2012 http://www.gsma.com
[IR.63]	GSMA PRD IR.63 – "LBS Roaming and Inter-working Guidelines" Version 3.0 15 January 2004 http://www.gsma.com
[IR.65]	GSMA PRD IR.65 - "IMS Roaming and Interworking Guidelines" Version 6.0 30 August 2011 http://www.gsma.com
[IR.67]	GSMA PRD IR.67 – "DNS/ENUM Guidelines for Service Providers & GRX/IPX Providers" Version 6,0 1 December 2011 http://www.gsma.com/
[IR.74]	GSMA PRD IR.74 - "Video Share Interoperability Specification" Version 1.4 20 December 2010 http://www.gsma.com/
[IR.77]	GSMA PRD IR.77 – "Inter-Operator IP Backbone Security

Document	Name
	Requirements For Service Providers and Inter-operator IP backbone Providers" Version 2.1 03 December 2009 http://www.gsma.com/
[IR.79]	GSMA PRD IR.79 - "Image Share Interoperability Specification" Version 1.4 29 March 2011 http://www.gsma.com/
[IR.83]	GSMA PRD IR.83 – " SIP-I Interworking Description" Version 1.2 08 June 2009 http://www.gsma.com/
[IR.84]	GSMA PRD IR.84 - "Video Share Phase 2 Interoperability Specification" Version 2.2 30 December 2010 http://www.gsma.com/
[CPM1.0-AD]	OMA Converged IP Messaging Architecture, Candidate Version 1.0 – 12 Oct 2010 http://www.openmobilealliance.org
[Presence]	OMA Presence SIMPLE Specification, 1.1, http://www.openmobilealliance.org/
[Presence2.0_DDS]	OMA Presence SIMPLE Data Specification, Approved Version 2.0, 29 September 2009 http://www.openmobilealliance.org/
[Presence2.1_DDS]	OMA Presence SIMPLE Data Specification, Approved Version 2.1, 02 October 2010 http://www.openmobilealliance.org/
[Presence2.0_TS]	OMA Presence SIMPLE Specification, Candidate Version 2.0, 02 December 2010 http://www.openmobilealliance.org/
[Presence2.0_RLS_TS]	OMA Resource List Server (RLS) Specification, Candidate version 2.0, 02 December 2010 http://www.openmobilealliance.org/
[RCS5.0]	GSMA "Rich Communication Suite 5.0 Advanced Communications Services and Client Specification" 16 April 2012 http://www.gsma.com/
[RCS5-CPM-CONVFUNC-ENDORS]	GSMA RCS 5.0 Endorsement of OMA CPM 1.0 Conversation Functions, Version 1.0 16 April 2012 http://www.gsma.com/
[RCS5-SIMPLEIM-ENDORS]	GSMA RCS 5.0 Endorsement of OMA SIP/SIMPLE IM 1.0, Version 1.0 16 April 2012 http://www.gsma.com/
[XDM2.0_Core]	OMA XML Document Management (XDM) Specification, Candidate Version 2.0, 16 September 2008 http://www.openmobilealliance.org/

2 OVERALL IMS NNI ARCHITECTURE

The IMS NNI architecture forms an important part of RCS NNI since RCS heavily utilizes IMS core system as specified by 3rd Generation Partnership Project (3GPP) to perform a number of key functions such as handling of SIP signalling, authentication, authorization, charging and routing support.

It should be noted that both main alternatives for IMS NNI, either using Mw/Gi/SGi interfaces, or using Ici/Izi interfaces are possible in RCS NNI. In other words, individual Service Providers can select the most optimal solution suitable. These two options are fully interoperable, so a Service Provider using Mw/Gi/SGi can interwork with a Service Provider using Ici/Izi without any modifications needed.

For further details of IMS NNI architecture, see Section 3 “Interworking Guidelines” in [IR.65], which illustrates the general service interoperability between IMS networks. For inter-Service Provider guidelines applicable for IMS based services including RCS, see Section 5 “Service Related Guidelines” in [IR.65].

Detailed inter-Service Provider guidelines associated with RCS services are indicated in later Sections of this document.

3 Capability Discovery

3.1 SIP OPTIONS Based

The present Section focuses on the interworking between two networks supporting the capability and new user discovery mechanism based on SIP OPTIONS as described in [RCS5.0] Section 2.6 “Capability and new user discovery mechanisms”. As a general principle the capability discovery based on SIP OPTIONS interworking between two IMS networks (IMS-NNI) is handled shall follow [IR.65].

In addition to general guidelines, the SIP OPTIONS NNI shall comply to the rule that the only feature tags which are allowed in either the contact or the accept-contact-header are those described in the [RCS5.0] Section 2.6 “Capability and new user discovery mechanisms” in addition to any service or capability tags which have been registered against the relevant standardization or regulation bodies (for example OMA, GSMA).

Finally, and as a general principle, those capability tags associated to specific RCS5.0 services where no interworking agreement exists between the service providers shall not be included on the NNI interface. For example, two Service Providers who support [IR.84] based Video Share, but who do not have an interworking agreement covering that service. If that capability is then allowed to cross the NNI, the users get the impression that the service can be used between them even though that will likely not be possible.

3.2 Presence Based

The present section focuses on the interworking between two networks supporting the capability and new user discovery mechanism based on Presence as described in [RCS5.0] Section 2.6, “Capability and new user discovery mechanisms”. This uses the presence architecture as defined in [RCS5.0] Section 3.7 “Social Presence Information” (see sub Section “Network architecture of Presence Enabler in RCS5.0”). As a general principle the capability discovery based on presence interworking between two IMS networks (IMS NNI) shall follow [IR.65].

The presence based capability discovery mechanism should follow the same general presence service NNI considerations as defined in Section 5 of this document. To support capability exchange, XDM interworking is not required.

In addition to these guidelines, the Presence NNI shall comply to the rule that the only service descriptions allowed in the presence document are those described in [RCS5.0] Section 2.6 “Capability and new user discovery mechanisms”, and Table “Complete SIP OPTIONS tag and Presence Service ID usage for RCS 5.0” in addition to any service description which has been registered against the relevant standardization or regulation bodies (for example OMA, GSMA).

Finally, and as a general principle, those service descriptions associated to specific RCS5.0 services where no interworking agreement exists between the Service Providers shall not be included in the NNI service descriptions. For example, two Service Providers who support [IR.84] based Video Share, but have no interworking agreement covering that service. If that capability is then allowed to cross the NNI, the users get the impression that the service can be used between them even though that will likely not be possible.

3.3 Interworking between Capability Discovery

Network Interworking for Capability Discovery is only required between Service Providers that do not support SIP OPTIONS exchange (as the default method or as a fallback mechanism) and those Service Providers that use SIP OPTIONS as the default discovery mechanism.

A summary of the specific conditions, under which capability discovery interworking is required, is defined in the [RCS5.0] specification, Table “Service Discovery network-based Interworking summary”.

In cases where such an Interworking Function (IWF) is necessary, the IWF architecture is negotiated and agreed between interconnecting operators. The architecture must ensure that all messages that require interworking treatment are routed to the appropriate IWF.

An IWF may be required to perform one or both of the following functions:

- Respond to SIP OPTIONS RCS capability exchange requests based on information obtained from a Presence Server ([RCS5.0] Figure “Capability interworking via network: Options request”).
- Respond to SIP SUBSCRIBE requests based on information obtained using SIP OPTIONS requests ([RCS5.0] Figure “Capability interworking via network: Presence request”).

The IWF architecture may be required to support bidirectional or unidirectional interworking ([RCS5.0] Table “Service Discovery network-based Interworking summary“):

- Bidirectional:
    - One Service Provider uses SIP OPTIONS as the default Capability discovery mechanism and does not support Social Presence Information (SPI) (no presence server is deployed that could provide capability information).
    - One Service Provider uses Presence as the default Capability discovery mechanism and does not support a client based dual-stack or other fall-back solution.
    - Interworking treatment is required for all capability exchange related messages in both directions.
- Unidirectional: Unidirectional interworking would be sufficient under the following conditions:

- One Service Provider uses SIP OPTIONS as the default Capability discovery mechanism. The Service Provider supports SPI (presence server is deployed) and all endpoints supporting capabilities exchange publish capabilities information into the presence server. The Service Provider supports SIP SUBSCRIBE anonymous fetch at the Presence Server.
- One operator uses Presence as the default Capability discovery mechanism and does not support a client based dual-stack or other fall-back solution.
- In this case interworking treatment is required in one direction only.
  - Interworking is required to respond to all incoming SIP OPTIONS capability exchange related requests.
  - Since the SIP OPTIONS default operator supports presence based anonymous fetch, interworking is not required for incoming SIP SUBSCRIBE anonymous fetch requests.

Figure 1 below provides high level examples of Bidirectional and Unidirectional interworking. The diagram illustrates logical functions and is not meant to specify the physical location of any interworking function elements:

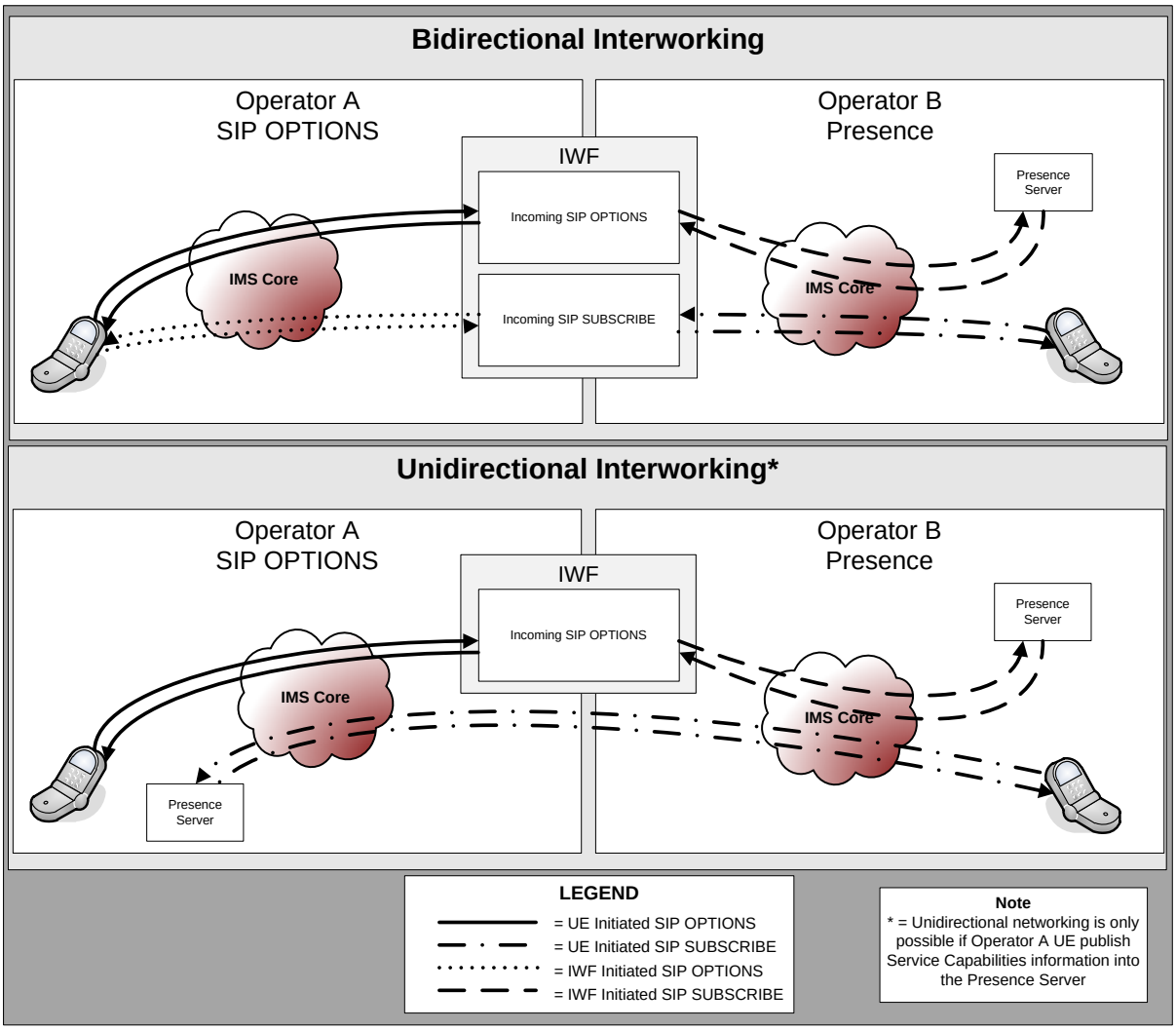

Figure 1: High Level Illustration of Bidirectional and Unidirectional Interworking

A properly deployed and functioning IWF should have no impact at the NNI level. Specifically:

- The SIP OPTIONS exchange at the NNI must conform with the SIP OPTIONS based specifications as defined in Section 3.1
- The Presence interface at the NNI must conform to the Presence specifications as defined in Sections 3.2 and 5.

3.3.1 Interworking: Incoming SIP OPTIONS

See [RCS5.0] Figure “Capability interworking via network: Options request“: When the IWF receives a SIP OPTIONS capabilities request that requires interworking, the IWF shall form and send an anonymous fetch SIP SUBSCRIBE addressed to the targeted presentity and send it to the network for routing to the appropriate Presence Server.

Since a SIP OPTIONS is targeted for one UE/presentity, the anonymous fetch SIP SUBSCRIBE is always a single/individual SIP SUBSCRIBE.

If the IWF receives a SIP NOTIFY in response to the SIP SUBSCRIBE, and the SIP NOTIFY contains a presence document, the IWF shall check the received presence doc for service descriptions that correspond to RCS services as defined [RCS5.0] specification Table “Complete SIP OPTIONS tag and Presence Service ID usage for RCS 5.0”. Default IWF policy is that all RCS service descriptions which are present and “OPEN” in the presence document will cause the IWF to form a response to the SIP OPTIONS with the corresponding Service Tag.

In the event the presence document does not define any open RCS services the IWF should respond to the SIP OPTIONS with a 480 Temporarily Unavailable response.

In the event the targeted User is not provisioned in the IMS network, the SIP SUBSCRIBE generated by the IWF should return a 404 Not Found response. In this case, the IWF should respond to the SIP OPTIONS with a 404 Not Found response.

In all other response cases, including timeout and error cases, the IWF should respond to the SIP OPTIONS request with the appropriate response selected from those defined in [RCS5.0] Section 2.6.1.1 “Capability discovery process through SIP OPTIONS message”.

3.3.2 Interworking: Incoming SIP SUBSCRIBE

See [RCS5.0] Figure “Capability interworking via network: Presence request”: When the IWF receives an individual SIP SUBSCRIBE the IWF shall treat the SIP SUBSCRIBE as anonymous fetch:

- Send a SIP OPTIONS request to the targeted presentity. The service tags defined in the SIP OPTIONS request are a function of the policy defined at the IWF for the relevant domain. A SIP SUBSCRIBE request does not contain service capabilities information and thus does not provide the IWF with information to populate service tags in the SIP OPTIONS request. There must be at least one RCS service tag defined in the SIP OPTIONS query to prevent the receiving RCS user from incorrectly deciding the originator is not an RCS capable subscriber. Two approaches can be used to populate the service tags in the SIP OPTIONS query:
    - Using static mapping rules: The SIP OPTIONS request is populated with one or more service tags based on a Service Provider policy defined at the IWF. For example, the capability discovery via presence service tag could be provided in all SIP OPTIONS requests.

  - Through discovery: The SIP OPTIONS request is populated with one or more service tags based on IWF service discovery. For example, subsequent to receiving a SIP SUBSCRIBE request, the IWF issues a SIP SUBSCRIBE request targeted to the originator of the initial SUBSCRIBE. The IWF uses the RCS service description information provided in the resulting NOTIFY to form the SIP OPTIONS request using the corresponding RCS Service Tags as defined in the [RCS5.0] Table “Complete SIP OPTIONS tag and Presence Service ID usage for RCS5.0”.

- Respond to the SIP SUBSCRIBE request. The response the IWF provides to the SIP SUBSCRIBE depends on the response received to the IWF generated SIP OPTIONS request.

  - If the IWF receives 200 OK response for a SIP OPTIONS request with RCS service tags, the IWF shall then respond to the original SUBSCRIBE message with a 200 OK. The IWF will compose a presence document that defines a service description that corresponds to each RCS services service tag that was defined in the SIP OPTIONS response based on [RCS5.0] Table “Complete SIP OPTIONS tag and Presence Service ID usage for RCS5.0”. The resulting presence document is sent to the SIP SUBSCRIBE originator in a NOTIFY message. Default IWF policy is that all RCS service tags which are present in the SIP OPTIONS response will cause the IWF to define a corresponding “OPEN” service description in the presence document.

  - In the event there is a 200 OK response to the SIP OPTIONS request, but it contains no RCS service tags for which a mapping is defined, the IWF should respond to the SIP SUBSCRIBE request with a 480 Temporarily Unavailable response.

  - In the event the targeted presentities not provisioned in the IMS network, the SIP OPTIONS request generated by the IWF should elicit a 404 Not Found response. In this case, the IWF should respond to the SIP SUBSCRIBE request with a 404 Not Found response.

For all other responses to IWF generated SIP OPTIONS requests, including timeout and error cases, the IWF should respond to the SIP SUBSCRIBE request with the most appropriate error response.

3.3.3 IWF Policy Considerations

Multiple aspects of IWF functionality will be impacted by or controlled by policies defined in each Service Provider network as well as policies defined at the IWF itself.

- User level policy: Responses with capability information across the IWF requires that the user on each side of the IWF has opted in to capability exchange. Thus, in the case where a SIP OPTIONS request is transformed into an SIP SUBSCRIBE anonymous fetch request for a presence user, and the presence user has not opted into sharing RCS service capabilities anonymously, it is expected that the SIP OPTIONS response will provide no service information even if such information had been published into the presence server and was being shared with SPI contacts

- IWF policies: It is possible for the Service Providers to jointly or singly define policies that are enforced at the IWF. Examples of such policies include:

- Domain level policies: Policies to define unique service mapping and filtering polices based on domain or some other criteria. This includes service mapping details such as rules on handling or mapping open/closed services as well as consideration of additional service details that are defined in service descriptions.

- Service level Policies: Policies to filter selected proprietary or other services from exposure across the IWF and thus the NNI across all domains and users.

4 IP INTERCONNECTION

4.1 Overview

There is a clear need for an IP based inter-Service Provider connection in RCS, simply because RCS is largely an IP based service. That is, existing CS/ Time-Division Multiplexing (TDM) based networks used for transporting voice between the Service Providers are not enough for the needs of RCS since they cannot be used for transporting SIP signalling or MSRP media.

IPX (IP eXchange) as defined in [IR.34] is an evolved version of GSMA GRX (GPRS Roaming eXchange) private inter-Service Provider IP backbone which has been commercially used since 2000 for all PS roaming traffic between GSMA Service Providers. IPX has been selected by GSMA as the preferred mechanism for the general IP roaming and interconnection, including also RCS. Therefore this document also concentrates on the model where IPX is utilized. This is in line with the existing IMS interworking recommendation given in [IR.65].

IPX is seen as the most optimal solution for providing the necessary global reach with low and predictable delay in a secure environment, that is something that is impossible to reach for example by internet based RCS NNI.

For the avoidance of doubt, this does not exclude usage of other alternatives, such as bilateral leased line, for RCS interworking purposes when seen fit by the participating Service Providers.

Further details on IPX, including the usage of different connectivity options and IPX Proxy, can be found in [IR.34] and [AA.80].

Application and transport layer protocols utilized by RCS services as documented in the [RCS5.0] Table “RCS protocols” of Section 2.8 “RCS Protocols” are valid also for NNI.

4.2 IPX

IPX is a global, private, IP network which supports end-to-end quality of service and the principle of cascading interconnect payments. IPX is completely separated from the public Internet. The IPX architecture consists of different IPX Providers connecting together via an IPX peering point for traffic exchange. Both signalling (such as SIP) and media (such as Real-time Transport Protocol (RTP) is transported within the IPX network. In IPX all parties are bound by the end-to-end SLA. IPX can be used to transport any IP based service between Service Providers, both in roaming and interworking scenarios.

Figure 2 shows a high-level point of view of IPX network connecting three Service Providers with two IPX providers.

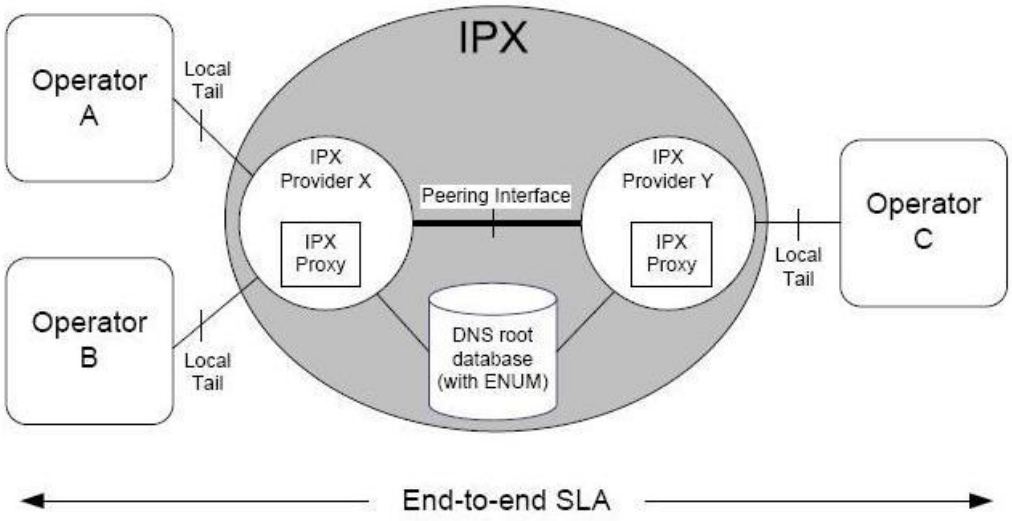

Figure 2: High-Level View of IPX (from IR.34)

IPX has three connectivity options:

- Transport-Only Connectivity Option
  A bilateral agreement between two Service Providers using the IPX transport layer with guaranteed QoS end-to-end. This model is not service aware
- Bilateral Service Transit Connectivity Option
  A bilateral agreement between two Service Providers using the IPX Proxy functions and the IPX transport layer with guaranteed QoS end-to-end. This model provides the opportunity to include service-based interconnect charging in addition to the transport charging of the transport-only model
- Multilateral Service Hub Connectivity Option
  A model providing multilateral interconnect with guaranteed end-to-end QoS and including service-based interconnect charging. Hubbing/multilateral connectivity is where traffic is routed from one Service Provider to many destinations or interworking partners via a single agreement with the IPX Provider. The hub functionality is provided by IPX Proxies

It should be noted that an IPX Proxy is not necessarily needed for RCS interworking as an IPX using the Transport-Only Option can handle the basic transportation of RCS traffic from one Service Provider to another.

In practice IPX offers the support of the necessary carrier-grade QoS features, security and global reach for any IP based service used between different Service Providers, including RCS. RCS uses the IMS NNI without change since from the IMS core system point of view IPX is just an IP network. There is no need for modifications of either 3GPP IMS specifications or IMS node implementations due to inclusion of IPX.

5 PRESENCE

5.1 Overview

Presence:
Presence at NNI conforms to [Presence], [Presence2.0_TS] and [Presence2.0_RLS_TS] with details provided in the sub Section 3.7.4.5.6 “Authorizing XCAP Request” in the Section 3.7 “Social Presence Information” of [RCS5.0].

The Presence data model at NNI is defined in [RCS5.0]:

- Section 3.7 “Social Presence Information”, sub Section 3.7.4.2 “Presence data model” for the <person> element,
- And Section 2.6 “Capability and new discovery mechanisms” sub Section 2.6.1.2.5 “Service part of the Presence data model“ for the <service> element.

The Presence data model defined in [RCS5.0] is based on [Presence], [Presence2.0_DDS] and [Presence2.1 DDS] and RFCs referred in these documents.

XDM:
XDM protocol at NNI (XCAP) conforms to [XDM2.0_Core] as defined in the Section 3.7 “Social Presence Information” Section of [RCS5.0].

6 MESSAGING & FILE TRANSFER

6.1 OMA IM NNI

6.1.1 OMA IM to OMA IM NNI

OMA SIMPLE Instant Messaging (IM) (SIP based Instant Messaging) may be used for chat (see [RCS5.0] Sections 3.3 “1-to-1 Chat” and 3.4 “Group Chat”). File Transfer (see [RCS5.0] Section 3.5 “File Transfer”) can also be handled via SIMPLE IM using the MSRP protocol.

Note: The RCS feature set is reduced compared to the full set of features offered by the OMA SIMPLE IM specifications. For example Large Message Mode and Group Messages are not supported in RCS and Pager Mode Messages are used only for Chat Disposition Notifications. For further information see [RCS5-SIMPLEIM-ENDORS].

The SIMPLE IM NNI follows [IR.65] and consists of IM-8 between IM Servers (MSRP) and IP-1 between IMS core systems (SIP) (IP-1 is the same as used by XDM and Presence, that is 3GPP Mw interface). In addition IM-2 is utilized between IMS core system and IM server, but this is an intra-Service Provider interface (standard 3GPP ISC interface between IMS and AS) and therefore out of scope for this study.

The OMA SIMPLE IM specifications allow various deployment options to be taken, for example in interworking scenarios where both Service Providers use an IM server, only one Service Provider uses an IM server or none of the Service Providers use an IM server (that is IM messages are routed in P2P fashion between the clients in 1-to-1 messaging session). In addition it is possible to separate signalling and media paths so while signalling might be routed via IM server(s), media could be using P2P mode instead.

So in a nutshell there are multiple different deployment models that can be supported. However, for RCS NNI it is recommended to concentrate on a single architectural option for interoperability reasons. It is also recommended that Service Providers deploying RCS NNI will utilize the model where both originating and terminating Service Provider are always using IM server, both for signal and media paths. That is IM traffic uses server-to-server connection over NNI.

An IM server deployed for RCS purposes has capabilities to function both as Controlling as well as Participating IM Function. The Participating IM Function acts as an IM service point for users, offering IM access and service policies. The Controlling IM Function is used for

example in case of group communication for the IM server that owns or shares the group identity.

6.1.2 OMA IM to Legacy

If the originating service provider allows inviting non-RCS users for Chat and a non-IMS user is invited, the originating network will interwork the invitation and messages to SMS or MMS depending on the message characteristics as described in [RCS5.0]. If the destination user is in another network the originating Service Provider delivers the interworked message to that network using the applicable legacy messaging NNI. The same behavior applies in case a user in a network with which there is no interworking agreement for Chat is invited for Chat. In that case the SIP INVITE request might be rejected at the NNI with one of the following SIP error responses:

- 488 Not Acceptable Here;
- 606 Not Acceptable.

If an IMS user that is not enabled for Chat is invited for a chat session, the terminating service provider can perform the interworking to SMS/MMS as described in [RCS5.0]. In that case the NNI will be according to Section 6.1. Whether this possibility is used shall depend on the interworking agreement. If such interworking is not supported, the terminating Service Provider can reject the SIP INVITE request with one of the following error responses which may result in the interworking to SMS/MMS being done in the originating network:

- 488 Not Acceptable Here;
- 606 Not Acceptable.

6.2 OMA CPM NNI

6.2.1 OMA CPM to OMA CPM NNI

OMA CPM (Converged IP Messaging) may be used for both Chat (see [RCS5.0] Sections 3.3 “1-to-1 Chat” and 3.4 “Group Chat”), Standalone Messaging (see [RCS5.0] Section 3.2 “Standalone Messaging”) and File Transfer (see [RCS5.0] Section 3.5 “File Transfer”) sing the MSRP protocol.

The RCS feature set is reduced compared to the full set of features offered by the OMA CPM specifications. For example predefined groups are not supported in RCS. For further information see [RCS5.0-CPMCONVFUNC].

The CPM NNI follows [IR.65] and consists of MSRP requests and responses carried over the CPM-CF and CPM-PF2 interfaces (as defined in [CPM1.0-AD]) between Messaging Servers and IP-1 between IMS core systems (SIP) (IP-1 being the same interface as used by XDM & Presence, that is 3GPP Mw interface). As specified in [RCS5.0], the NNI between two (2) networks should not carry a message in the SIP INVITE request.

The Message Store related requests are local to the Service Provider’s network and therefore require no NNI support.

The OMA CPM specifications allow to separate the signalling and media paths so while signalling might be routed via IM server(s), media could be using P2P mode instead. However, for RCS this option is not used. Therefore it is assumed that Service Providers deploying RCS NNI would utilize the model where both originating and terminating Service Provider are always using a Messaging Server, both for the signalling and media paths. That is CPM traffic uses server-to-server connection over NNI.

6.2.2 OMA CPM to Legacy

As described in Section 3.2.4 “Technical Realization” of [RCS5.0], if a CPM Standalone Message is sent to a non-IMS user, the originating network will interwork the message to SMS or MMS depending on the message characteristics. If the destination user is in another network the originating network delivers the interworked message to that network using the applicable legacy messaging NNI. The same behavior applies in case a CPM Standalone Message is sent to a user in a network with which there is no interworking agreement for CPM Standalone Messaging. In that case the SIP INVITE request might be rejected at the NNI with one of the following error responses:

- 488 Not Acceptable Here;
- 606 Not Acceptable.

In case the terminating user is an IMS user not supporting CPM standalone messaging and there is an interworking agreement for CPM based Standalone Messaging with the terminating network, the message can be interworked to SMS or MMS in the terminating network. In this case the NNI will be according to Section 6.2

If the originating Service Provider allows inviting non-RCS users for Chat, the behavior is similar. In this case the situation is different from Standalone Messaging in that the support of the Chat service by the terminating Service Provider doesn’t guarantee that that service provider is able to perform the interworking of Chat to SMS/MMS for IMS users that are not enabled to use the Chat service. In that case the terminating Service Provider can reject the SIP INVITE request with one of the following error responses which may result in the interworking to SMS/MMS being done in the originating network:

- 488 Not Acceptable Here;
- 606 Not Acceptable.

6.3 OMA IM - OMA CPM Interworking

6.3.1 SIP Header and SDP Mapping

The following tables show the required mapping of SIP headers and the Session Description Protocol (SDP).

RCS Service	OMA IM	OMA CPM	Comment
Chat, Group Chat	In Contact and Accept-Contact headers: +g.oma.sip-im	In Contact and Accept-Contact headers: +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.session"	Feature tag mapping
File Transfer	In Contact and Accept-Contact headers: +g.oma.sip-im	In Contact and Accept-Contact headers: +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.filetransfer"	Feature tag mapping

Chat, Group Chat, File Transfer	Contribution-ID (mandatory)	Contribution-ID (mandatory: add if not present)	An OMA IM SIP INVITE request is expected to carry a Contribution-ID. However, if a Contribution-ID is not present in the OMA IM SIP INVITE request, the IWF shall create one according to the procedures defined in [RCS5.0]
Chat, Group Chat, File Transfer	Conversation-ID (if present)	Conversation-ID (mandatory: add if not present)	If a Conversation-ID is not present in the OMA IM SIP INVITE request, the IWF SHALL create one according to the procedures defined in [RCS5.0]
Chat, Group Chat, File Transfer	InReplyToContribution-ID (if present)	InReplyToContribution-ID (optional)	If an InReplyToContribution-ID is not present in the OMA IM SIP INVITE request, the IWF should not create one.
Chat, Group Chat, File Transfer	All other headers	All other headers and values are copied without change except for changes required to allow the Messaging Server to insert itself in the media path	
Chat, Group Chat, File Transfer	SDP body	The SDP body is copied without change except for changes required to allow the Messaging Server to insert itself in the media path.	

Table 1: OMA IM to OMA CPM mapping for INVITE requests and responses

	OMA CPM	**OMA IM**	**Comment**
Chat, Group Chat	In Contact and Accept-Contact headers: +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.session"	In Contact and Accept-Contact headers: +g.oma.sip-im	Feature tag mapping
File Transfer	In Contact and Accept-Contact headers:	In Contact and Accept-Contact headers:	Feature tag mapping

	+g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.filetransfer"	+g.oma.sip-im	
Group Chat	Referred-By with more than one URI	Referred-By with only one URI, with preference for TEL URI if present	Because the OMA IM TS does not require support for more than one value in the Referred-By header, the recipient's network might not allow more than one URI in this header. The IWF thus is required to leave only one value in this header, preferably the TEL URI if present.
Chat, Group Chat, File Transfer	All other headers	All other headers and values are copied without change except for changes required to allow the Messaging Server to insert itself in the media path	
Chat, Group Chat	SDP body	The SDP body is copied without change except for: - changes required to allow the Messaging Server to insert itself in the media path and - the *a=accept-wrapped-types* attribute that shall only include text/plain	
File Transfer	SDP body	SDP body is copied without change except for changes required to allow the Messaging Server to insert itself in the media path	

Table 1: OMA CPM to OMA IM mapping for SIP INVITE requests and responses

6.3.2 Standalone Messaging

Since Standalone Messaging as defined in OMA CPM is endorsed by RCS, and OMA SIMPLE IM standalone messaging is not endorsed by RCS, no interworking is required. If the terminating network does not support CPM Standalone Messaging, refer to Section 6.2.1 for interworking guidelines.

6.3.3 1-to-1 Chat

The 1-to-1 Chat service enables two users, including two users across two different operator networks, to exchange messages instantly. This section describes the guidelines for the 1-to-1 session setup and chat message exchange between OMA IM and OMA CPM.

6.3.3.1 Interworking is handled on the OMA IM side

The NNI is the same as the OMA CPM to OMA CPM NNI as defined in Section 6.2.1 and the procedures are as defined in Sections 6.3.3.4 and 6.3.3.5.

6.3.3.2 Interworking is handled on the OMA CPM side

The NNI is the same as the OMA IM to OMA IM NNI as defined in Section 6.1.1 and the procedures are as defined in Sections 6.3.3.4 and 6.3.3.5.

6.3.3.3 Interworking is handled by a third party

When interworking to OMA IM or to OMA CPM is handled by a third party, the NNI is as defined in Section 6.1.1 and section 6.2.1 and the procedures are as defined in Sections 6.3.3.4 and 6.3.3.5.

6.3.3.4 Chat Session Setup – General

The IMS Core shall be configured to trigger the Messaging Server for feature tags from either messaging technology.

Interworking agreements need to define whether the Chat NNI is as per OMA IM with first message in SIP INVITE request, or as per OMA CPM without first message in SIP INVITE request.

If interworking is not required for first message in SIP INVITE request, then the feature tag of the request shall be mapped by the terminating Messaging Server according to the messaging technology used by the operator before relaying to the endpoints.

Mapping of SIP headers and SDP shall be done according to the tables in Section 6.3.1

6.3.3.5 Chat Session Setup where one side carries a message in the SIP INVITE request

Whether any interworking is needed is up to interworking agreements.

In all cases, the interworking function can be collocated with the terminating Messaging Server, the originating Messaging Server or could be a separate network entity on either the terminating or originating side.

An interworking function on the originating side needs to be aware of the terminating network and the technology used in the terminating network. How the interworking function on the originating side determines that interworking is required is outside the scope of this document.

6.3.3.5.1 Chat is originated on OMA IM side

If interworking of a first message in SIP INVITE request is required, then when a SIP INVITE request carrying a first message arrives, the interworking function shall:

1. Generate a CPM Session SIP INVITE request based on the incoming SIP INVITE request, perform the SIP INVITE request header mapping as described in Section 6.3.1, and send the generated SIP INVITE request towards the recipient on behalf of the original sender.

2. Accept the session on behalf of the CPM User by sending a 200 OK response, receiving the ACK and setting up the MSRP session as specified in [RCS5.0];

3. Until a response is received from the recipient network, send the message carried in the incoming SIP INVITE request and any subsequent messages received via MSRP SENDs as Pager Mode CPM Standalone Messages:

    a. Perform the SIP INVITE request header mapping as described in section 6.3.1, with the difference that when mapping to a Pager Mode CPM Standalone Message, some of the SIP INVITE request headers do not apply to a SIP MESSAGE request and thus shall not be mapped;

    b. Send out the Pager Mode CPM Standalone Message towards the CPM recipient;

Optionally, the interworking function may implement a timer to delay the sending of the messages via Pager Mode CPM Standalone Messages.

If a SIP 200 OK response is received from the recipient network, and MSRP session is established, an end to end Chat session is in place: The interworking function acts as a Back-to-Back User Agent (B2BUA) to relay all messages and notifications exchanged between the sender and the recipient. If there are any messages received not yet sent as Pager Mode CPM Standalone Messages, they should be sent via MSRP.

If any error response is received from the recipient network, no Chat session is set up with the recipient, and the session towards the originating IM user.is torn down after inactivity from the IM user as defined in [RCS5.0].

If no end to end session has been established, and the recipient responds with a CPM Session SIP INVITE request, interworking as described in Section 6.3.3.5.2 applies. How the recipient decides whether to respond with CPM Session or CPM Standalone Message is outside of the scope of this document.

Note: If the sender attempts to extend the 1-to-1 Chat session into a Group Chat, and no end to end session has been established, the recipient user will reject the Group Chat invitation because it will not find a 1-1 Chat session matching the Contribution-ID in the Session-Replaces value as described in [RCS5.0].

If a SIP INVITE request is received from the sender when there is already an on-going Chat session with the same sender and recipient, then as per [RCS5.0], the interworking function shall send a BYE on the ongoing Chat session with the recipient and send an ACK for the new session.

6.3.3.5.2 Chat is originated on OMA CPM side

If interworking towards a network requiring first message in a SIP INVITE request is required, then when a SIP INVITE request arrives, the interworking function shall:

1. Automatically accept the session on behalf of the recipient user by sending a 200 OK response requesting only text/plain as an allowed media (that is *a=accept-wrapped-types:text/plain)*, receiving the ACK and setting up the MSRP as specified in [RCS5.0];

2. Once the first chat message is received via MSRP, the interworking function shall

    a. Respond with MSRP 200 OK;

    b. Store the chat message;

    c. Perform the SIP INVITE request header mapping as described in Section 6.3.1;

    d. Initiate a SIP INVITE request towards the recipient, including the first chat message as a CPIM body in the SIP INVITE request;

3. Subsequent chat messages received via MSRP from the chat initiator are stored until the recipient responds.

If a SIP 200 OK response is received from the recipient network, and MSRP session is established, a Chat session is set up with the recipient, the rest of the stored messages are delivered via MSRP and an end to end Chat session is in place: The interworking function acts as a B2BUA to relay all messages and notifications exchanged between the sender and the recipient.

If any error response is received from the recipient network, no Chat session is set up with the recipient, and delivery is attempted in the same way as already specified in [RCS5.0] when chat messages are stored. This may result in the interworking function performing the interworking by generating multiple SIP INVITE requests towards the recipient, one for each new chat message received.

If a SIP 200 OK response is received from the recipient network when there is already an on-going Chat session with the same sender and recipient, then as per [RCS5.0], the interworking function shall send a BYE on the on-going Chat session with the recipient and send an ACK for the new session.

Note: If either participant in the end-to-end Chat session attempts to extend the 1-to-1 Chat session into a Group Chat, the Session-Replaces value will not carry the Contribution-ID matching the 1-to-1 Chat session if the recipient did not answer the first SIP INVITE request received, so the original 1-to-1 Chat session cannot be identified using the Session-Replaces value.

6.3.3.6 Disposition Notification

If the disposition notification is carried in a SIP MESSAGE request, the feature tag included in the SIP MESSAGE request shall be mapped by the terminating Messaging Server according to the messaging technology used by the operator before relaying to the endpoints. The mapping is performed at the terminating network.

If an aggregated notification is to be delivered across the NNI interface, it shall be repackaged to individual notifications at the originating network.

6.3.3.7 Chat Message Processing

During normal session setup according to [RCS5.0] and [RFC4975], each endpoint and interworking function will learn the maximum chat message size allowed during the session,

as well as the allowed content-types. Any failure of delivery of a message because of size or content-type issues will be indicated via the MSRP procedures defined in [RFC4975].

6.3.4 Group Chat

The Group Chat service enables users, including users across different Service Provider networks, to exchange messages between many users instantly. This Section describes the guidelines for the Group Chat session setup and chat message exchange between OMA IM and OMA CPM.

6.3.4.1 Session Setup

The feature tag of the request shall be mapped at the terminating network according to the CHAT MESSAGING TECHNOLOGY parameter before relaying to the endpoints. Chat session feature tags are defined in [RCS5.0].

If the terminating network Messaging Server is using OMA CPM technology and no Conversation-ID and InReplyToContribution-ID is present in the incoming SIP INVITE request, the terminating network Messaging Server shall add these.

Mapping of SIP headers and SDP shall be done according to the tables in Section 6.3.1.

6.3.4.2 Disposition Notification

If the disposition notification is delivered after the chat session has ended, the feature tag included in the SIP MESSAGE shall be mapped by the terminating Messaging Server according to the messaging technology used by the terminating Service Provider before relaying to the endpoints. The mapping is performed at the terminating network.

If the receiving device does not support delivery notifications, the terminating network Messaging Server shall generate the delivery notification on behalf of the device when the delivery notification is requested.

If an aggregated notification is to be delivered across the NNI interface, it shall be repackaged to individual notifications at the originating network.

6.3.4.3 Chat Message Processing

When the chat message being sent is larger than the negotiated message size between the conference focus and the recipient, which is also limited by the MAX SIZE GROUP IM parameter of each side, the conference focus will generate the delivery failure report to the message sender if the delivery notification is requested by the sender. However, the receiver is currently not notified of the failed message delivery due to size incompatibility. As such, the message size incompatibility may cause a delivery failure of a chat message to some participants across Service Providers.

When multimedia content is exchanged at the Group Chat session, if the terminating network or the terminating endpoints do not support multimedia content, the Messaging Server will not deliver the multimedia content to those participants. As such, the multimedia content incompatibility may cause a delivery failure of a chat message to some participants across Service Providers.

6.3.5 File Transfer

The File Transfer service enables users to send a file to another user, including to a user in a different Service Provider. This Section describes the guidelines for the File Transfer session setup and file exchange between OMA IM and OMA CPM.

6.3.5.1 Session Control Handling

The feature tag of the request shall be mapped at the terminating network according to the underlying messaging technology before relaying to the endpoint. File transfer feature tags are defined in [RCS5.0].

Mapping of SIP headers and SDP shall be done according to the tables in Section 6.3.1.

6.3.5.2 File Content Exchange

The media transfer technology (based on MSRP) is the same in the OMA IM and CPM technologies.

7 CONTENT SHARING

7.1 Image Share

The NNI architecture of Image Share, as well as NNI of the Image Share signalling and media shall follow Section 2 of this document.

The NNI of Image Share service shall follow Section 3.6.4.2 “Image Share” and subsequent Sections of [RCS5.0].

7.2 Video Share

The NNI architecture of Video Share, as well as NNI of the Video Share signaling and media shall follow Section 2 of this document.

The NNI of Video Share service during voice call shall follow Section 3.6.4.1.1 “Video Share during a voice call” and subsequent Sections of [RCS5.0].

The NNI of Video Share service without voice call shall follow Section 3.6.4.1.2 “Video Share without a voice call” and subsequent Sections of [RCS5.0].

The NNI of potential VS AS shall be identical to the UNI described in Section 3.6.4.1.2 “Video Share without a voice call” of [RCS5.0].

8 IP VOICE AND VIDEO CALL

8.1 IP Voice Call

General technical guidelines on how IP Voice Call interworking between two IMS networks (IMS NNI) is handled for the RCS services is found in [IR.65].

Note: IP voice call communication between device in one Service Provider’s network and device in another Service Provider’s network shall not have any impact on the IMS NNI, independent of which access network is being used.

8.2 IP Video Call

General technical guidelines on how IP Video Call interworking between two IMS networks (IMS-NNI) is handled for the RCS services shall follow [IR.65].

Note: IP video call communication between device in one Service Provider's network and device in another Service Provider's network shall not have any impact on the IMS NNI, independent of which access network is being used.

9 GEOLOCATION

9.1 Location Push

Location Push service is based on the RCS File Transfer service. See Section 3.10 "Geo-location Services" in [RCS5.0] for Geo-location Push service description.

9.2 Location Pull

For this service to be available between two Service Providers, an LBS (Location Based Service) infrastructure that is interoperable at the NNI interface and optionally at the roaming interface is required. The LBS NNI interface can be based on a user plane architecture, in this case, [SUPL] architecture and protocols apply.

Note: [IR.63] shall be the reference for NNI and roaming principles for the RCS Geo-location PULL service once it has been updated to support this kind of NNI.

In RCS:

- LBS NNI is between the Location PULL API gateway and the Home Location server.
- LBS roaming is between the Home Location Server and the Visited Location Server.

10 IDENTIFICATION OF SERVICES

Identification of services is an important aspect of interworking. For example possible intermediate IPX nodes (such as IPX Proxy), and also terminating networks as regards securing interworking agreements and potential termination fees, etc. While charging and agreement aspects are out of scope for this document (and for IREG in general), there's still the need to provide technically this functionality which then could be utilized commercially.

According to [24.229], charging and accounting is expected to be based upon the contents of the P-Asserted-Service header and the actual media related contents of the SIP request and not the Accept-Contact header field contents or the contact reached.

Note: Not all RCS services have a standardized P-Asserted-Service value. When they do, the value is listed along with the rest of the information that may be used to identify a service. Furthermore, some RCS services share the same value for P-Asserted-Service.

10.1.1 Capability query

- SIP
  - OPTIONS containing in the Accept-Contact and Contact header fields at least one of the following feature tags and values that could possibly occur combined
    - +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.msg; urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.largemsg"
    - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcse.im"
    - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcse.ft"
    - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.gsma-is"
    - +g.3gpp.cs-voice
    - +g.3gpp.iari-ref="urn:urn-7:3gpp-application.ims.iari.gsma-vs"

        - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcse.sp"
        - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcse.dp"
        - +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.mmtel"
        - video
        - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcs.geopull"
        - +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcs.geopush"
    - anonymous SUBSCRIBE/NOTIFY with event = "presence"

10.1.2 Social Presence Information exchange:

- SIP (non-anonymous SUBSCRIBE/NOTIFY with event = "presence")
- XCAP (GET for service "presence content XDMS")

10.1.3 Standalone Messaging:

- SIP:
    - MESSAGE (in case of Pager Mode CPM Standalone Messages)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.msg
        - Accept-Contact and Contact header fields containing feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.msg" and
        - not carrying content of the type “message/imdn+xml”; or
    - INVITE (in case of Large Message Mode CPM Standalone Messages)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.largemsg
        - Accept-Contact and Contact header fields containing feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.largemsg”
- MSRP in the session established using SIP INVITE

10.1.4 One-To-One Chat:

- SIP
    - INVITE (in case of SIMPLE IM based chat sessions)
        - Accept-Contact and Contact header fields containing feature tag +g.oma.sip-im and
        - without SDP containing a=file-selector and
        - without “isfocus” parameter in the Contact Header and
        - username part of the URI in the P-Asserted-Identity header field different from “rcse-standfw” or
    - INVITE (in case of CPM based chat sessions)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.session
        - Accept-Contact and Contact header fields containing feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.session” and
        - without “isfocus” parameter” in the Contact header field and
        - username part of the URI in P-Asserted-Identity header field different from “rcse-standfw”
- MSRP in the session established using SIP INVITE

10.1.5 Group Chat:

- SIP
    - INVITE, SUBSCRIBE and REFER (in case of SIMPLE IM based chat sessions)

        - Accept-Contact and Contact header fields containing feature tag +g.oma.sip-im and
        - without SDP containing a=file-selector
        - with “isfocus” parameter in the Contact header field or
    - INVITE, SUBSCRIBE and REFER (in case of CPM based chat sessions)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.session
        - Accept-Contact and Contact header fields containing feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.session” and
        - with “isfocus” parameter in the Contact header field
- MSRP in the session established using SIP INVITE

10.2 Disposition Notifications:

- SIP
    - MESSAGE (used for both Standalone Messaging and Chat disposition notifications)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.msg
        - Accept-Contact and Contact header fields containing feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.msg” and
        - carrying content of the type message/imdn+xml ; or
    - MESSAGE (used for Chat disposition notifications)
        - with feature tag +g.oma.sip-im; or
    - INVITE (used for Chat disposition notifications)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.session
        - Accept-Contact and Contact header fields containing feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.session” and
        - without “isfocus” parameter in the Contact header field and
        - with “rcse-standfw” as user part of the URI in the P-Asserted-Identity header field; or
    - INVITE (used for Chat disposition notifications)
        - Accept-Contact and Contact header fields containing feature tag +g.oma.sip-im and
        - without “isfocus” parameter in the Contact header field and
        - with “rcse-standfw” as username part of the URI in the P-Asserted-Identity header field
- MSRP in the session established using SIP INVITE or, for Chat disposition notifications, MSRP within the session established for the Chat itself

10.2.1 File Transfer:

- SIP
    - INVITE (in case of SIMPLE IM based File Transfers)
        - Accept-Contact and Contact header fields containing the +g.oma.sip-im feature tag and
        - Accept-Contact and Contact header fields NOT containing the feature tag +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcs.geopush" and
        - SDP containing a=file-selector
    - INVITE (in case of CPM based File Transfers)
        - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.oma.cpm.filetransfer

        - Accept-Contact and Contact header fields containing the feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.oma.cpm.filetransfer" and
        - Accept-Contact and Contact header fields NOT containing the feature tag +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcs.geopush"
- MSRP in the session established using SIP INVITE

10.2.2 Video Share:

- SIP INVITE
    - Accept-Contact and Contact header fields containing the +g.3gpp.cs-voice feature tag and
    - Accept-Contact and Contact header fields NOT containing the +g.3gpp.iari-ref feature tag
- RTP in session established using SIP INVITE

10.2.3 Video Share Phase 2:

- SIP INVITE
    - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.mmtel
    - Accept-Contact and Contact header fields containing the feature tag +g.3gpp.iari-ref="urn:urn-7:3gpp-application.ims.iari.gsma-vs"
- RTP in session established using SIP INVITE

10.2.4 Image Share:

- SIP INVITE
    - Accept-Contact and Contact header fields containing the feature tag +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.gsma-is"
- MSRP in session established using SIP INVITE

10.2.5 IP Voice Call:

- SIP INVITE
    - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.mmtel
    - Accept-Contact and Contact header fields containing the feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.mmtel" and
    - only audio media in SDP in 200 OK response
- RTP in session established using SIP INVITE

10.2.6 IP Video Call:

- SIP INVITE
    - P-Asserted-Service: urn:urn-7:3gpp-service.ims.icsi.mmtel
    - Accept-Contact and Contact header fields containing the feature tag +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.mmtel"
    - Accept-Contact and Contact header fields containing the "video" capability indication and
    - audio and video media in SDP in 200 OK response
- Separate RTP streams for audio and video in session established using SIP INVITE

10.2.7 Geo-location PUSH:

- SIP INVITE
- Accept-Contact and Contact header fields containing the feature tag +g.3gpp.iari-ref="urn%3Aurn-7%3A3gpp-application.ims.iari.rcs.geopush"
- MSRP in the session established using SIP INVITE

10.2.8 Geo-location PULL:

- SMS
- SUPL

11 DNS & ENUM

For Domain Name System (DNS) usage in RCS interworking, see general IMS related guidelines in [IR.67] Section 4.5 “IP Multimedia core network Subsystem (IMS)”. ENUM guidelines as illustrated in [IR.67] Section 5 “E.164 Number Translation” are applicable also for the purpose of RCS, including the Mobile Number Portability (MNP) issues described in Annex C “Solving Number Portability in ENUM”.

12 DOCUMENT MANAGEMENT

Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
0.1	12/02/09	Very first early draft		
0.2	20/02/09	Minor update		
0.3	17/03/09	Major update		
0.4	31/03/09	Version for Kista workshop		
0.5	15/04/09	Update based on Kista workshop feedback		
0.6	04/06/09	Major update for RCS Berg meeting		
0.7	19/06/09	Update based on RCS#5 discussions		
0.8	01/07/09	Update based on PWP#40 discussions		
0.9	20/07/09	Updated based on email approval comments		
0.91	19/08/09	Final version for DAG		
1.0	01/10/09	Final approved version for public distribution		
2.0	21/07/10	Incorporated Major CR 001 (IR.65 related updates)		
2.1	21/10/10	Incorporated Minor CR 002 (RCS R3 related updates)		
3.0	30/07/12	Incorporated Major CR 003 (RCS 5.0 related update)		

Other Information

Type	Description
Document Owner	IREG
Editor / Company	Tero Jalkanen / TeliaSonera

ANNEX A: CONFIGURATION PARAMETERS WITH NNI IMPACT

NNI parameter	UNI parameter	Recommended NNI handling
Capability Discovery		
Polling period	pollingPeriod	The recommended value is 0 as it will significantly reduce the number of capability queries across the NNI.
Polling rate period Polling rate	pollingRatePeriod pollingRate	The recommended value is that in case polling is enabled, these parameters should be set to values that minimize the NNI traffic without compromising the user experience.
Presence		
Max size of icon [bytes]	ICON MAX SIZE	This parameter influences the size of the file transfer that crosses NNI. This value is negotiated and agreed between interconnecting Service Providers. Each Service Providers can configure a size limit for the icon that customers can publish (i.e., RCS Configuration parameter: IconMaxSize). [RCS5.0] limits this to a maximum of 200 kilobytes.
Max size of free text [bytes]	NOTE MAX SIZE	• A RCS user can enter free text for note • Each Service Provider can configure a upper size for these elements (up to a limit of 200 characters) • Proposed limit on the note value should be low to minimize NNI traffic and discourage “guerilla messaging.”
Max size of favourite URI label [bytes]	FAVORITE LINK LABEL MAX LENGTH	• A RCS user can enter free text for URI label • Each Service Provider can configure a upper size for these elements (up to a limit of 200 characters) • Proposed limit on the URI label value should be low to minimize NNI traffic and discourage “guerilla messaging.”
Max size of location text [bytes]	LOCATION TEXT MAX LENGTH	• A RCS user can enter free text for location text • Each Service Provider can configure a upper size for these elements (up to a limit of 200 characters) • Proposed limit on the location text value should be low to minimize NNI traffic and discourage “guerilla messaging.”
Messaging & File Transfer		
Chat enabled	CHAT AUTH	This should be covered in the interworking agreements. If a Service Provider disables Chat service for all users, then the Chat service traffic should not be allowed to cross the NNI based on the service identification (see Section 10).
Message in INVITE	FIRST MSG IN INVITE	Differences should be covered in the interworking agreements and dealt with according to Section 6.3.

Standalone message enabled	STANDALONE MGS AUTH	This should be covered in the interworking agreements. If a Service Provider disables Standalone Message service for all users, the Standalone Message service should not be allowed to cross the NNI based on the service identification (see Section 10).
Multimedia in chat enabled	MULTIMEDIA IN CHAT	As described in [RCS5.0] and Sections 6.1, 6.2 and 6.3, this parameter is part of the capability exchange and any differences between interconnected Service Providers will therefore be honoured at the protocol level.
Max size of 1-to-1 message [bytes]	MAX SIZE 1-to-1 IM	As described in [RCS5.0] and Sections 6.1, 6.2 and 6.3, this parameter is part of the capability exchange and any differences between interconnected Service Providers will therefore be honoured at the protocol level.
Maximum size of IM content [kbytes]	MAX SIZE GROUP IM	As described in [RCS5.0] and Sections 6.1, 6.2 and 6.3, this parameter is part of the capability exchange and any differences between interconnected Service Providers will therefore be honoured at the protocol level.
Max size of large message [bytes]	MAX SIZE STANDALONE	As described in [RCS5.0] and Sections 6.1, 6.2 and 6.3, this parameter is part of the capability exchange and any differences between interconnected Service Providers will therefore be honoured at the protocol level.
Max number of participants in group chat session	MAX_AD-HOC_GROUP_SIZE	Any differences in the value between interconnected Service Providers will be honoured at the protocol level since the final decision is with the Controlling Messaging Server. Such differences might lead to inconsistencies in the user experience and possible failed attempts though. It is therefore recommended that Service Providers with lot of NNI traffic between themselves (e.g., those within the same country) use similar values.
IM session inactivity timer [seconds]	IM SESSION TIMER	As described in [RCS5.0] and Sections 6.1, 6.2 and 6.3, this parameter is negotiated during session setup and any differences between interconnected Service Providers will therefore be honoured at the protocol level. Since differences will lead to inconsistencies in the user experience (especially for group chat), it is recommended that Service Providers with lot of NNI traffic between themselves (e.g., those within the same country) use similar values.
FT maximum file size [kbytes]	FT MAX SIZE	As described in [RCS5.0] and Sections 6.1, 6.2 and 6.3, this parameter is part of the capability exchange and any differences between interconnected Service Providers will therefore be honoured at the protocol level. Since differences will lead to inconsistencies in the user experience and possible failed attempts, it is recommended that Service Providers with lot of NNI traffic between themselves (e.g., those within the same country) use similar values.
Auto-accept of group chat	IM SESSION AUTO ACCEPT GROUP CHAT	Any differences in the value between interconnected Service Providers will be honoured at the protocol level since a final decision is with the invited clients. Such differences might lead to inconsistencies in the user experience though. It is therefore recommended that Service Providers with lot of NNI traffic between themselves (e.g., those within the same country) use similar values.
Interworking with SMS/MMS	IM CAP NON RCS	If this functionality is enabled, a user is able to invite non-RCS contacts to a chat session requiring the behaviour described in Section 6.2.1. Therefore the interworking agreements should cover this parameter
Content Sharing		
IS maximum image size [kbytes]	IS MAX SIZE	Maximum authorized size of an Image Share in kilobytes).If a file is bigger than IS MAX SIZE value then the transfer will be cancelled by the receiving Service Provider.

VS maximum duration [seconds]	VS MAX DURATION	Maximum connection time of a Video Share in seconds. After expiration of this time limit, the receiving Service Provider can force to disconnect the session.
Geolocation		
Max length of geo-location text	GEOLOCATION TEXT MAX LENGTH	This parameter influences the size of the file transfer that crosses NNI and should be negotiated between the interconnect Service Providers.

Table 3: Mapping of UNI & NNI Parameters per RCS Service