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Contents

Foreword

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shall not indicates an interdiction (prohibition) to do something

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can indicates that something is possible

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will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

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is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the set of stage-3 procedures, APIs, and protocols for the reference points defined in Real-Time Media Communication (RTC) architecture. While TS 26.510 defines the common set of APIs and interactions, this document refers to TS 26.510 for the general aspects and primarily deals with RTC-specific aspects to support WebRTC-based real-time media transport over 5G.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 26.506: "5G Real-time Media Communication Architecture (Stage 2)".

[3] 3GPP TS 26.510: "Media delivery; interactions and APIs for provisioning and media session handling".

[4] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[5] IETF RFC 9110 (2022): "HTTP Semantics".

[6] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

[7] IETF RFC 8834 (2021): "Media Transport and Use of RTP in WebRTC".

[8] IETF RFC 8835 (2021): "Transports for WebRTC".

[9] 3GPP TS 23.003: "Numbering, addressing and identification".

[10] IETF RFC 8829 (2021): "JavaScript Session Establishment Protocol (JSEP)".

[11] IETF RFC 7807 (2016): "Problem Details for HTTP APIs".

[12] IETF RFC 8825 (2021): "Overview: Real-Time Protocols for Browser-Based Applications".

[13] IETF RFC 5124 (2008): "Extended Secure RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/SAVPF)".

[14] IETF RFC 7007 (2013): "Update to Remove DVI4 from the Recommended Codecs for the RTP Profile for Audio and Video Conferences with Minimal Control (RTP/AVP)".

[15] IETF RFC 3551 (2003): "RTP Profile for Audio and Video Conferences with Minimal Control".

[16] IETF RFC 4585 (2006): "Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF)".

[17] IETF RFC 3711 (2004): "The Secure Real-time Transport Protocol (SRTP)".

[18] IETF RFC 5104 (2008): "Codec Control Messages in the RTP Audio-Visual Profile with Feedback (AVPF)".

[19] IETF RFC 4588 (2006): "RTP Retransmission Payload Format".

[20] 3GPP TS 26.114: " IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[21] IETF RFC 9112 (2022): "HTTP/1.1".

[22] IETF RFC 7478 (2015): "Web Real-Time Communication Use Cases and Requirements".

[23] 3GPP TS 26.119: "Media Capabilities for Augmented Reality"

[24] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[25] Apple: "Getting Raw Accelerometer Events", https://developer.apple.com/documentation/coremotion/getting_raw_accelerometer_events.

[26] Google: "Sensor Coordinate System", https://developer.android.com/develop/sensors-and-location/sensors/sensors_overview.

[27] ITU-R Recommendation BT.601-7 (03/2011): "Studio encoding parameters of digital television for standard 4:3 and wide screen 16:9 aspect ratios".

[28] Microsoft: "Microphone Array Geometry Descriptor Format", https://learn.microsoft.com/en-us/windows-hardware/drivers/audio/microphone-array-geometry-descriptor-format.

[29] IETF RFC 8831 (2021): "WebRTC Data Channels".

[30] IETF RFC 8261 (2017): "Datagram Transport Layer Security (DTLS) Encapsulation of SCTP Packets".

[31] W3C Recommendation: WebRTC: Real-Time Communication in Browsers, March 2023. https://www.w3.org/TR/webrtc/

[32] IETF RFC 7874 (2016): "WebRTC Audio Codec and Processing Requirements"

[33] IETF RFC 7742 (2016): "WebRTC Video Processing and Codec Requirements"

[34] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Services (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[35] OpenAPI: "OpenAPI 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md.

[36] 3GPP TS 26.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[37] 3GPP TS 26.522: "5G Real-time Media Transport Protocol Configurations".

[38] 3GPP TS 29.514: "5G System; Policy Authorization Service".

[39] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane nodes".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

RTC Application: A Native WebRTC Application or a Web App that is compliant with the profile of a WebRTC-based application defined in the present document.

RTC endpoint: A WebRTC endpoint incorporating an instance of the WebRTC Framework that is capable of participating in an RTC session and which is deployed either in the RTC Access Function of a UE or in the Media Function of an RTC AS.

RTC Client: UE function comprising an RTC Access Function and an RTC Media Session Handler which interacts with functions in the network and UE applications.

RTC Access Function: A set of functions including an instance of the WebRTC Framework. The RTC Access Function exchanges real-time media with one or more RTC endpoints via reference point RTC-4m or RTC-12, and the RTC Access Function exchanges signalling messages with WebRTC Signalling Function via reference point RTC-4s. Also, the RTC Access Function exposes client APIs defined in the present document to the RTC Application at reference point RTC-7 and to the RTC Media Session Handler at reference point RTC-11.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

API	Application Programming Interface
AR	Augmented Reality
DTLS	Datagram Transport Layer Security
FFS	For Further Study
FoV	Field of View
HTTP	Hyper-Text Transfer Protocol
ICE	Interactive Connectivity Establishment
IMU	Inertial Measurement Unit
MNO	Mobile Network Operator
NAT	Network Address Translation
OTT	Over-The-Top
PSI	PDU Set Importance
RGB	Red-Green-Blue colour space
RTC	Real-Time Communication
RTP	Real-time Transport Protocol
RWT	Response Wait Time
SCTP	Stream Control Transmission Protocol
SRTCP	Secure Real-time Transport Control Protocol
SRTP	Secure Real-time Transport Protocol
SSE	Server-Sent Events
STUN	Session Traversal Utilities for NAT
SWAP	Simple WebRTC Application Protocol
TLS	Transport Layer Security
TURN	Traversal Using Relays around NAT
UPF	User Plane Function
WebRTC	Web Real-Time Communication
XR	Extended Reality

4 Procedures for real-time media communication

4.1 General

This clause defines all procedures for real-time media communication using the different RTC reference points. Table 4.1-1 summarises the APIs used to provision and use RTC features specified in TS 26.506 [2].

Table 4.1-1: Summary of APIs relevant to RTC features

RTC feature	Abstract	Relevant APIs		
		Interface	API name	Clause
Content configuration	Content delivery is configured according to Configuration Provisioning associated with a Provisioning Session.	RTC-1	Provisioning Sessions API	6.2
			Real-time Media Communication provisioning API	6.3
		RTC-5	Service Access Information API	10.2
Metrics reporting	The RTC endpoint uploads metrics reports to the RTC AF according to a provisioned Metrics Reporting Configuration it obtains from the Service Access Information for its Provisioning Session.	RTC-1	Provisioning Sessions API	6.2
			Metrics Reporting Provisioning API	6.7
		RTC-5	Service Access Information API	10.2
			Metrics Reporting API	10.5
Consumption reporting	The RTC endpoint provides feedback reports on currently consumed content according to a provisioned Consumption Reporting Configuration it obtains from the Service Access Information for its Provisioning Session.	RTC-1	Provisioning Sessions API	6.2
			Consumption Reporting Provisioning API	6.8
		RTC-5	Service Access Information API	10.2
			Consumption Reporting API	10.6
Dynamic Policy invocation	The RTC endpoint activates different traffic treatment policies selected from a set of Policy Templates configured in its Provisioning Session.	RTC-1	Provisioning Sessions API	6.2
			Policy Templates Provisioning API	6.6
		RTC-5	Service Access Information API	10.2
			Dynamic Policy API	10.3
Network Assistance	The RTC endpoint requests bit rate recommendations and delivery boosts from the RTC AF.	RTC-5	Service Access Information API	10.2
			Network Assistance API	10.4
Edge content processing	Edge resources are provisioned for processing content in RTC sessions.	RTC-1	Provisioning Sessions API	6.2
			Edge Resources Provisioning API	6.5
		RTC-5	Service Access Information API	10.2

4.2 Procedures for media session handling

4.2.1 Provisioning (RTC-1) procedures

A RTC Application Provider may use the procedure in this clause to provision the network for RTC sessions that are operated by that RTC Application Provider. In order to configure ICE candidates, dynamic policies, and/or reporting, the RTC Application Provider shall create a new Provisioning session in the RTC AF and shall use the interactions specified in clause 5.2.2 of TS 26.510 [3] at reference point RTC-1 to create and subsequently manipulate Provisioning session in the RTC AF.

Throughout the Provisioning session established, reference point RTC-1 offers the following set of procedures:

- *Discovery of ICE candidates:* relays the configuration information for STUN, TURN, and SWAP servers in the trusted domain to RTC Media Session Handler in UE, at RTC-5, if required by the Provisioning session. The list of associated server information depends on the collaboration scenarios as identified in TS 26.506 [2].

- *Configuration of dynamic policies:* allows the configuration of Policy Templates at RTC-5 that can be applied to RTC-4m media sessions.

- *Configuration of reporting:* permits the MNO to collect, at RTC-5, QoE metrics and consumption reports about RTC-4m media sessions.

A RTC Application Provider may use any of these procedures, in any combination, to support its RTC sessions.

4.2.2 Network media session handling (RTC-3, RTC-5) procedures

The following operations at reference point RTC-5 are used by a RTC Media Session Handler in a UE to invoke services relating to RTC session on the RTC AF. Reference point RTC-3 may be involved to a subset of operations involved in the exchange of QoS flow information as well as QoE and consumption report.

- *Service Access Information:* It is the set of parameters and addresses needed by RTC endpoint to activate transmission and/or reception of RTC session. It additionally includes configuration information to invoke the subsequent procedures. The detailed procedure to acquire Service Access Information is specified in clause 5.3.2 of TS 26.510 [3].

- *Configuration information:* It is the set of addresses needed by RTC endpoint to acquire the service URL. It may include the addresses of trusted STUN/TURN servers as well as trusted WebRTC signalling servers that supports the SWAP protocol. If it is activated by RTC Application Provider at reference point RTC-1, RTC Media Session Handler shall use the procedures and operations specified in clause 10.3.

- *Dynamic policy invocation:* It is used by RTC Media Session Handler to manage Dynamic Policy Instance resources in the RTC AF. RTC Media Session Handler shall use the interaction specified in clause 5.3.3 of TS 26.510 [3] to instantiate Policy Template in the RTC AF that are described in the Dynamic Policies API in clause 10.4.

- *Metrics reporting:* It is used to submit a QoE metrics report to the RTC AF by RTC Media Session Handler of RTC endpoint at reference point RTC-5 or by the RTC AS at reference point RTC-3, if metrics reporting is applied for a media streaming session. To determine whether and how to send metrics reports the RTC AF, the RTC Media Session Handler shall use the procedures and operations specified in clause 5.3.5 of TS 26.510 [3].

- *Consumption reporting:* It is used to submit a consumption report to the RTC AF by the RTC Media Session Handler of the RTC endpoint at reference point RTC-5 or by the RTC AS at reference point RTC-3, if consumption reporting is applied for RTC session. This is indicated by the presence of a Client Consumption Reporting Configuration in the Service Access Information. To determine whether and how to send consumption reports to the RTC AF, the RTC Media Session Handler shall use the procedures and operations specified in clause 5.3.6 of TS 26.510 [3].

- *Network assistance:* It is used by the RTC endpoint to request Network Assistance from one of the RTC AF instances listed in the Network Assistance Configuration of the Service Access Information. To do this, the RTC Media Session Handler shall use the procedures and operations specified in clause 5.3.4 of TS 26.510 [3].

4.2.3 UE media session handling (RTC-6, RTC-11) procedures

The reference point RTC-6 is used to exchange the report of media consumption as configured by Service Access Information. When consumption reporting is active for a particular RTC session, the RTC Media Session Handler shall use procedures and operations specified in clause 5.4.6 of TS 26.510 [3].

The reference point RTC-11 is used to exchange the QoE metric reporting as configured by Service Access Information. When metric reporting is active for a particular RTC session, the RTC Media Session Handler shall use procedures and operations specified in clause 15.

4.3 Procedures for media content and signalling transport

4.3.1 Media transport (RTC-4m, RTC-12) procedures

4.3.1.1 General

In the RTC System, real-time media shall be communicated at either reference point RTC-4m or RTC-12.

- RTC-12 shall be used for peer-to-peer communication between multiple RTC Access Functions in UEs where this is permitted by the underlying 5G System.
- RTC-4m shall be used for communication between the RTC Access Function in the UE and the RTC AS, and between multiple RTC Access Functions in UEs where peer-to-peer communication is not permitted by the underlying 5G System.

In addition, reference point RTC-4 interface may be further split into the *signalling part* (RTC-4s) and *media transport part* (RTC-4m), depending on the collaboration scenario as specified in TS 26.506 [2].

Table 4.3.1.1-1 describes the associated reference points for collaboration scenarios.

Table 4.3.1.1-1: Associated reference point RTC-4s/4m and RTC-12 for collaboration scenarios

Type		Collaboration scenario 1	Collaboration scenario 2	Collaboration scenario 3	Collaboration scenario 4
Media, metadata	UE-to-RTC AS	X	RTC-4m (NOTE 2)	RTC-4m	RTC-4m
	Peer-to-Peer	X	RTC-12	RTC-12	RTC-12
Signalling		X	X	RTC-4s	RTC-4s
NOTE 1: X denotes that the corresponding reference point is not the scope of the present document. NOTE 2: For the case when TURN server within ICE Function is involved to the other RTC endpoint.					

4.3.1.2 Media transport procedures at RTC-4m and RTC-12

Under the control of an RTC Application (i.e., *Native WebRTC App* or *Web app*) the RTC Access Function sends/receives media data, application data and/or media-related metadata to/from a peer RTC endpoint at reference point RTC-4m (if its peer is the Media Function of the RTC AS) or RTC-12 (if its peer is another RTC Access Function).

In the context of the present document, neither the requirements for audio codecs and processing as defined in RFC 7874 [32] nor the requirements for video codecs and processing as defined in RFC 7742 [33] apply to RTC endpoints. The codecs that RTC endpoints are required to support are specified in clause 16.

When a Dynamic Policy Instance is operative during an RTC session, PDUs contributed by RTC endpoints on the application flow(s) described by each Application Flow Description shall comply with the media transport properties declared by that Application Flow Description, as specified in clause 10.3.

4.3.2 Signalling (RTC-4s) procedures

This reference point is used for the exchange of signalling messages related to the RTC session between the RTC Application of the UE and the WebRTC Signalling Function of the RTC AS. The RTC application (i.e., *Native WebRTC App* or *Web app*) sends/receives signalling message to/from RTC AS (i.e., WebRTC Signalling Function) via reference point RTC-4s and RTC-7. Signalling procedures for RTC-4s refer to the procedure specified in the signalling protocol for RTC System in clause 13.2.

If a WebRTC Signalling Function is provided in RTC AS, an RTC Application shall configure itself to use one of the WebRTC Signalling Function servers (e.g., use the WebRTC Signalling Function server which supports the SWAP protocol listed in the *swapEndpoints* in the Service Access Information message obtained by the RTC Media Session Handler at reference point RTC-5. The configured signalling server information is sent to RTC Application via