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Augmented Reality Framework (ARF); Standards landscape for ETSI AR Functional Reference Model (<https://standards.iteh.ai>) Document Preview

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Reference

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Foreword

This Group Report (GR) has been produced by ETSI Industry Specification Group (ISG) Augmented Reality Framework (ARF).

The ISG ARF shares the following understanding for Augmented Reality: Augmented Reality (AR) is the ability to mix in real-time spatially-registered digital content with the real world. The present report provides a snapshot of standardization efforts conducted by various Standards Development Organizations (SDOs) and other fora, as available at the time of publishing. It positions the existing and emerging standards in the context of the ETSI GS ARF 003 [i.1].

While the goal of the present document is to provide an exhaustive list of relevant standards pertaining to the functional blocks and Reference Points (RPs) of the AR Framework Reference Architecture, this may not be the case with the first version of the present document and updates may be available in future versions.

Modal verbs terminology

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1 Scope

The present document identifies existing and emerging standards and technologies relevant to the ten functional blocks and nineteen reference points specified in ETSI GS ARF 003 [i.1]. It describes how each standard contributes to addressing the interoperability needs of components, systems and services seeking to fulfil the roles of each defined block and reference point.

The present document also identifies where new or additional coordination between existing standards bodies and working groups may be needed to clarify how each contributes to any interoperability gaps and to reduce confusion emerging from standards scope overlap or conflicts.

While some of these standards included in the present document directly address an AR function, others are addressing key technological components that can be useful to increase interoperability of AR components, systems and services and their interactions with other information technologies.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] [ETSI GS ARF 003](#): "Augmented Reality Framework (ARF) AR framework architecture".
- [i.2] [W3C® Recommendation 08 October 2024](#): "WebRTC: Real-Time Communication in Browsers".
- [i.3] [W3C® Recommendation 16 August 2011](#): "Scalable Vector Graphics (SVG) 1.1".
- [i.4] [W3C® Working Draft 14 February 2025](#): "Media Capabilities".
- [i.5] [W3C® Working Draft 04 July 2024](#): "Media Source Extensions™".
- [i.6] [W3C® Editor's Draft 04 July 2024](#): "Media Playback Quality".
- [i.7] [W3C® Recommendation 9 April 2020 \(Link errors corrected 23 June 2020\)](#): "Web of Things (WoT) Thing Description".
- [i.8] [IETF RFC 9293](#): "Transmission Control Protocol (TCP)".
- [i.9] [IETF RFC 768](#): "User Datagram Protocol".
- [i.10] [IETF RFC 791](#): "Internet Protocol".
- [i.11] [IETF RFC 8200](#): "Internet Protocol, Version 6 (IPv6) Specification".
- [i.12] [IETF RFC 3550](#): "RTP: A Transport Protocol for Real-Time Applications".
- [i.13] [IETF RFC 7826](#): "Real-Time Streaming Protocol Version 2.0".
- [i.14] [IETF RFC 3261](#): "SIP: Session Initiation Protocol".

- [i.15] [IETF RFC 2974](#): "Session Announcement Protocol".
- [i.16] [IETF RFC 2608](#): "Service Location Protocol, Version 2".
- [i.17] [IETF RFC 6763](#): "DNS-Based Service Discovery".
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- [i.32] United States Coast Guard - U.S. Department of Homeland Security: "[GPS References](#)".
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- [i.34] Bluetooth®: "[Core Specifications 5.2](#)".
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3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

3 Degrees of Freedom (3DoF): visual system providing rotation of the viewing position around three perpendicular axes

6 Degrees of Freedom (6DoF): visual system providing rotation of the viewing position around three perpendicular axes and allowing the transition of the viewing position along these three axes

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

2D	Two dimensions
3D	Three dimensions
3DoF	3 Degrees of Freedom
6DoF	6 Degrees of Freedom
AAC	Advanced Audio Coding
AFX	Animation Framework eXtension
API	Application Programming Interface
AR	Augmented Reality
ARAF	Augmented Reality Application Format
ARF	Augmented Reality Framework
ARML	Augmented Reality Markup Language
ASCII	American Standard Code for Information Interchange
ASPRS	American Society for Photogrammetry and Remote Sensing
AUI	Advanced User Interface
AV1	AOMedia Video 1
AVC	Advanced Video Coding
AVP	Attribute-Value Pairs
BIFS	Binary Format for Scenes
BIM	Building Information Modelling
CAD	Computer Aided Design
Collada	Collaborative Design Activity
CRS	Coordinates Reference System
DGPS	Differential Global Positioning System
DNS	Domain Name System
FBX	Filmbox
glTF	Graphics Language Transmission Format
GNSS	Global Navigation Satellite System
G-PCC	Geometry-based Point Cloud Compression
GPS	Global Positioning System
GR	Group Report
HEVC	High Efficiency Video Coding
HTML	HyperText Markup Language
HTTP	Hypertext Transfer Protocol
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IoT	Internet of Things
IP	Internet Protocol
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
JPEG	Joint Photographic Experts Group
JSON	JavaScript Object Notation
LAN	Local Area Network
LAS	LASer
LiDAR	Light Detection And Ranging
MIV	MPEG Immersive Video
MPEG	Motion Picture Expert Group
MQTT	Message Queuing Telemetry Transport
OASIS	Organization for the Advancement of Structured Information Standards
OGC	Open Geographic Consortium
OMI	Open Metaverse Interoperability
PNG	Portable Network Graphics
RAHT	Region-Adaptive Hierarchical Transform
RFC	Requests For Comments
RFID	Radio Frequency Identification
RGB	Red Green Blue
RP	Reference Point

RTCP	RTP Control Protocol
RTP	Real Time Protocol
RTSP	Real Time Streaming Protocol
SDK	Software Development Kit
SDO	Standards Developing Organization
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SVG	Scalable Vector Graphics
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UML	Unified Modelling Language
URI	Uniform Resource Identifier
USD	Universal Scene Description
V3C	Visual Volumetric Video-based Coding
VFX	Visual Effects
V-PCC	Video-based Point Cloud Compression
VR	Virtual Reality
VRML	Virtual Reality Markup Language
VVC	Versatile Video Coding
X3D	eXtensible 3D
XML	eXtensible Markup Language
XR	eXtended Reality

4 Organization of this AR Standards Landscape

4.1 Introduction

ETSI GS ARF 003 [i.1] defines a global architecture of an AR system consisting of hardware, software and data components. In addition to the global architecture, a functional architecture was defined. The functional architecture specified by ETSI GS ARF 003 [i.1] is shown in Figure 1. Logical functions are shown as named boxes that may be nested in cases where a high-level function is composed of several subfunctions. The architecture can be used for describing stand alone or "fully" integrated AR systems as well as for describing implementations of components distributed across local and remote resources (e.g. network servers). Depending on the deployment scenario and the application requirements, multiple logical subfunctions and functions can also be combined in one deployable unit.

Functions in the architecture are connected by Reference Points (RPs). A reference point in a functional architecture is located between two non-overlapping functions and represents the interrelated interactions between those functions. Reference point implementations are interfaces that convey information between functions in a unidirectional or bidirectional way using a specified protocol.