

SMPTE STANDARD

Definition and Representation of
Haptic-Tactile Essence for
Broadcast Production Applications



Table of Contents

Foreword 2

Intellectual Property 2

Introduction 2

1 Scope 4

2 Conformance Notation 4

3 Normative References 5

4 Terms and Definitions 5

 4.1 aggregation 5

 4.2 electro-mechanical 5

 4.3 half-precision floating point number 5

 4.4 sensor 5

 4.5 haptic-tactile sensor 5

 4.6 sensor data 5

 4.7 liner acceleration 5

 4.8 angular acceleration 6

 4.9 linear velocity 6

 4.10 angular velocity 6

5 Haptic-Tactile Essence 6

 5.1 General 6

 5.2 Haptic-Tactile Essence Type 6

 5.3 Haptic-Tactile Essence Update Rate 8

 5.4 Haptic-Tactile Essence Value 8

 5.5 Haptic-Tactile Essence Data Components 8

 5.6 Sensor Identification 9

 5.6.1 Sensor IDs 9

 5.6.2 IEEE EUI Identifiers (Informative) 9

 5.6.3 Unique Material Identifier (UMID) (Informative) 9

Bibliography (Informative) 10

Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual.

SMPTE ST 2021-1 was prepared by Technology Committee 10E.

Intellectual Property

SMPTE draws attention to the fact that it is claimed that compliance with this Standard may involve the use of one or more patents or other intellectual property rights (collectively, "IPR"). The Society takes no position concerning the evidence, validity, or scope of this IPR.

Each holder of claimed IPR has assured the Society that it is willing to License all IPR it owns, and any third party IPR it has the right to sublicense, that is essential to the implementation of this Standard to those (Members and non-Members alike) desiring to implement this Standard under reasonable terms and conditions, demonstrably free of discrimination. Each holder of claimed IPR has filed a statement to such effect with SMPTE. Information may be obtained from the Director, Standards & Engineering at SMPTE Headquarters.

Attention is also drawn to the possibility that elements of this Standard may be subject to IPR other than those identified above. The Society shall not be responsible for identifying any or all such IPR.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

Haptic-tactile enabled broadcasts and transmissions can be described as follows:

- They are the end to end use of technology to capture, encode, broadcast and deliver haptic-tactile information conveying the "feeling" or "impact" of an originating event. This enables the end user to receive and experience the haptic-tactile experience at a remote location.
- The "capture" part of the system is accomplished by means of sensors (single or multi-axis accelerometers and / or other means of sensing or capturing the haptic-tactile vibration or movement) on a remote object or person (such as a hockey player, a race car, etc.). The haptic-tactile essence can be incorporated into the media production that is sent from the remote production location to the broadcast plant, and then to the end user's device for extraction and decoding.
- The haptic-tactile essence is decoded or extracted at the end user's location and converted into a digital or analog signal that is used by the appropriate electro-mechanical hardware so that the end user can experience substantially the same haptic-tactile effects of the captured event.

The Flow Chart below illustrates a simplified view of a haptic-tactile broadcast system, showing the haptic-tactile information captured by one or more sensors, the coding of the haptic-tactile essence, the communication, and the decoding for use of the haptic-tactile essence by end user hardware.

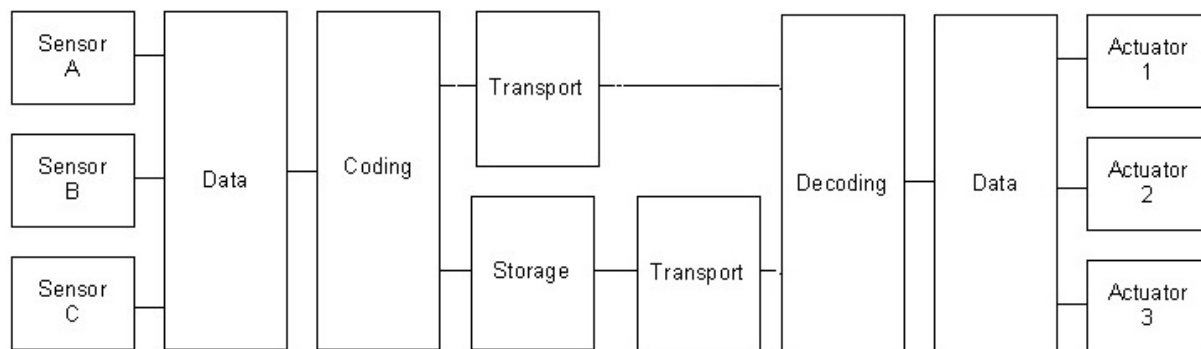
While sensors can create either analog or digital signals of different magnitudes and resolutions, the inputs to the haptic-tactile broadcast system are expected to be presented in a digital format as half-precision floating point numbers at a rate not exceeding 800 samples per second, per sensor.

Data from multiple sensors can be used to represent different locations or aspects of one physical object and multiple sensors can convey information for different motion axis and for linear or rotational movement.

Electro-mechanical end user hardware is commonly referred to as a “tactile transducer”, “actuator”, “motion” system or “simulator”.

This document is part of a suite of documents that address the definition and representation of haptic-tactile essence, as well as its transport. The acquisition of the haptic-tactile essence is out of scope for this suite of documents.

Tactile Data Eco-system



Haptic-Tactile Data Flow Chart

This document addresses only sensors that measure motion or direction. Other types of haptic-tactile essence, such as texture, temperature, etc. are not addressed by this document.

Haptic-Tactile essence is synchronized with visual and aural elements of the program stream. If it is not, the experience for the viewer can be unpleasant, and not an accurate representation of the content being presented. For this reason, latency is also considered.