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Internet of things (IoT) – Underwater communication technologies for IoT

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Symbols and abbreviated terms.....	6
5 Enabling/driving technologies of underwater communication.....	7
5.1 General.....	7
5.2 Acoustic communication.....	8
5.2.1 Technical overview	8
5.2.2 Trend of technology (modern communication trends).....	14
5.3 Optical (wire/wireless) communication	21
5.3.1 Technical overview	21
5.3.2 Trend of technology (modern communication trends).....	24
5.4 Very Low Frequency (VLF)/Extremely Low Frequency (ELF).....	28
5.4.1 Technical overview	28
5.4.2 Trend of technology (modern communication trends).....	31
5.5 Magnetic fusion communication (MFC).....	39
5.5.1 Technical overview	39
5.5.2 Trend of technology (modern communication trends).....	42
Bibliography.....	54
Figure 1 – Example of underwater acoustic sensor network system	8
Figure 2 – Path loss of sound wave	10
Figure 3 – Multipath of sound wave.....	10
Figure 4 – Terrestrial/underwater interworking gateway	13
Figure 5 – Underwater cable structure	21
Figure 6 – Fibre-optic wired communication system overview	21
Figure 7 – Current underwater cable map	23
Figure 8 – Optical wired communication system overview	25
Figure 9 – Optical wired communication system based on WDM technology	25
Figure 10 – Trideco antenna tower array used in the US Navy's Cutler station.....	29
Figure 11 – Valley-span antenna type used by the US navy station, Jim Creek.....	29
Figure 12 – Aerial photograph of Clam Lake ELF facility in Wisconsin, USA (1982)	34
Figure 13 – Cutler VLF transmitter's antenna towers.....	36
Figure 14 – Cutler antenna array	36
Figure 15 – VLF transmission centre in Japan	38
Figure 16 – Trideco-type antenna placement in Harold E. Holt.....	38
Figure 17 – Australian VLF transmitter (1979).....	39
Figure 18 – Shape of envelope	40
Figure 19 – BPSK modulated signal.....	41
Figure 20 – Magnetic field communication and Zigbee communication comparison experiment.....	42

Figure 21 – Experimental water tank for comparing magnetic field communication characteristics according to medium and distance 43

Figure 22 – Experimental water tank filled with water and soil..... 43

Figure 23 – Strength of magnetic field due to distance in air, water, and soil 44

Figure 24 – Physical layer packet format..... 45

Figure 25 – Preamble area type 45

Figure 26 – Header area type 45

Figure 27 – Encoding circuit of header check cyclic redundancy code..... 46

Figure 28 – Payload area format..... 46

Figure 29 – Definition of Manchester coding 47

Figure 30 – Definition of NRZ-L coding 47

Figure 31 – Scrambler block diagram..... 48

Figure 32 – ASK modulation diagram 49

Figure 33 – BPSK modulation diagram..... 49

Figure 34 – Preamble coding and modulation process 49

Figure 35 – Process of coding and modulating headers 50

Figure 36 – Process of coding and modulating the payload..... 50

Figure 37 – Magnetic fusion communication super frame structure 50

Figure 38 – Magnetic field communication network structure..... 51

Figure 39 – Magnetic fusion (power transfer) communication network super-frame structure 52

Figure 40 – Magnetic fusion (power transfer) communication network structured diagram 53

Table 1 – Envelope parameters 40

Table 2 – Intensity of magnetic field due to distance in air, water, and soil..... 44

Table 3 – Definition of data rate and coding..... 46

Table 4 – Definition of frame check cyclic redundancy code..... 47

Table 5 – Data rate and coding details..... 48

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FOREWORD

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The language used for the development of this Technical Report is English.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

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INTRODUCTION

Earth is the aquatic planet as water covers 70 % of its surface. Due to the rapid growth of technology, underwater communication technologies can be used for the development of various smart underwater applications. The underwater communication system is one of the fastest-growing fields since many applications such as monitoring applications, military applications, security applications, new resource exploration, etc. are continuously being developed and used. However, many applications still need to be studied in-depth and underwater resources also need to be explored. Therefore, the research in underwater communication technology plays a vital role in the exploration of undersea resources and the development of various underwater applications.

Using the radio frequency (RF) signal, the communication technology in the underwater environment can be extremely influenced by various factors such as environmental noise, pollution, power, etc. This can cause several issues related to attenuation, frequency fading, Doppler shift, multipath effect, etc. Hence, acoustic communication technology has been used by numerous researchers to solve these issues. In the case of high-speed acoustic communication, problems like limited bandwidth, reliability in data, error rate, multipath, etc. remain to be solved.

Optical communication technology is used for high-speed and short-range communication in the underwater environment. The optical communication uses the laser to carry the information through the water. In the case of long-distance communication in the underwater environment, optical communication is not suitable. The magnetic fusion communication in the underwater environment is only used for near-field communication. Therefore, all communication technologies are essential for underwater communication.

The purpose of this document is to provide a technical overview of the different communication technologies in the underwater environment such as acoustic communication, optical communication, Very Low Frequency (VLF)/Extremely Low Frequency (ELF) communication, and Magnetic Fusion Communication (MFC). Correspondingly, this document also provides the characteristics of each communication technology in the underwater environment, trends of underwater communication technology, layered design of underwater technology, and the application development using different communication technologies.

INTERNET OF THINGS (IoT) – UNDERWATER COMMUNICATION TECHNOLOGIES FOR IoT

1 Scope

This document describes the enabling and driving technologies of underwater communication such as acoustic communication, optical communication, Very Low Frequency (VLF)/Extremely Low Frequency (ELF) communication, and Magnetic Fusion Communication (MFC). This document also highlights:

- technical overview of different communication technologies;
- characteristics of different communication technologies;
- trends of different communication technologies;
- applications of each communication technology;
- benefits and challenges of each communication technology.

2 Normative references

There are no normative references in this document.