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Ubiquitous Code : ucode

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Table of Contents

Introduction 4
Scope 4
Position of this Document 4
Reference Documents 4
1. Introduction 5
1.1. Definition 5
1.2. Usage 5
2. Structure 6
2.1. Code Width 6
2.2. Basic Code Structure 6
2.2.1. Version 6
2.2.2. Top Level Domain Code: TLDc 6
2.2.3. Class Code: cc 7
2.2.4. Second Level Domain Code: SLDc 8
2.3. Special Code 9

Ubiquitous Code: ucode

Introduction

Scope

This document specifies the basic format (128-bit version) for ubiquitous code (ubiquitous code: ucode), which is an identifier (ID) system to identify “objects,” ”places,” and “concepts” in Ubiquitous ID architecture.

Position of this Document

This document defines the details of the ucode code system and structure specified by document [1] "Ubiquitous ID Architecture."

References

[1] T-Engine Forum, Ubiquitous ID Center, "Ubiquitous ID Architecture," 910-S002/UID-00002, 2006.
[2] T-Engine Forum, Ubiquitous ID Center, "Authorized Standard Meta-code in ucode,” 930-S101(2)/UID-00011, 2006.
[3] T-Engine Forum, Ubiquitous ID Center, "ucode Tag Architecture," 930-S201/UID-00017, 2006.

1. Introduction

1.1. Definition

A ucode is an identifier (ID) to identify individual “objects,” “places,” and “concepts” in the real world in Ubiquitous ID architecture. "Objects" in this document include tangible objects such as industrial products and agricultural crops, and intangible objects such as content and programs. "Places" include the real world features such as roads and buildings and smaller components such as rooms and corridors. "Concepts" include the relationships between "objects" and "places" and the information which can be the real world context.[1]

1.2. Usage

Physical ucodes assigned to tangible “objects” existing in the real world are stored in the tags, called a ucode tag [3], and implemented by RFID, smart card, barcode, or 2D code in Ubiquitous ID architecture [1]. Various automatic recognition technologies automatically identify the objects to which ucode tags are attached by reading the ucodes from ucode tags. In addition, logical ucodes assigned to non-real “objects” represent the concept to be identified. In either case, the ucode is the key when searching the database based on the automatically recognized “objects,” “places,” or “concepts.”

The ucode can work as a metacode which embeds other code systems. By utilizing this metacode function, the ucode can embed existing identifiers, for example, the code system used in existing barcodes or the numbering system for various industrial products, etc.

[1] It is a policy not to attach ucode tags to people due to security and privacy concerns.

2. Structure

2.1. Code Width

Basic code width of ucode is 128 bits. The width of the basic ucode can be extended by an integral multiple of 128 such as 256 bits, 384 bits, and 512 bits. This document defines the basic 128-bit width format only.

2.2. Basic Code Structure

The ucode consists of five fields: Version, Top Level Domain Code, Class Code, Second Level Domain Code, and Identification Code (Figure 1, Table 1).

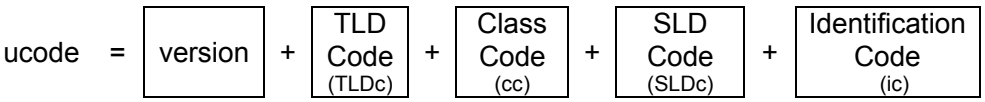

Figure 1: ucode (128-bit basic width) Structure

Table 1: ucode Field Name and its Width

Field Name	Width
Version	4 bits
Top Level Domain Code: TLDc	16 bits
Class Code: cc	4 bits
Second Level Domain Code: SLDc	Multiple types
Identification Code: ic	Multiple types

2.2.1. Version

The version indicates a ucode version number. Current version is "0000" (binary notation).

2.2.2. Top Level Domain Code: TLDc

The ucode space is managed by being divided into subspaces called a domain. That is, the domain is a subspace as a ucode management unit.

The domain is comprised of two-layers, and the ucode space is managed in a two-layered hierarchical structure. The Top Level Domain (TLD) is defined as the higher level domain of ucode space.

An organization that manages TLD is defined a TLD management organization. TLD management organization manages a ucode space of 108 bits.

Ubiquitous ID Center allocates the Top Level Domain Code (TLDc) to a TLD management organization. TLDc is 16 bit wide. TLDc is allocated according to the ucode allocation policy separately defined by Ubiquitous ID Center. In addition, the following TLDcs are reserved for special use shown in Table 2.

Table 2: TLDc for Special Use

TLDc	Usage
0xe000	Reserved ucode space (metacode space)
0xffff	eTRON ID

A reserved ucode space is defined as a generic term of the metacode space reserved by Ubiquitous ID Center for the reason of converting the tag unique IDs into ucodes, of the inclusion of other code systems, etc. The details of the reserved ucode space are specified in [2]. The details of eTRON ID are defined separately.

2.2.3. Class Code: cc

The Class Code indicates the boundary between the Second Level Domain Code (SLDc) and the Identification Code (ic), as described below.

If cc's most significant bit is 1, the ucode is 128 bits. If cc's most significant bit is 0, the ucode is an extended code consisting of 256 bits or more. The extended code is defined separately.

cc's lower 3 bits indicates the boundary between the domain code and the identification code, defining each width. Figure 2 and Table 3 show the correspondence between cc's lower 3 bits and SLDc and ic widths.

cc (4 bits)	SLDc + ic (104 bits)

	1000	Reserved	
Class A	1001	SLDc (8 bits)	Ic (96 bits)
Class B	1010	SLDc (24 bits)	Ic (80 bits)
Class C	1011	SLDc (40 bits)	Ic (64 bits)
Class D	1100	SLDc (56 bits)	Ic (48 bits)
Class E	1101	SLDc (72 bits)	Ic (32 bits)
Class F	1110	SLDc (88 bits)	Ic (16 bits)
	1111	Reserved	

Figure 2: Predefined cc Values and Bit Boundary between SLDc and ic (1)

Table 3: Predefined cc Values and Bit Boundary between SLDc and ic (2)

Class Code	Domain Space Size	Bit Number of SLDc and ic
0xxx	Reserved for extension	
1000	Reserved	
1001	96 bits (Class A)	ucode with SLDc = 8 bits, ic = 96 bits
1010	80 bits (Class B)	ucode with SLDc = 24 bits, ic = 80 bits
1011	64 bits (Class C)	ucode with SLDc = 40 bits, ic = 64 bits
1100	48 bits (Class D)	ucode with SLDc = 56 bits, ic = 48 bits
1101	32 bits (Class E)	ucode with SLDc = 72 bits, ic = 32 bits
1110	16 bits (Class F)	ucode with SLDc = 88 bits, ic = 16 bits
1111	Reserved	

2.2.4. Second Level Domain Code: SLDc

The Second Level Domain (SLD) is defined as the lower level domain of ucode space. The Second Level Domain space has six types of size from 16 bits to 96 bits in 16 bit unit. A space is called Class A - Class F according to the size. A Second Level Domain code (SLDc) is a code that is allocated to a Second Level Domain. SLDc's bit width plus Second Level Domain space's bit width is always 104 bits (Table 3).

SLDc is allocated by a TLD management organization. The SLD management organization is defined as an organization that manages an SLD.

2.3. Special Code

The codes shown in Table 4 are reserved for special use.

Table 4: Special Code

Special Code	Type
0x?0-0000-0000-0000-0000-0000-0000-0000	reserved
0x?f-ffff-ffff-ffff-ffff-ffff-ffff-ffff	reserved

*First sign “?” indicates an arbitrary value of 0-f.

Index

C

Class Code 6, 7

E

eTRON ID 7

I

Identification Code 6

R

Reserved ucode space 7

S

Second Level Domain Code 6

Second Level Domain 8

Second Level Domain Code 8

Special Code 9

T

TLDc 6

Top Level Domain 6

Top Level Domain Code 6, 7

U

ucode 6

V

Version 6