国际二维码对象标识体系（IDcode）

白皮书

（2019 年）

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2019 年 8 月

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前　言

自上世纪80年代二维码技术诞生以来，伴随着通信网络和智能终端设备的发展，二维码逐渐应用到经济贸易、社会生活的多个领域，目前已成为全球供应链、智能数据链、产业价值链建立的关键技术以及物品流通和贸易结算新的载体和符号，是全球经济活动创新与增长的重要驱动技术，由其催生的新产业、新模式、新业态不断涌现，不断改变着人们的生产生活方式。

目前，在全球范围内，二维码行业发展呈现出三大趋势：一是全球技术发展迅速，二维码码制技术、编码技术、识读解析技术、存储技术等较为成熟稳定并多样化，而且随着移动网络、智能终端等外部因素的发展而日益得到优化提升；二是全球应用日趋广泛，二维码正成为新的物品标识技术、移动互联入口和贸易流通的结算载体，渗透到全球经济贸易和社会生活的各个领域，引起各国政府高度重视；三是全球统一协调发展需求开始凸显，由于各国二维码标准尚不互通，体系尚不互联，二维码的全球化、标准化发展日益成为影响二维码更好支撑全球贸易便利化、产业价值链重塑和数字经济发展的关键因素。

标识体系是支撑二维码标准化、全球化、产业化发展的重要基础设施。二维码对象标识体系（IDcode）是由ZIIOT研究提出，经ISO、CEN、AIM国际组织共同认可的标识体系，是国际标准《ISO/IEC 15459

信息技术 自动识别与采集技术 唯一标识》的组成部分，用于对任何类型的对象（人、事、物）进行全球唯一二维码身份标识，即“二维码身份证”。IDcode 具有分层灵活、良好的兼容性、可扩展性强等特点，适合作为现有各种编码体系之间进行交换的元标识机制。

本白皮书着重分析了全球二维码产业发展现状和趋势，全面介绍了 IDcode 技术起源、标准发展、应用与管理，梳理了一些应用案例，并提出了 IDcode 建设应用指南，用以指导各国家和地区、各行业标识体系的建设应用。

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目　录

一、物联网发展与编码标识技术

物联网带来的信息科技席卷全球， 万物互联时代，物品之间的链接范围就直接决定了物联网的行业价值。以数据运算为基础的万物互联网的前提，必须得把每一个物品都编制成特定的数据标识，给每一个物品设立独特的“身份证号码”，才有可能在巨大的数据信息传递的过程中，通过“身份证号码”实现物与物之间精准的交互。

唯一的身份必须具备以下特性：

1、全球性

不能在一个地区，一个省可以识别这个身份，到另一个地区、另一个省就不能识别;不能在一个国家可以识别、到另一个国家就不能识别，因此必须是全球标准。物联网域名应是全球分配全球共通的，是一个获得全球广泛认可、广泛使用、尤其具备国际公平性，不由少数国家掌控的标准。

2、兼容性

从对物体计数的简单排列序号，到各种企业里的复杂编号体系，以及到虽然只适合专业领域内使用，但成规模的甚至具有全球使用范围的编号体系。要构成这些不同身份的万物互联，必须具备极强的兼容性的方法才能构成互联体系。物联网域名正是具备这个特性。

3、适合虚实物体

不仅实物能够互联，一个虚拟物体比如一个电子文档、一个复杂

的网络平台也能互联。物联网域名在计算机网络里已经使用了 20 多年，在标识虚拟物体方面是全球最成熟的体系。正是这个强大的特性，可以在云端或网络中对和实物对应的数据(虚物体)做标识，才能最快捷的构成非智能物体的联网。

将包含唯一编码的低成本的标识技术与网络技术相结合实现物与物之间的通信，编码序列化（serialization）的思想已为工业界广泛接受；即物品首先要有一个唯一的身份标识，并且可以通过这个唯一标识来获取物品的相关信息。物品的唯一编码是物联网的重要基础之一，由于传统因素和行业特征不同形成了不同的编码体系，例如 UID 编码、EPC 编码、OID 编码、Handle 编码等。

标识数据的载体为二维码或 RFID 标签、NFC 等，随着智能手机终端的普及，相比电子标签的标识载体，二维码具有使用方便、安全、价格低廉、数据容量大、容错性高等显著优势。对于消费者来说，只需要通过简单的手机扫描标签上的二维码标识，就可以直接获取产品的信息，更加方便快捷，正占有越来越多的市场地位。

二维码作为物联网感知层核心技术之一，连接人与物、物与物、人与网络、物与网络，在数字经济发展中起着重要的支撑促进作用。

1. 存储：内容存储，数字信息及数据

2. EDI：数据采集与电子数据交换，产业链间流转与管理

3. 入口：实现 020 和移动互联网成本最低的最佳入口

4. ID：人、物、事的身份唯一标识，物联网基础设施

二、全球二维码发展状况

（一）二维码起源、发展历程

随着高科技的飞速发展，国际经济向一体化迅速迈进，极大地促进了信息技术的发展。各类信息的数量以前所未有的速度剧增，为了实现对信息的标识、快速采集、传递和有效利用，作为移动通信产物的新型存储媒体二维码技术应运而生，因其快速、准确、成本低、可靠性高强、容量大等特点，已成为信息经济最普遍的实用技术，渗透到全球经济发展的各个领域和日常生活中，无论在商品零售、制造业、电子支付、共享经济、电子商务，还是在公共媒体、现代物流和供应链管理以及食品安全追溯中，都担当着不可或缺的重要角色。

第一阶段：20 世纪 80-90 年代前期，技术起源阶段

1987 年，David Allais 在 Intermec 公司开发了 Code 49。

1988 年 5 月，Dennis Priddy 和 Robert S. Cymbalski 在 Data Matrix 公司发明了 Data Matrix 码，成为最早的二维矩阵码。

1989 年，一维条码 Code128 的发明人 Ted Williams 开发了 Code 16K。

1990 年，美国 Symbol Technologies,Inc.的王寅君在缝合算法的基础上开发了 PDF417 条码。

1992 年，Ted Williams 发明了 Code One,成为最早作为国际自

动识别制造商协会(AIM)标准公开的二维条码。

1994 年 9 月，日本 Denso 公司研制出 QR Code 矩阵码，成为最早可以对汉字进行编码的条码。

第二阶段：1996-2005 年，技术研究和试用阶段

美国、日本、中国等国家开始研究二维码技术和应用，如美国在军事装备管理方面应用二维码，日本在汽车零部件生产方面应用二维码，中国则把“二维条码新码制开发与关键技术标准研究”列入国家“十五”重大科技专项，研制完成二维条码标准《汉信码》。

第三阶段：2006-2010 年，应用探索阶段

欧洲、美国、日本、韩国、中国等国家开始在物品包装、公共交通、移动营销、旅游等公众民生领域应用二维码。

尤其 2009 年，中国铁路火车票上印制二维码，正式拉开二维码在重要行业领域大范围应用的序幕，二维码开始走进中国民众的视野。

第三阶段：2011-2017 年，开放应用和产业规范阶段

二维码有着基础且重要的作用。各国都十分重视二维码技术研发、

智能手机和 3G、4G 网络的普及，加速了二维码产业发展，中国互联网企业腾讯、阿里巴巴分别推出“扫一扫”和二维码支付等业务，迅速引爆二维码应用市场，二维码在中国进入开放应用阶段。

这一阶段，中国二维码应用后来居上，超过了欧美日韩等国家，占据了全球90%以上市场。同时，随着二维码开始渗透到社会生产生活各个方面，中国开始逐步推动行业规范发展：

2013年，中国二维码注册解析公共服务平台上线；

2014年，二维码专业研究机构中关村工信二维码技术研究院（ZIIOT）正式成立，二维码对象标识体系IDcode正式发布，二维码标准规范体系开始建立；中国的海尔集团首先使用了该标准，目前IDcode体系已经在中国、韩国、印度等全球几十个国家开始使用；

2015年，中国发布了全球第一个二维码评价认证体系；随后，中国开始在各领域推广实施二维码标准及认证评价体系。

同时，各国也在积极布局，且拥有的相关专利数量十分可观，但由于二维码的核心编码技术基本趋于成熟，这些专利多数是在其他技术分支上的创新。

第五阶段：2018年起，全球标准化发展阶段

随时物联网的发展，社会的运行模式和民众的生活方式正在发生革命性改变，二维码取代一维码成为贸易流通和结算的载体和符号成为不可逆的趋势，全球标准化发展势在必行。

2018年8月，ZIIOT获得国际标准化组织（ISO）、欧洲标准委员会（CEN）、国际自动识别与移动技术协会（AIM ）三大国际组织共同认可，正式成为全球二维码标识代码发行机构，发行代码为“MA”。

ZIIOT研发的IDcode体系成为国际标准《ISO/IEC 15459 信息技术 自动识别与数据采集技术 唯一标识》组成部分。

同时，为推动IDcode标准体系的全球应用，ZIIOT主导成立统一二维码标识注册管理中心（UTC Global），负责向全球用户发放二维码标识，专门开展国际二维码代码发行运营服务、标准制订、认可评定体系建立等工作。这标志着全球二维码有了统一编码体系，建立了统一注册服务体系，整个行业开始进入标准化发展和互联互通阶段，将引导二维码技术在全球贸易便利化、产业价值链重塑和数字经济发展中发挥重要作用。二维码发展到现在，已成为移动互联产业中关键流量入口和交互介质，同时还在不断催生出新的模式、业态和产业，是数字经济的重要组成部分。可以预见的是，二维码产业未来一定是全球性的互联互通。

（二）二维码技术应用产业发展情况

1. 二维码技术标准情况

二维码定义

二维码（two-dimensional code）是用某种特定的几何形体按一定规律在平面（二维方向上）分布的图形来记录数据的信息技术，在代码编制上巧妙地利用构成计算机内部逻辑基础的“0”、“1”比特流的概念，使用若干个与二进制相对应的几何形体来表示文字数值信息，通过图象输入设备或光电扫描设备自动识读以实现信息自动处理。

二维码的特点

二维条码是较为经济、实用的一种自动识别技术，具有输入速度快、可靠性高、采集信息量大、灵活实用、自由度大、设备结构简单、成本低等优点，同时还具有可表示数字、文字、图像、音视频等信息、保密防伪性强等优点。

二维码技术是在一维条码技术的基础上诞生的一项衍生技术。国际上对二维码技术的研究始于 20 世纪 80 年代末，已研制出多种码制，全球现有的一维码、二维码码制多达 250 种以上。美国讯宝科技公司（Symbol）和日本电装公司（Denso）都是二维码技术的佼佼者。目前得到广泛应用的二维码码制国际标准有 QR 码、PDF417 码、DM 码和 MC 码，见图 1.1。

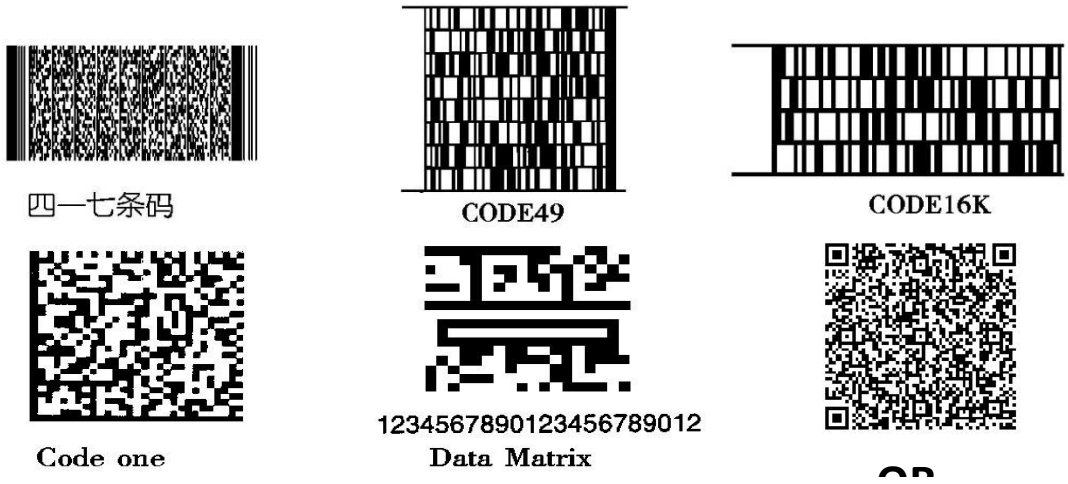


图 1.1 国际主要二维码码制

上世纪 90 年代，中国引进二维码技术，对几种常用的二维码技术规范进行了翻译和跟踪研究,并自主研发了一些码制技术，目前已开展应用的主要有 GM 码、CM 码、汉信码和龙贝码等，见图 1.2。

图 1.2 中国主要二维码码制

目前从全球来看，二维码技术应用标准体系还不健全，主要体现在：一是标准不成体系；二是标准分散，尤其是各行业的应用标准；三是各国标准之间不统一、不互通。

2. 编码及二维码标识应用情况

伴随着工业互联网、物联网、人工智能、大数据、云计算等新技术的发展，作为万物互联标识身份的基础代码资源管理成为全球发达经济体竞争的关键领域，以二维码等介质为载体的万物互联标识正在全球大面积普及，逐步发展成为万物互联的核心代码标识之一。

中国国家药监局 2018 年 12 月 25 日发布了医疗器械行业标准《医疗器械唯一标识基本要求》，实施日期为 2020 年 1 月 1 日，相关的法规《医疗器械唯一标识系统规则》和标准《医疗器械唯一标识系统术语与定义》《医疗器械唯一标识数据库基本数据集》也即将发布，标志着中国医疗器械行业全面实施医疗器械唯一标识已成定局。

《医疗器械唯一标识基本要求》中提出标识的唯一性是基本原则，对于采用序列号生产控制的医疗器械，医疗器械唯一标识的唯一性应指向单个产品，可通过符合国际标准，如 ISO/IEC 15459-4 和

ISO/IEC 15459-6，或者通过其他适当的方式实现。此标准充分考虑到企业全球化的发展需求，体现了标准的国际兼容性和互通性。中关村工信二维码研究院（ZIIOT）作为全球代码发行机构参与了本标准制定的研讨和试点工作，其牵头制订的 IDcode 标识体系是 ISO/IEC 15459 系列国际标准的组成部分。

在工业互联网领域所连接的对象是多种多样的，采用的标识体系存在不兼容、相互矛盾的问题。包含各种对象，比如物品，虚拟，对象：人、组织等等，而且每一种对象本身标识体系也存在很多种方案。比如在制造领域存在着多种对象，包括人员、组织、设备、信息等等，怎样把这些对象进行互联，是工业互联网首先要解决的一个问题，我们把互联网和工业互联网标识体系做一个比对。大家都知道正是因为 TCP-IP 协议的应用，才使全世界计算机能够连起来，互联网才成为可能性，要在工业互联网领域将大量的对象连接在一起，同样需要统一的标识体系，这是工业互联网能够产业发展的一个首先要解决的基础设施的问题。

欧盟防伪指令 2011/62 / EU，自 2019 年 2 月 9 日后在欧盟上市的药品需要具备安全功能——唯一标识符（UI），以二维码的形式；并配备防篡改装置（如开盒留痕签）。关于二维码的打印质量，要求达到 ISO/IEC 15415 1.5 级（C 级），否则生产商需要提供合理说明。强调制造商有责任确保 UI 在整个生命周期内的可读性和完整性。因此，必须以合适的方式检查二维码的可读性和正确性，考虑二维码和防篡改功能的在货架期内稳定性。

3. 二维码应用发展情况

二维码作为一种高容量信息存储、传递和识别的技术，自诞生之日起就得到了美国、德国、日本、中国等国家的关注，不仅应用于证件、票据、商品及货物管理，而且也应用于工业生产自动化管理，与此同时，条码技术提供商如霍尼韦尔等开发的二维码设备、软件与检测设备等，迅速占领了国际市场。

相比二维码在发达国家的广泛应用，20 世纪初期，二维码在中国的应用相对滞后。中国二维码应用主要集中在企业无线营销、电子票证、个人手机用户等，以及少量的行业解决方案，大范围的城市级应用少之又少。二维码在中国第一次大范围的应用是 2009 年新版火车票的发售。目前，二维码在中国食品安全、公共交通、产品防伪溯源、媒体出版、仓储物流、企业营销等领域已得到了较为广泛的应用。

中国申通地铁集团称自 4 月 19 日起，合肥、上海两地城市轨道交通二维码乘车实现互联互通，这是继“沪杭甬”“沪-温”地铁二维码实现互通后，安徽的城市轨交首度加入长三角城轨互联互通。据统计，目前“Metro 大都会”APP 累计下载已超过 1852 万次，累计注册用户超过 1400 万人，平均日活用户数接近 150 万人。其中，约 25 万人开通了“沪-杭”“沪-甬”等乘车二维码互联互通，每周有近万名用户新增开通跨省市的二维码互通服务。预计 5 月底前，沪、杭、合、甬、温这五城轨道交通企业将进一步协作推进各座城市之间的二维码互通，未来也将争取进一步扩展覆盖长三角其他主要城市地铁，

惠及更多长三角市民，进一步推进长三角交通一体化发展。

二维码成为物联网关键技术，引起传统 IT 龙头纷纷涌入，直接加速产业结构的变革。目前二维码产业参与者主要包括：码制/编码体系提供方、识读设备/软件厂商、应用系统开发商、信息服务提供商和各类用户。全球来看，大型设备厂商如霍尼韦尔等主导着识读设备市场，行业应用系统存在小贵乱散的局面，在移动互联、电子商务方面应用较好，信息服务、质量保证、认证、保险、检验检测等配套产业相对落后。

WiredRelease COMTEX 2 月 09 日消息，Market.us 最近发布了一份关于"全球条维码读取器市场"的研究报告。涉及类型（光学成像仪条形码扫描器和激光条形码扫描仪），应用（一维条码和二维条码),市场评估，竞争情景,重要企业以及 2019-2028 的趋势和预测。

国际上，海尔、沃尔玛、丰田、苹果、阿里、腾讯等一些大型企业开始将二维码技术应用于企业管理、营销、支付等领域，中国成立第三方行业组织开展二维码行业管理服务工作。从 2012 年初开始，中国先后成立了二维码专项工作组、二维码院士工作站、二维码技术研究院、二维码注册认证中心等行业第三方力量，在二维码产业研究、标准建设、技术产品整合、应用示范、宣传推广等方面取得了一定成果，ZIIOT 建设的二维码注册认证公共服务平台在中国各地区取得了广泛的应用，涵盖工业制造、农业生产、交通物流、食品安全、城市管理、文化传播等多个领域，行业影响力和公共服务能力日益提升。

二维码在发达国家尤其日韩得到了高度普及，广泛应用于银行、国防、海关、税务、公共安全、交通运输、民用商品等领域，上自城市管理服务体系，下至民众日常生活服务，都得到了行之有效的普及应用。

流水线二维码设备也就是固定式二维码扫描器，用于读取流水线上产品的二维码标识信息，以取代人工识别，提高效率，搭配软件操作显示屏和触发及报警装置，再加上软件标识自动检测系统。可以用于生产线上重码检测判断、缺码或少码检测判断，确保商品在出厂后标识零差错。

中国国家信息中心发布了《中国共享经济发展年度报告（2019）》，报告显示，2018 年共享经济市场交易额为 29420 亿元，比上年增长 41.6%；平台员工数为 598 万，比上年增长 7.5%；共享经济参与者人数约 7.6 亿人，其中提供服务者人数约 7500 万人，同比增长 7.1%。共享经济推动服务业结构优化、快速增长和消费方式转型的新动能作用日益凸显。

尤其是，生态系统中各单个环节的应用条件已经具备并逐渐开始开展一些应用，更需要一个使二维码产业有应用、有发展，实现规模效应和产业集聚能力的国际化组织，能把各环节串联起来，形成成熟的、稳定的产业链体系和机制，推动二维码产业生态在全球经济发展中发挥出巨大的作用。

4. 二维码产业的管理情况

二维码在中国的应用程度有目共睹，不断拓展新领域和新方向是大势所趋，每一项与二维码相关的优质技术都有望带来巨大的经济效益，需要广泛应用。在此情形下，以“兵戎相见”来解决二维码治理或许不是最佳途径，让全球二维码产业链中的各方都能实现互利共赢，才是更需要迫切解决的问题。

2018 年 8 月，ZIIOT 获得国际标准化组织（ISO）、欧洲标准委员会（CEN）、国际自动识别与移动技术协会（AIM ）三大国际组织共同认可，正式成为全球二维码标识代码发行机构，发行代码为“MA”。ZIIOT 研发的 IDcode 体系成为国际标准《ISO/IEC 15459 信息技术 自动识别与数据采集技术 唯一标识》组成部分。

同时，为推动 IDcode 标准体系的全球应用，ZIIOT 主导成立统一二维码标识注册管理中心（UTC Global），负责向全球用户发放二维码标识，专门开展国际二维码代码发行运营服务、标准制订、认可评定体系建立等工作。这标志着全球二维码有了统一编码体系，建立了统一注册服务体系，整个行业开始进入标准化发展和互联互通阶段，将引导二维码技术在全球贸易便利化、产业价值链重塑和数字经济发展中发挥重要作用。

2019 年 3 月 5 日，根据中国国家市场监督管理总局的统一部署，从 3 月 1 日起，全国市场监管部门统一启用和换发新版营业执照，并增加二维码功能。扫描二维码可以快速查询该企业的公示信息，方便社会各界了解企业情况，进一步扩大营业执照在社会管理领域的应

用，为企业自律、部门监管和社会共治奠定基础。

（三）二维码在全球产业升级中的战略地位

当前，二维码已经成为信息高速路上人与人、人与物、物与物之间互联互通的重要标识和入口技术，未来几年将继续保持高速的成长态势，二维码有逐步成为新的产品标识和国际物品流通、移动互联交互的技术手段的趋势，由其催生的新产业新模式新业态不断涌现，渗透到国民经济与社会生活的各个领域，成为全球经济活动创新与增长的重要驱动技术，二维码具有成长为万亿级规模产业的巨大潜力价值。

同时，随着移动互联网、物联网的发展和智能终端的普及应用，网络安全正从对 IP 地址的控制管理转为对网络入口的安全控制管理，二维码成为实现网络入口和网络空间安全管控的重要技术手段和新型介质载体，是网络安全体系的重要组成部分。以二维码为代表的信息技术直接关系到全球信息网络安全、社会管理运行和经济产业发展，推动二维码标准化普及应用和产业聚集化规范发展是培育经济新动能，保障全球信息安全的重要举措。

加快发展二维码技术应用，是企业提高效率、拓展市场、创新经营模式和提升品牌形象的有效手段，是提升产业和资源的组织化程度、转变经济发展方式、提高经济运行质量和增强国际竞争力的重要途径，对于优化产业结构、支撑战略性新兴产业发展和形成新的经济增长点具有非常重要的作用，对于满足和提升消费需求具有十分重要

的意义，对于经济和社会可持续发展具有愈加深远的影响。

（四）全球二维码产业发展趋势

当前，全球信息技术高速发展，二维码成为全球新的物品标识技术、全球贸易的通行证和重要信息基础设施，是国际运输和贸易便利化的重要基础，是国际信息互换、监管互认、执法互助的技术支撑载体，迎来了前所未有的战略发展机遇，二维码的产业化、聚集化、全球化发展成为重要课题。

新一轮科技革命的兴起极大改变了世界产业格局，二维码作为物品标识、重要信息载体、移动互联入口，其应用广泛深入生产生活各个领域，预计到 2020 年二维码及产业相关应用规模达到万亿量级。以物联网、大数据、云计算为代表的新一代信息技术以及以“互联网+”为代表的新的经济形态及运行模式正在成为新的经济引擎，全球主要经济体国家均发布相关政策推动产业发展。日本与韩国分别提出了“U-JAPAN 战略”与“U-KOREA 战略”，美国提出“智慧地球“发展战略，欧盟也制定了欧洲物联网发展战略计划，中国则制定物联网、互联网发展战略，迅速成为全球二维码应用第一大市场。

加强世界各国的沟通、协调、合作，推进建立全球贸易新秩序、应对世界产业格局变化、共享新科技革命成果交流各国智慧和方案，构建全球产业健康发展共同体，是全球二维码产业新动能发展的不竭动力。

三、IDcode 介绍

（一）背景

随着二维码技术在各国的广泛应用，全球范围内二维码标准不互通、体系不统一等突出问题日益凸显，如不同编码体系之间、不同码制标准之间、同一码制标准下不同应用系统之间不能互联互通，严重影响行业应用效率和用户的使用，导致应用很难规模化推进。二维码的全球化、标准化发展日益成为影响二维码更好支撑全球贸易便利化、产业价值链重塑和数字经济发展的关键因素，所以亟需建立统一的编解码体系来完善行业应用环境和发展环境。

从 2012 年起，国际二维码相关机构开始研究二维码行业标准互通问题，ZIIOT 在与有关国际组织研讨基础上，提出了二维码对象标识体系（IDcode）的设想，研究建立了二维码统一编解码体系和互通机制，使二维码能够在全球范围内对“人、事、物”对象进行唯一标识。

（二）IDcode 基本概念

IDcode（Identity code），是实现各种不同对象标识统一管理的一种体系，用于对任何类型的对象（人、事、物）进行全球唯一二维码身份标识，即“身份证”。

IDcode 具有三大核心价值：

（1）身份标识：为每一个对象（人/事/物）分配一个二维码的全球唯一身份标识，是“对象”的二维码身份证。

（2）互联互通：制定了不同码制、编码体系、应用系统之间映射和互联机制，实现了跨地域、跨平台、跨系统、跨码制之间的互联互通。

（3）安全防护：为公众提供安全的移动互联网交易交互环境，为企业提供公信力的信息化安全应用工具。

（三）IDcode 理念和特征

与其他标识机制相比，IDcode 具有面向多种对象、与对象的相关特性信息相关联、兼容现有的各种标识机制、分层灵活、可扩展性强等特点。IDcode 的技术优势体现于多个方面：

编码科学

IDcode 具有分层灵活、可扩展性强等特点，适合作为不同编码机制之间转换的桥梁，具有国际通用性。

IDcode 兼容性强，具有很好的易用性，能够兼容国内外主要编码体系，用户可以直接采用其他编码体系或自定义编码方式，在编码方面只作微小改动即可。

IDcode 本身还具有很强的语义性，规范了编码的结构和语义描述，这为今后形成大数据、进行大数据挖掘和分析奠定了基础。

安全可控

IDcode 通过统一注册和解析前后两个端口，实现了统一二维码标识全生命周期的管控。同时，在实际应用中，ZIIOT、UTC Global

维护顶层 IDcode 标识，各个单位负责该单位分支下的 IDcode 维护工作，实现自我管理和维护。

体系互通

IDcode 制定了不同码制、编码体系、应用系统之间映射和互联机制，实现了跨地域、跨平台、跨系统、跨码制之间互联互通，有效解决应用孤岛和系统继承性开发问题，实现内部功能链无缝衔接、外部供应链顺畅贯通。

身份唯一

IDcode 在兼容多种码制和编码体系的同时，为所有对象分配统一且唯一的二维码身份标识，即“二维码身份证”，具有全球唯一性。通过 IDcode，可以得到该对象的相关特性、信息。

开放共享

IDcode 通过向社会开放标准化技术接口实现二维码产业内科学分工，各角色用户简易调用接口即可应用，从而实现对整个产业链进行良好支撑。

四、IDcode 技术与标准化

（一）IDcode 编码规则

IDcode 编码结构符合国际标准《ISO/IEC 15459 信息技术 自动识别与数据采集技术 唯一标识》，为树状结构，分为三部分：

第一部分为用户根，由四个节点组成，第一个节点根标识符“MA”，

是 ISO、CEN、AIM 三大组织共认的全球代码；第二个节点国家地区代码符合《ISO 3166-1:2013 代码为各国及其分支机构的名称表示 第 1 部分：国家代码》；第三个节点用户代码按用户类型编码，一般企事业单位采用各国行政区划代码或由各国自行编码，该节点依据应用需求可以扩展；第四个节点为注册顺序号，按申请顺序依次排列；

第二部分为标识对象类目，分为通用编码结构和自有编码结构两种情形，通用编码结构由三个节点组成（见图 4.1），自有编码结构节点数量由用户定义（见图 4.2）；

第三部分为自定义标识对象个体编码，用户根据应用的需求自定义节点数量和每个节点的位数。

第一部分与第二部分之间以“.”或“/”符号隔开，第二部分与第三部分之间以“.”或“/”符号隔开，每一部分的节点与节点之间以“.”符号隔开。

IDcode 编码支持阿拉伯数字、英文字母组合。数据结构示意图见图 4.1（通用编码结构）、图 4.2（自有编码结构）。

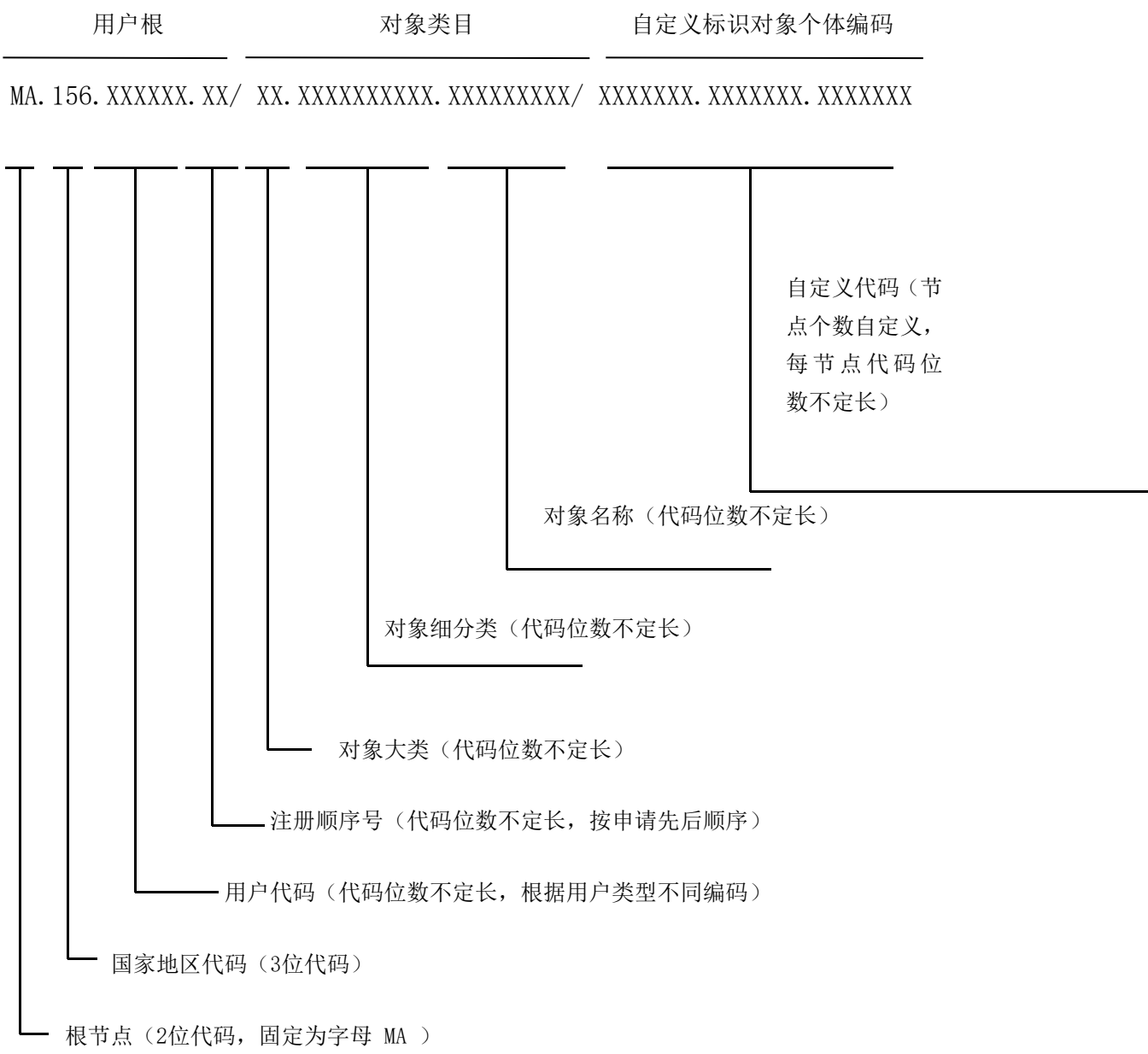


图 4.1 二维码标识编码数据结构示意图（通用编码结构）

例如：MA.156.110101.8/20.36550104.01/20170630.0010

其中 MA.156.110101.8 表示单位根，20.36550104.01 表示对象类目，20170630.0010 表示自定义标识对象个体编码。

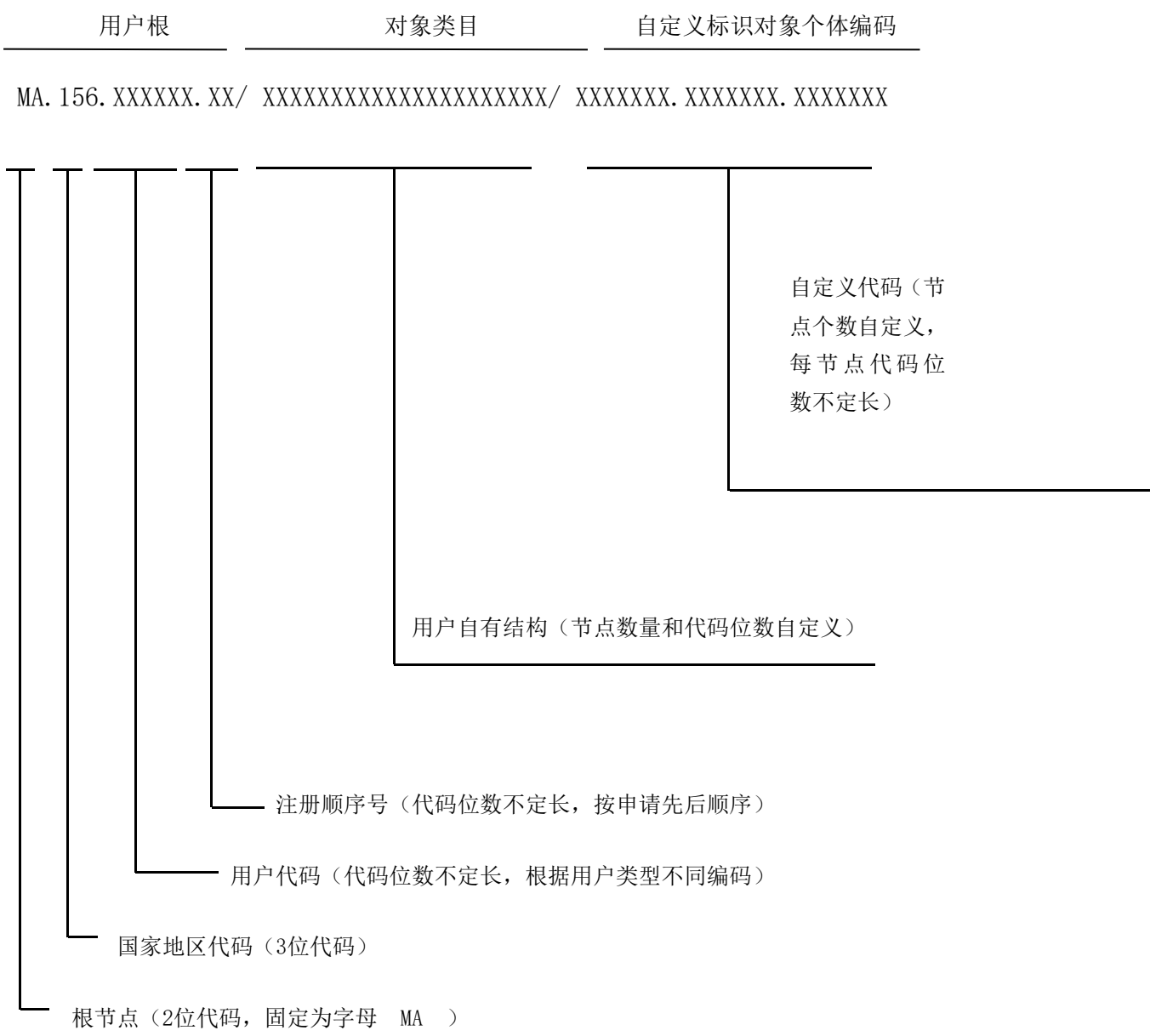


图 4.2 二维码标识编码数据结构示意图（自有编码结构）

例如：MA.156.110101.8/203655010404/20170630.0010

其中，MA.156.110101.8 表示用户根，203655010404 表示用户自有对象类目，20170630.0010 表示用户自定义标识对象个体编码。IDcode 具有分层灵活、良好的兼容性、可扩展性强等特点，适合作为现有各种编码体系之间进行交换的元标识机制，可以支持各种码制二维码，如 GM 码、龙贝码、汉信码、QR 码、DM 码等；兼容支持各种编码体系，如 OID、Handle、Ecode 等编码体系，政府部门、行业机构制订的编码体系以及各单位主体自定义的、个性化的编码体系。

（一）IDcode 解析网络

IDcode 平台基于区块链技术搭建分布式的全球二维码标识链网络（GICN）,在全球范围内建设分布式的、区域性的、多层级的标识节点。解析时，由标识节点依据编码信息对标识对象进行的结构化定义和描述，在时间、空间和行为多维度上对其进行内容解析，然后通过全球二维码标识链网络（GICN）实现所有标识节点间数据同步。

（二）IDcode 安全特性

IDcode 安全特性体现在两个方面：一是生成端安全，自身编码结构科学实现了二维码标识的全球唯一性和可追溯性，同时建立了病毒库过滤机制保证了二维码生成时安全可靠；二是解析端安全，同样建立了病毒库过滤机制，能够及时屏蔽、禁止非安全内容的解析，而且出现安全风险后能够及时、准确、迅速定位到二维码的申请主体和使用主体，并采取屏蔽访问或下线处理等应急措施，保障解析过程的安全。

（三）IDcode 标准研制

2016 年 7 月，ZIIOT 基于 IDcode 体系提出二维码标准综合框架体系（见图 4.3），开始组织制订二维码行业各类标准，包括二维码对象标识符编码规则等基础标准，还开展了交通运输、农业装备、铁道设施、家电维修、追溯服务、电子车牌、居民健康卡等不同领域二维码应用标准以及认证标准制定工作。

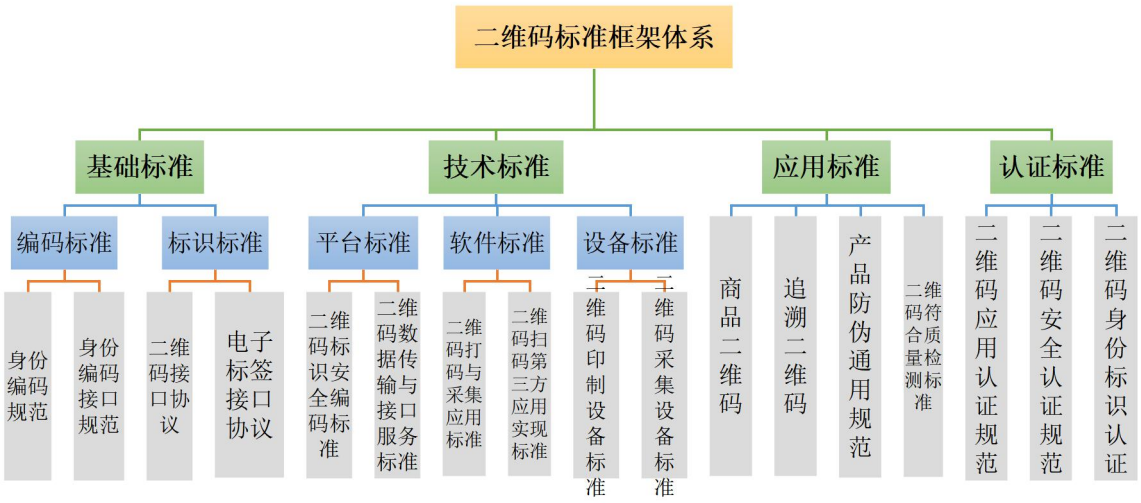


图 4.3 二维码标准综合框架体系

2018 年 8 月 1 日，IDcode 编码体系成为《ISO/IEC 15459 信息技术 自动识别与数据采集技术 唯一标识》系列国际标准的组成部分，ISO/IEC 15459 系列标准是国际通用且是应用最广泛的编码和标识标准。基于 IDcode 编码体系参与或组织制订了中国 YY/T 1630-2018《医疗器械唯一标识基本要求》行业标准，T/CIIA 001-2018《追溯通用技术要求》、T/CIIA 002-2018《追溯服务管理要求》、T/CECC 3-2018《二维码对象标识符通用要求》团体标准以及 CQC9221-2016

《二维码注册认证平台评价技术规范 二维码应用管理 要求》评价类标准等，联合中国相关部委机构制订交通运输、药品追溯监管、农业装备等20多项行业标准，计划通过3年时间建立起完备的二维码标准体系。

五、IDcode应用与管理

IDcode体系面向全球服务，为各类用户提供二维码身份标识注册、解析、平台应用和认证等应用服务。

（一）IDcode注册

任何类型单位主体用户无论有无二维码，均可注册申请IDcode，用户可以通过网络（全球官方网站：www.idcodeglobal.com）自助注册或前往各个国家注册机构提交相关资料现场注册。

首先，单位主体用户注册成为IDcode平台用户，即获得单位根IDcode，单位根IDcode适用于单位主体标识、介绍、宣传等用途；然后，单位主体用户为拟标识的“对象”注册对象IDcode，对象IDcode适用于对象标识、介绍、防伪、追溯、销售等用途。

（二）IDcode解析

IDcode平台提供基础解析功能，面向公众用户提供解析追溯服务。通过输入IDcode标识符，获得与标识对象相关的信息。用户通过PC客户端查询、手机客户端查询、系统插件、多种格式文档嵌入、机器自动识别等方式，获得标识对象的多种解析信息。

为了本行业内部或者各行业之间能够进行更好的数据交互，IDcode 平台提供统一的基础解析接口 API，为各行业、系统间的数据互联互通奠定基础。

（三）IDcode 平台和产业服务

以 IDcode 标识体系为基础搭建全球标识管理公共服务平台向社会提供统一的、公共的、权威的标识注册解析服务，建成了 IDcode 标识解析国际顶级节点、中国、韩国、印度、加拿大、缅甸、老挝等其他 6 个国家顶级节点，并在中国各省市建立服务机构推动各地二维码规范应用，截至 2019 年 5 月，已在中国 23 省市建立了二级节点，并在交通运输、农业机械、医疗器械、石油化工、重要产品追溯等领域组织开展了示范应用；目前已有 50 万多家机构、企业在平台进行了注册，开展了示范应用，包括海尔集团及其全球供应商、澳柯玛、广州日报、河北中烟等大型企业；注册品类 20 多万类，涵盖工业制造、农业生产、交通物流、文化传播、城市管理、食品安全等众多领域；累计应用二维码标识数量近 100 亿个。此外围绕 IDcode 标识解析体系聚集了大量行业知名专家、研究机构、技术企业和服务厂商，具备了从产业研究、架构规划、技术支撑到咨询、培训等产业服务的综合服务能力。

（四）IDcode 认可评定

IDcode 建立了认可评定体系，对从事 IDcode 体系相关的人员、企业、机构等，对其资格、能力、水平进行认可评定，分为三类：

一是人员类：包括从业水平等级、培训讲师、认可审查员、评定审查员等；

二是企业类：包括面向服务提供商（SP）的资格、标准产品等，面向应用企业的标识合规性、应用管理规范性等；

三是机构类：主要为开展 IDcode 认可评定业务的各类认证机构。

图 4.4 各类认证证书示例

（五）IDcode 注册管理

1. 全球管理发行机构——ZIIOT

ZIIOT 是国际标准化组织（ISO）、欧洲标准委员会（CEN）、国际自动识别与移动技术协会（AIM Global）三大国际组织共同认可的国际代码发行机构，发行代码（IAC）为“MA”，负责 IDcode 体系管

理维护，代码“MA”将首先用以向全球用户发放二维码标识。ZIIOT是与国际物品编码协会（GS1）、美国电气和电子工程师协会（IEEE）、万国邮政联盟（UPU）等大型国际组织并列的国际代码发行机构。

2．全球代码发行机构——UTC Global

为了履行代码发行机构的职责、更好的服务全球，ZIIOT 主导成立了“统一二维码标识注册管理中心（UTC Global）”向全球统一提供二维码代码发行和注册服务，是 IDcode 体系的管理机构，负责开展国际二维码代码发行工作、认可评定体系建立等工作。UTC Global 成为全球二维码代码发行机构，在各国设立分支发行机构，包括国家代码发行机构、区域代码发行机构、行业代码发行机构、平台企业代码发行机构等，负责该区域或行业内相关工作；并基于区块链技术搭建全球码链平台（IDchain），推进全球二维码标识链网络（GICN）和全球贸易流通数字票证体系建设，构建新技术条件下的全球贸易信用体系，提升全球贸易便利化水平和流通效率。

3．各国代码发行机构

UTC Global 将在全球各国设立代码发行运营机构，目前已建立 UTC China 和正在建设 UTC Korea、UTC India、UTC Canada、UTC 老挝、UTC 缅甸等国家分支发行机构，计划到 2020 年在全球 50 个以上的国家建立分支发行机构。

（六）IDcode 国际产业峰会

举办国际二维码产业发展峰会形成国际共识。在 2018 国际二维

码产业发展峰会上，正式启动了全球二维码代码发行服务，并为印度、加拿大、韩国、老挝、缅甸五个国家机构授牌设立分支发行机构，来自俄罗斯、法国、加拿大、印度等 10 多个国家的机构代表一致同意发起成立二维码产业国际合作组织，以共商、共建、共享、共赢为宗旨，推动建设全球二维码代码发行管理机制和产业治理体系，构建全球二维码产业发展共同体，以二维码代码发行为牵引引导二维码技术产业更好服务世界、服务人类。2019 国际二维码产业发展峰会将于 8 月 23 日-25 日在佛山市举行。

六、IDcode 应用案例

（一）主要应用领域

自 IDcode 平台上线以来，已为全球几十万家政府机关、企事业单位、社会组织提供了代码注册和发放服务，在工业制造、农业生产、城市管理、公共交通、医疗卫生、产品追溯、食品安全、媒体出版、仓储物流、企业营销等方面得到了较为广泛的应用。IDcode 以产品标识为物品切入口，进一步帮助企业实现渠道优化、库存管理、生产管理、智能售后、跨界整合资源、精准营销等价值应用，建造从原材料加工——产品生产—运输—产品售后—终端消费一体化标识价值体系，重塑传统行业商业模式，助力经济转型。

（二）各国应用情况

1. 韩国

UTC Korea 基于 IDcode 体系，搭建了国家之间正品认证追溯系

统，为经过平台认证的商品（如化妆品）赋予全球唯一的二维码身份标识，为商品生产、配送/库存管理等全链条流程提供第三方追溯防伪认证，消费者收到商品时，通过扫描产品上的二维码，就能移动到仿造品(判定)页，即可验证产品真伪。

2. 印度

UTC India 基于 IDcode 体系，推动搭建中印进出口贸易二维码注册认证平台，为中印进出口产品提供二维码注册、认证、追溯等公共服务，构建中印进出口贸易二维码注册认证产业体系，并逐步完善形成完整的产业生态。打造中印两国标准统一、互联互通的二维码产业体系，促进“印度制造”业务开展。

3. 中国

UTC China 在交通服务、城市管理、产品追溯、供应链管理、精准扶贫服务等方面开展了二维码应用试点工作。

1）家电行业二维码标识应用支撑服务

背景：中国家电行业自 2000 年以来形成产业化、集中化发展模式，国内外先后出现知名家电品牌，如海尔、格力、奥柯玛等，市场竞争逐渐激烈起来，产品更新迭代越演越烈，随着大量新产品填充入市场，家电维修管理、与消费者信息互动等领域渐渐出现了管理真空，市场投拆不断增多，厂家面对无序生产信息无法进行质量认定与责任追踪，市场急需一种新手段解决面临的问题。

行业痛点：

（1）对于家电生产企业来说，上游主关件供应厂家太多，对其供应质量没有参考数据依据。

（2）行业内没有先例借鉴，没有标准和方法。

（3）产品生产上下游产业链信息闭塞，无法形成产品全生命周期数据。

（4）与消费者之间没有便捷有效的沟通渠道。

解决方案：利用 IDcode 编码体系对跨平台、多供应商进行统一标识，形成以产品生产制造企业为核心的上下游供应管控手段，结合主关件信息开源特性构建产品生产全生命周期信息数据，实行质量责任纳入生产链条的管理办法，落实生产责任延伸制度，让生产质量与售后质量无缝衔接，实现产品质量终身可控，确保品牌价值与品牌力量；此模式一经使用，即产生显著效果，先后被行业内多家家电企业所模仿。

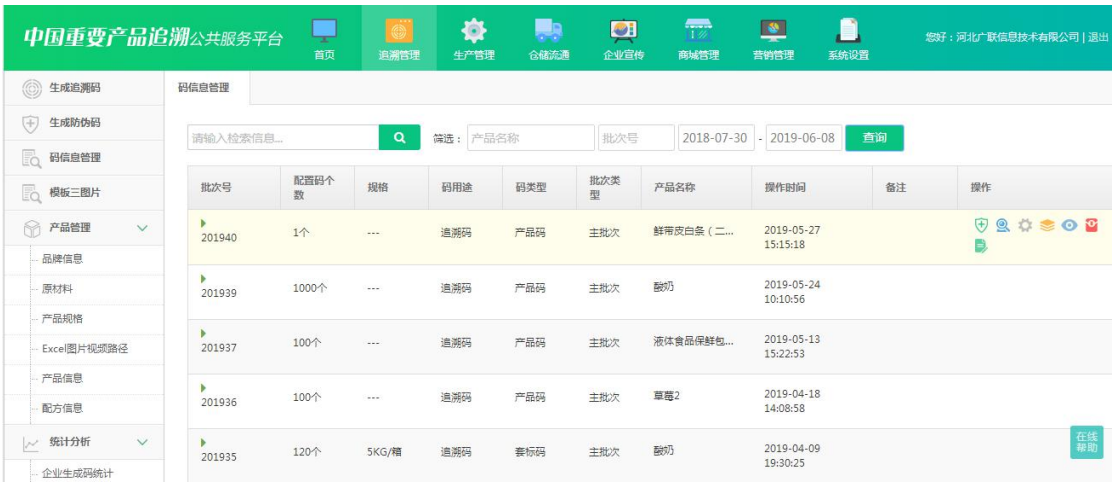
应用案例：海尔集团二维码统一管理平台。

2）农产品行业二维码标识应用支撑服务

应用案例：工信部物联网设施农业精细化管理项目、全国茶品追溯服务平台、东北人参大市场追溯平台、华英农业精细化管理项目、新疆精河枸杞追溯项目。

3）食品行业二维码标识应用支撑服务

应用案例：赤峰蒙都牛羊肉追溯、沙漠之花产品追溯、广东鳗鱼追溯。



4）药品医疗器械行业二维码标识应用支撑服务

应用案例：国家药监局医疗器械唯一标识标准试点项目、国家中医药管理局药材追溯平台、吉林医疗健康卡发放管理平台。

5）电子商务行业二维码标识应用支撑服务

背景：近年，中国电子商务发展飞快，先后经历了 B2B、B2C、020 等不同的发展时期，已经基于互联网服务形成了由原料、工厂、物流、仓储、零售组成的一套完整产业链条，但是始终无法解决信息的最后一公里问题，每个业务环节都存在多个信息孤岛，无法形成完整的产业信息链条，整个电子商务行业的防伪、追溯、信誉都处在危机之中。

行业特点：

（1）电商平台众多，从全国到本地、再到行业充斥着行色不一的电商平台，自然也潜伏着很多未知渠道。

（2）产品和交易缺失标准。

（3）渠道管理不可控。

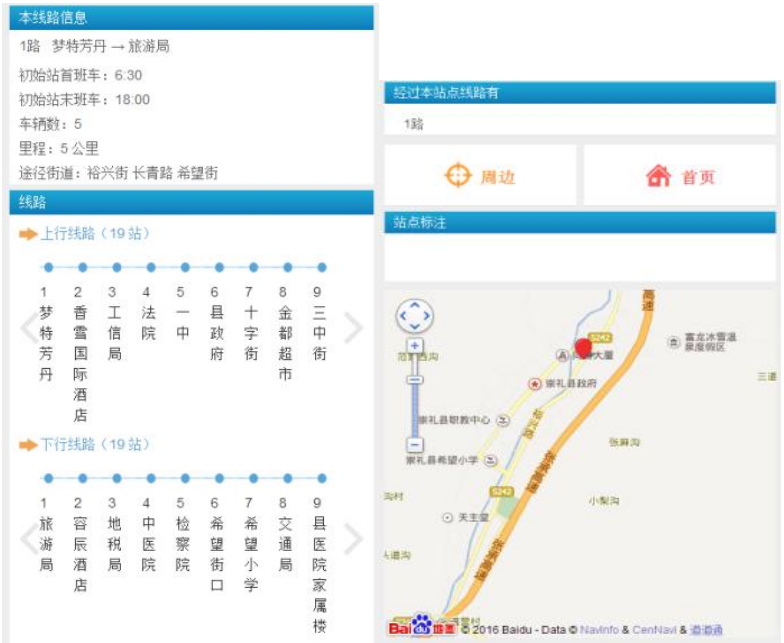
（4）产品不可控。

解决方案：基于 IDcode 编码打造产品身份标识，依托工厂主体发展 F2C 电商模式，通过区块链数字签名服务构建新型的渠道管理和物流管控模式，解决产业链全域的化信息贯通，形成行业业务信息标准，利用物联网、大数据、5G 技术的新兴和发展，真实地解决最后一公里信息的真实性和可控性，给未来电子商务行业进行一次彻底升级。

应用案例：赤峰蒙都牛羊肉追溯电商服务项目

6）交通行业二维码标识应用支撑服务

应用案例：石家庄公交、便民自行车，交通部二维码标识标准体系研究。



7）物流供应链行业二维码标识应用支撑服务

背景：目前，中国物流供应还属于粗放式的管理模式，主要体现在供需关系处理环节上，这会出现物流过程管理不当、供应流向不明不清、供应效果分配不均，最终造成资源上的极大浪费，而中国属于人口大国，人均资源占有率本就极低，这种物流供应情况是急需解决的头等问题。

解决方案：利用 IDcode 编码体系对资源、输力以及需求量进行标准化、可量化的身份标识，形成统一、及时的市场全覆盖的信息共享联动机制，对物流业务的接发环节进行物联网手段控制，实现物流业务数据节点全程数据收集控制，最终对资源数量、物流流向、需求数量做到实时掌控、实时调控、实时预警的效果。

应用案例：工信部冷链试点项目、环保部铅酸蓄电池回收管理项目

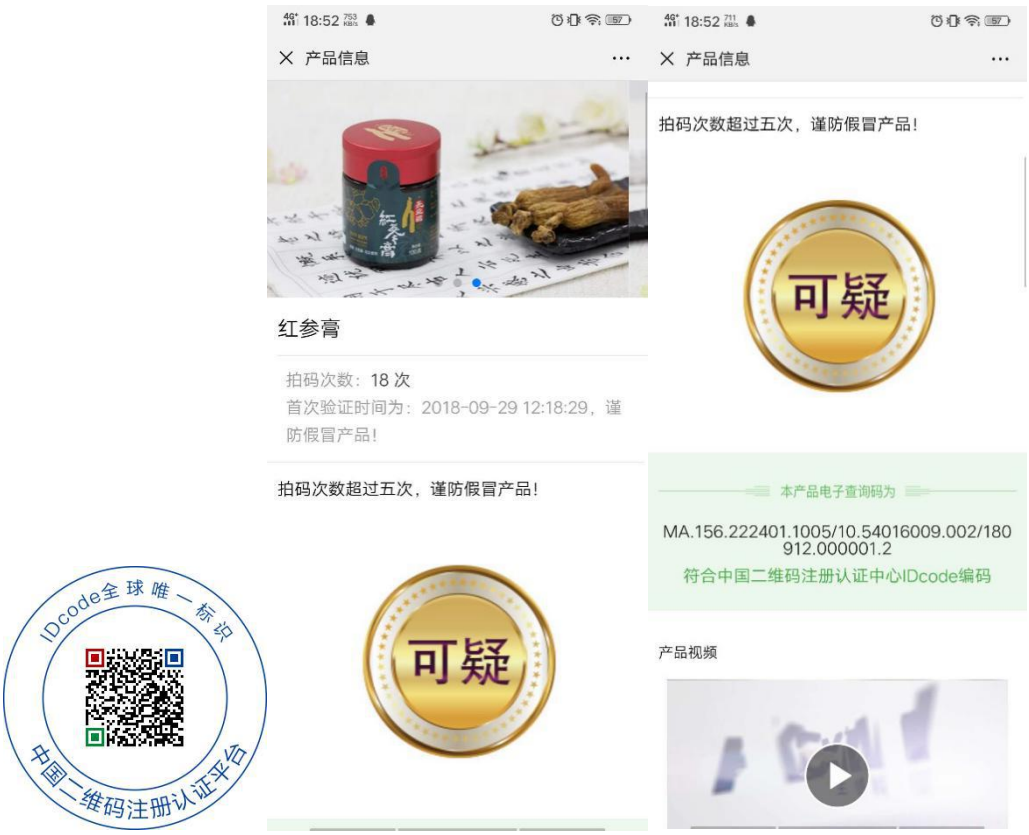
8）社区管理行业二维码标识应用支撑服务

应用案例：石家庄智慧人口管理平台、吉林公安人口二维码标识平台。

9）贸易行业二维码标识应用支撑服务

解决方案：以产品二维码身份标识作为全球贸易的最小单元信息载体，建立基于贸易业务的服务标准，包括：商品展示、物流管理、支付管理、认证溯源、信用管理、企业认证、服务监督、进出口税务管理、检验检疫，形成二维码全球贸易产品数据中心与标准服务中心，为跨国、跨区域、跨文化、跨语言的贸易提供最基础的互联网服务。

应用案例：广东中小企业二维码注册认证平台、可喜安产品管理平台。



10）营销行业二维码标识应用支撑服务

背景：中国互联网发展迅猛，新媒体行业快速崛起，以生产企业、新媒体服务商、市场主体、消费者终端四方构成的新兴市场一片繁荣，但越着兴盛过后，宣传价值被过度压榨，市场回归理性的意图日益明显，营销行业进入瓶颈期。

行业痛点：

（1）宣传价值转化率下滑严重。

（2）会员机制互不互通，全域化难度大。

（3）营销主体不清晰，联动性差。

（4）保障机制不健全，风险不可控。

解决方案：针对生产企业、营销服务商、市场主体建立认证入驻平台，对其产品、服务、资源进行身份标识，对其营销活动进行统一监管、协调和分析，构建统一营销需求管理平台，实现统一品牌、统一管理的新型营销模式。

应用案例：澳柯玛营销售后管理平台、商信通平台、飞网平台。

11）交通运输服务

UTC China 与中国交通通信信息中心共同搭建了交通运输二维码公共服务平台，实现交通运输领域二维码身份标识的统一注册、备案、

解析、管理、分发，统一交通运输行业二维码标准，推进交通运输领域二维码的标准化、规范化应用。2019 年 1 月，由中国交通信息中心和中关村工信二维码技术研究院共同承担了交通部科技司下发的《交通运输二维码标准应用研究》的任务课题（任务课题号：2019-16-061），该课题的研究填补中国在交通运输二维码标准的空白，保障国家支柱产业信息安全发展。促进交通运输行业有序发展，形成聚集效应打造行业新的经济增长点。推进行业服务体系与平台整合，规范产业市场环境与生态机制。

12）城市社区管理

基于 IDcode 体系搭建 2022 冬奥会智慧崇礼二维码公共服务平台和大数据中心，在张家口崇礼推进城市管理、人口管理、旅游信息化、交通服务、食品溯源等信息化应用，促进政府管理和公共服务有效融合，创新社会管理思想和方法，推进智慧城市和冬奥会信息化建设。

良好的社区环境，需要每一位居民的积极参与。居民只要用手机扫一扫，管理服务信息、居民邻里活动、商家经营情况等，简单便捷地实现民主管理、民主监督，有效增强社区党务、居务工作透明度，让居民真正实现在阳光下自治，零距离享受社区服务，监督社区工作。

石家庄智慧人口管理平台、吉林公安人口二维码标识平台，社区结合实际，将制作的党组织建设标准、网格管理标准、城市巡查标准、安全场所检查标准、商圈企业服务标准、物业企业管理标准等一系列的标准化体系，链接在每一个二维码中，工作人员“扫码一键清”，只需要对照标准体系处置即可，工作效率和准确性大大提升。

13）精准扶贫服务

“互联网+精准扶贫”信息服务平台是基于 IDcode 体系打造的精准扶贫信息服务平台。在扶贫工作开展中对扶贫对象、扶贫过程记录，直到完成扶贫退出贫困的全过程信息进行精细管理；同时实现村务信息化“无纸化”办公；提供面向公众的公益扶贫平台；结合农产品追溯认证体系、电商系统帮助贫困村农副产品走向线上走进城市，目前，已经在中国信阳、漯河、天门等多个城市实施。

七、IDcode 建设应用指南

（一）代码发行机构建设指南

UTC Global 制定发行机构代码分配方案，开放注册、解析服务平台接口，并制定相应的管理规程建设，包括注册受理、审查、分配、信息采集程序等工作内容，推进各类代码发行机构建设。

1．国家代码发行机构

UTC Global 对国家代码发行机构申请者的资质、申请材料进行审核，具体流程见下图：

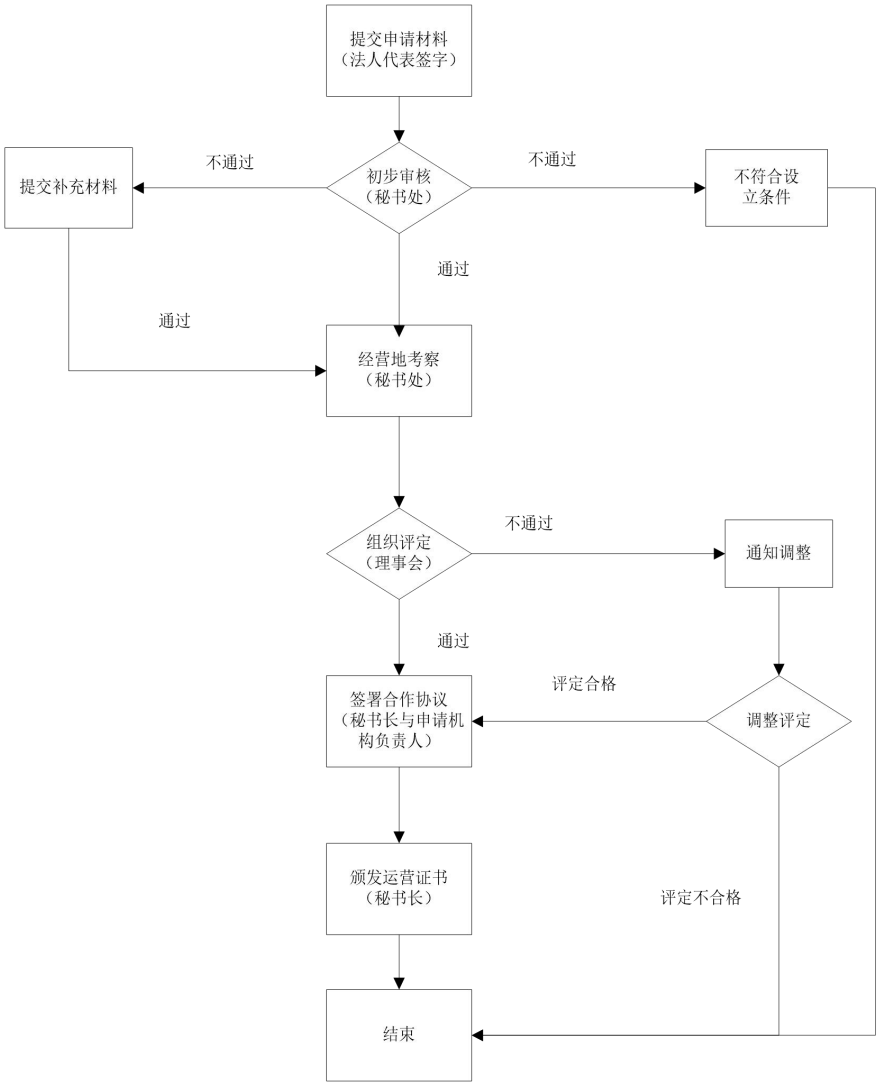


图 7.1 分支机构申请审核流程

各国家代码发行机构设立后，主要从六方面推进工作落地：

1）建设标识链节点：建设管理节点为本国及周边地区提供二维码数据上链服务及存证查证服务；建设区域、行业、平台企业等其他类型代码发行机构；

2）研究产业政策：协助政府部门或行业组织研究二维码技术应用和产业发展的政策措施；

3）制订标准：依据 UTC 标准体系组织制订当地的二维码相关标准；

4）教育培训：组织二维码产业专家开展专业培训，普及二维码产业知识和业务开展技能；

5）建设全球数据网络节点：以二维码产业体系为基础规划建设大型全球化分布式数据同步网络节点；

6）开展应用推广：结合本国优势产业和区域特性开展相关二维码应用推广。

2．其他类型代码发行机构

UTC Global 及各国分支机构对其他类型代码发行机构的申请者分配代码，开放平台标准接口，若申请者已经建立服务平台或需要新建服务平台的，则按照标准接口进行对接建设，若申请者无需搭建服务平台的，则针对应用区域或行业进行子账户设置即可。

代码发行机构设立后，首先针对所在区域或行业的应用需求展开分析，对标识对象按人、事、物进行梳理和分类，发放全球唯一二维码身份标识，即“二维码身份证”。这些对象一般包括实体对象和虚拟对象。

（二）企业应用指南

基于 IDcode 体系建设的企业应用，应依据以下步骤进行：

第一步：注册获得授权。在 IDcode 平台提交资料进行注册以获得使用授权。

第二步:获取二维码标识。用户根据自身需求,可以选择从 IDcode 平台直接获取二维码标识，或与 IDcode 平台技术对接获取二维码标识。

第三步：二维码分发解析。用户将获取的二维码标识分别发放给管理对象，并与应用系统建立关联进行解析。

第四步：应用开发。与支撑单位共同建立垂直行业细分领域的应用系统，提供行业用户全方位的应用解决方案，增强 IDocde 对行业的服务能力；

第五步：能力评定。用户可向经过 UTC 授权的第三方认证机构申请二维码应用相关的评定服务，以获得相应的能力等级。

八、展望

（一）基础网络建设

完善服务平台（www.idcodeglobal.com），加快建设全球分布式数据标识链节点，到 2020 年全球大部分国家地区节点建设完成。

（二）服务体系建设

在主要经济体国家设立代码发行机构，为当地企业用户提供 IDcode 相关服务，到 2023 年在 100 个国家建立发行机构，全球 1000

万家企业使用 IDcode。

打造行业应用资源池，针对不同行业应用领域，集中一批专业性强，有实力的行业应用方案合作伙伴，提供行业用户更全面、直接的应用服务体验。

（三）技术体系建设

依据 ISO/IEC 15459 系列国际标准和 IDcode 体系要求，组织研究制订各领域的技术标准与应用标准。

研究建立 IDcode 认可评定、检验检测等配套的技术服务体系。

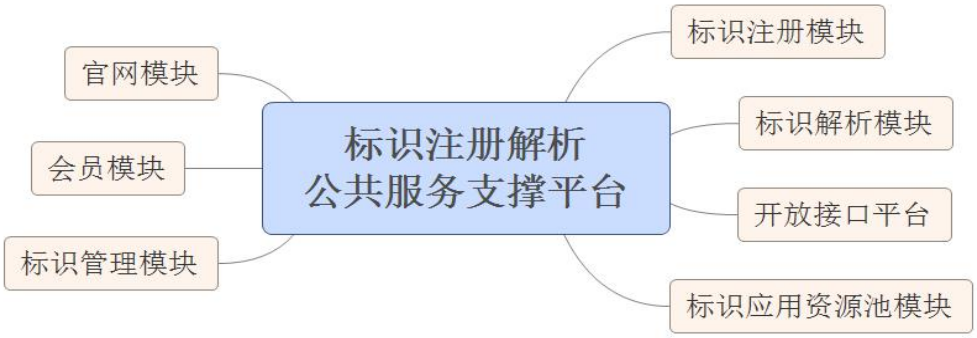


图 8.1 平台模块

(1) 网站模块:为标识解析公共服务平台提供一个官网内容发布、管理和展示服务，作为运营方的官网网站，便于对外推广和宣传。

(2) 会员模块：为用户进驻平台提供注册、登录、准入申请，运营方审核、会员行为统计等服务。

(3) 标识注册模块：为用户提供标识统一注册申请和解析设置服务。

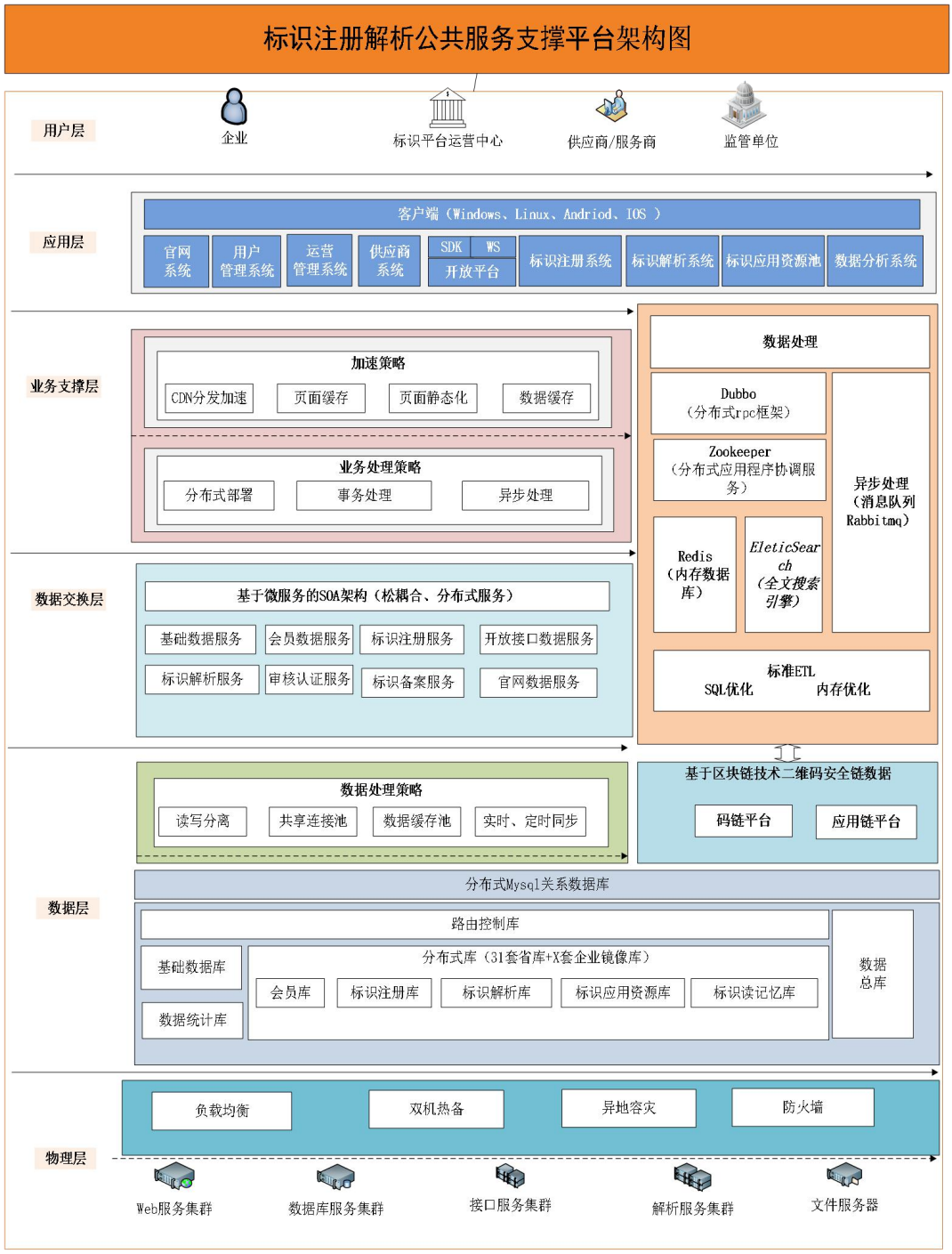
(4) 标识解析模块：为用户注册的标识提供供统一解析服务。

(5) 标识运营管理模块：为平台运营提供标识、解析管理、标识数据统计分析等服务。

(6) 标识开放平台：为技术供应商提供接口服务，便于自身应用接入平台，为企业提供标识应用一体化服务。

(7) 标识应用资源池模块（生态体系）：为应用技术服务商与使用用户提供一个对接互动平台，技术服务商的应用能发布到该资源池，使用用户可以到该资源池选择自己满足自己的应用，也可发布个性需求，便于技术服务商响应需求，建立起 IDcode 应用生态体系。

以下为平台技术架构图：



（四）产业服务

举办国际二维码交流活动，组织研讨会、展览展示，促进各国间 IDcode 技术交流和应用创新。组织编写培训教材和课件，联合各国高校、培训机构、企业等组织开展 IDcode 技术和应用人才培训。

IDcode 编码体系的应用推广，对于促进企业数字化、智能化建设，推进行业和产业健康有序发展，培育和扶植一批创新型企业，促进工业互联网产业聚集有着多重效益。

(1)M2M、车联网市场最具内生动力，商业化发展更加成熟。市场需求、成本、标准化、技术成熟度、商业模式是影响物联网应用规模化推广的主要因素，M2M 和车联网市场内生动力强大，相关技术标准日趋成熟，全面推广的各方面条件基本具备，将成为物联网应用的率先突破方向。

(2)在工业领域，工业领域提出的“数字孪生”“数字化映射”“增强现实”等概念和技术，都是将使用环节的信息进行数字化，并融入到产品/设备的生命周期管理中进行分析和预测，以进一步提升工业设备的能力和价值

(3)行业应用仍将持续稳步发展，蕴含巨大提升空间。行业应用仍然是物联网发展的重要领域。在工业、农业、电力、交通、物流、安防、环保等行业领域，物联网应用提升的空间广阔。

(4)万物互联时代全面开启，全球互联网连接增长步入动力转换阶段。全球互联网正从“人人相联”向“万物互联”迈进，物联网作为互联网的网络延伸和应用拓展，实现对物理世界的感知识别、实时控制、精确管理和科学决策。

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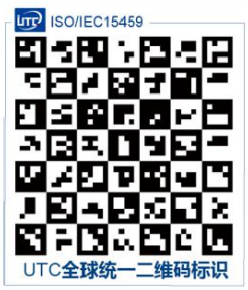
电话：86-10-68207646

86-10-68207542

邮箱：info@idcodeglobal.com

网址：www.idcodeglobal.com　　www.idcode.org.cn



International Two-Dimensional Code Object Identifier System (IDcode)

White Paper

(2019)

Zhongguancun Industry & Information Research Institute of Two-dimensional Code Technology (ZIIOT)

Unified Two-dimensional Code Registration Management Center (UTC Global)

August 2019

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Preface

Since two-dimensional code technology came out in the 1980s, it has been gradually applied to many fields of economy, trade and social life with the development of communication network and intelligent terminal devices. Now it has become a key technology for the establishment of global supply chains, intelligent data chains and industrial value chains as well as a new supporter and symbol of goods circulation and trade settlement. It is an important driving technology for the innovation and growth of global economic activities. New industries, new models and new forms of business spawned by it are emerging and changing the way people live and work.

Currently, global development of two-dimensional code industry presents three trends. First, two-dimensional code technology develops rapidly across the globe. Two-dimensional code system technology, encoding technology, reading and resolution technology and storage technology are relatively mature, stable and diversified, and are being increasingly optimized and improved with the development of external factors, such as mobile network, intelligent terminal, etc. Second, global application of two-dimensional codes is increasingly widespread. Two-dimensional code is becoming a new object identification

technology, a mobile interconnection access and a settlement supporter for trade circulation. It permeates into all areas of global economy, trade and social life, arousing much attention from many governments. Third, global demand for unified and coordinated development of two-dimensional code begins to emerge. As two-dimensional code standards and systems in many countries are not yet interconnected, globalized and standardized development of two-dimensional code increasingly becomes a key factor for it to better support global trade convenience, remodel industrial value chain and develop digital economy.

Identification system is an important infrastructure that supports the standardization, globalization and industrialization of two-dimensional code. IDcode, a two-dimensional code object identification system put forward by ZIIOT after research and approved by ISO, CEN and AIM, is an integral part of the international standard of *ISO/IEC 15459 Information Technology - Automatic Identification and Date Capture Techniques - Unique Identification*. Each object (person, thing, item) is assigned with a globally unique identification of two-dimensional code, namely, a two-dimensional code ID. With flexible layering, good compatibility and strong expansibility, IDcode is suitable as a meta identification mechanism for exchanges among various existing encoding systems.

This white paper specially analyzes the development status and trend

of global two-dimensional code industry, comprehensively introduces the origin, standard development, application and management of IDcode technology, sorts out some application cases, and puts forward IDcode building and application guideline to guide the building and application of identification systems in various industries of different countries and regions.

Editorial Board

Contents

I. Development of Internet of Things and encoding identification technology

Information technology brought by Internet of Things (IoT) has swept the world, in the era of interconnection of everything, the scope of interconnection among objects directly determines the industrial value of IoT. IoT is based on data operation. It is necessary to compile each object into a specific data identifier and assign a unique ID number for each object so that accurate interaction between objects through the ID number can be possibly realized in the process of huge data information transmission.

A unique identity must be:

A. Global

It cannot be only identifiable in one region or province, but not in another region or province. It cannot be only identifiable in one country, but not in another. It must be a global standard. IoT domain name should be assigned globally and connected globally. It should be an international standard widely recognized, widely used, especially with international fairness, and not controlled by a few countries.

B. Independent and Safe

Each country has the independent intellectual property rights of its IoT domain name, which embodies fairness. South Korea, Japan, India

and some European countries have developed their own object identification system with independent intellectual property rights on the basis of IoT domain name system, which can be seamlessly connected with the whole world. This independent intellectual property rights and independent resolution system also greatly increase the security of IoT domain name.

C. Applicable to Virtual and Physical Objects

Not only physical objects, but so virtual ones can be connected, such as an electronic document or a complex network platform. IoT domain name has been used in computer network for more than 20 years and is the world's most sophisticated system for identifying virtual objects. This powerful feature can mark the corresponding data of physical objects (virtual objects) in the cloud or network, so as to constitute the interconnection of non-intelligent objects in the fastest way.

The idea of encoding serialization, which combines low-cost identification technology that contains unique encoding with network technology to realize the communication between objects, has been widely accepted by industrial circles. An object must have a unique identity first, and its relevant information can be acquired through this unique identification. Unique encoding of objects is one of the important foundations of IoT. Different encoding systems grow from different

traditional factors and industrial features, such as UID encoding, EPC encoding, OID encoding, Handle encoding and so on.

Identification data are carried by two-dimensional code, RFID tag, NFC, etc. With the popularity of smart phone terminals, two-dimensional code has significant advantages including convenient use, safety, low price, large data capacity and high fault tolerance compared with electronic label. Consumers only need to scan the two-dimensional code on the label with their mobile phones to directly acquire product information. As it is more convenient and fast, it is occupying more and more market shares.

As one of the core technologies of the perception layer of IoT, which connects people and objects, objects and objects, people and network, and objects and network, two-dimensional code plays an important role in supporting and promoting the development of digital economy.

A. Storage: Storing contents, digital information and data;

B. EDI: Data capture and electronic data interchange. Transfer and management of industrial chains;

C. Entry: The best entry with the lowest cost for O2O and mobile Internet;

D. ID: Unique identification of people, things and items. Infrastructure of IoT.

II. Global development of two-dimensional code

1. Origin and development history of two-dimensional code

With the rapid development of high technology, the international economy is marching rapidly towards integration, which has greatly promoted the development of information technology. A variety of information has increased at an unprecedented speed. In order to realize the identification, rapid collection, transmission and effective utilization of information, a new storage medium of two-dimensional code technology, which is the product of mobile communication, emerged at the historic moment. Because of its characteristics of rapidity, accuracy, low cost, high reliability and large capacity, it has become the most common and practical technology in the information economy, permeating all fields of global economic development and daily life, playing an indispensable role in commodity retailing, manufacturing, electronic payment, sharing economy, e-commerce, public media, modern logistics and supply chain management, and food safety traceability.

Stage one: The technical origin stage from the 1980s to the early 1990s

In 1987, David Allais developed Code 49 at INTERMEC Inc.

In May 1988, Dennis Priddy and Robert S. Cymbals ki invented the Data Matrix Code at the Data Matrix Company, the earliest

two-dimensional matrix code.

In 1989, Ted Williams, inventor of the one-dimensional barcode Code 128, developed Code 16K.

In 1990, Wang Yinjun of American Symbol Technologies, Inc., developed PDF417 barcode based on stitching algorithm.

In 1992, Ted Williams invented Code One, which became the first two-dimensional barcode published as the standard of International Association of Automatic Identification Manufacturers (AIM).

In September 1994, Japan's Denso Company developed QR Code matrix code, the earliest barcode that can encode Chinese characters.

Stage two: 1996-2005, technical research and trial stage

The United States, Japan and China, etc., have begun to study the technology and application of two-dimensional codes. For example, the United States applied two-dimensional codes to military equipment management; Japan applied two-dimensional codes to automobile parts production, and China has included "Study on the Development of a New Two-dimensional Code System and Key Technical Standards" in the national "Tenth Five-Year Plan" major science and technology program, developed and completed the two-dimensional code standard Hanxin Code.

Stage three: 2006-2010, application exploration stage

Europe, the United States, Japan, South Korea and China etc., began to apply two-dimensional code in the areas of goods packaging, public transportation, mobile marketing, tourism and other public livelihood.

Especially in 2009, two-dimensional codes were printed on China's railway train tickets, officially opening the prelude to the wide application of two-dimensional codes in important industries, and the two-dimensional codes began to enter the vision of the Chinese people.

Stage four: 2011-2017, open application and industrial standardization stage

Two-dimensional codes play a fundamental and important role. Many countries attach great importance to developing two-dimensional code technology, deploying two-dimensional code patents and establishing two-dimensional code standards, with a view to take the lead in industrial development in the era of mobile internet.

Taking the QR code as an example. Its core technology patents are possessed by Denso Wave. In recent years, the company has been deploying a series of new QR code patents worldwide, which has been basically completed in 2013.

The popularity of smart phones and 3G and 4G networks has accelerated the development of the two-dimensional code industry.

Chinese Internet companies, such as Tencent and Alibaba, have launched "Scan_Mode" and two-dimensional code e-payment services respectively, quickly detonating the two-dimensional code application market, and two-dimensional code has entered an open application stage in China.

At this stage, China's two-dimensional code application came to the fore, surpassing Europe, America, Japan and South Korea and occupying more than 90% of the world's market. At the same time, as two-dimensional code began to permeate all aspects of social production and life, China began to gradually promote the standardized development of two-dimensional code industry:

In 2013, China's two-dimensional code registration and resolution public service platform went online;

In 2014, Zhongguancun Industry & Information Research Institute of Two-dimensional Code Technology (ZZIIOT), a professional research organization for two-dimensional codes, was formally established, and the two-dimensional code object identifier system, namely IDcode, was officially released, and the standard system for two-dimensional codes began to be established. China's Haier Group took the lead in using the standard, and up to now, the IDcode system has already been used in dozens of countries around the world such as China, South Korea and India.

In 2015, China released the world's first two-dimensional code accreditation and certification system. Subsequently, China began to promote the implementation of two-dimensional code standards and certification accreditation system on a large scale.

In the meanwhile, many other countries have also been actively deploying the industry, who own an impressive number of related patents. However, as the core encoding technology of two-dimensional codes is basically mature, most of these patents are innovations in other technology branches.

In 2017, international competition in this regard was fierce, and competition in China also surged with one dispute after another. The most striking one was two-dimensional code patent infringement dispute between China's Gmedia and Alibaba, Tencent. Most of these patents belong to the specific application technology of two-dimensional code in the field of e-commerce, whose innovation focuses on the realization of commercial application logic.

Stage five: from 2018 onwards, the globalization and standardization development stage

In addition to patent competition and intellectual property disputes from home and abroad, two-dimensional code industry faces security risks, which are quite difficult to solve. While providing great

convenience for users around the world, two-dimensional codes are subject to many crisis and risks as their technology source is uncontrollable. A standard, secure and interconnected two-dimensional code system is urgently to be established.

In August 2018, ZIIOT was recognized by three international organizations: International Organization for Standardization (ISO), European Committee for Standardization (CEN) and Advancing Identification Matters (AIM), and officially became the global two-dimensional code issuing agency granted with the assigned issuing agency code of “MA”. The IDcode system developed by ZIIOT has become an integral part of the international standard ISO/IEC 15459 Information Technology-Automatic Identification and Data Capture Techniques -Unique Identification.

Meanwhile, in order to promote the globalization of IDcode standard system, ZIIOT took the lead to establish the Unified Two-dimensional Code Registration Management Center (UTC Global), which is responsible for issuing two-dimensional codes to users around the world and specialized in international two-dimensional code issuance and operation services, standard formulation, establishment of accreditation and certification system, etc. This marks the establishment of a unified coding system and a unified registration service system for the global two-dimensional code. The whole industry has begun to enter the stage of

standardization and interconnection, and will guide the two-dimensional code technology to play an important role in global trade facilitation, industrial value chain reshaping and digital economy development. At current stage of development, two-dimensional codes have become a key entry of data flow and an interaction medium in the mobile internet industry. Besides, they are constantly generating new models, formats and industries, which are an important part of the digital economy. It is foreseeable that the two-dimensional code industry will surely be interconnected globally in the future.

Stage five: from 2018 onwards, the globalization and standardization development stage

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2. Development of two-dimensional code technology application industry

5. Technical Standards of Two-dimensional Code

Definition of Two-dimensional Code

Two-dimensional code is an information technology that captures data with a certain geometric figure distributed in a plane (two-dimensional direction) according to a certain rule. In coding, it skillfully uses the concepts of “0” and “1” bit streams, that form the internal logic basis of a computer, and uses several geometric figures corresponding to binary to represent text and numerical information,

which is automatically read by image input equipment or photoelectric scanning equipment to realize automatic information processing.

Features of Two-dimensional Code

Two-dimensional bar code, as an economical and practical automatic identification technology, has the advantages of fast input speed, high reliability, large amount of information collected, flexibility and practicality, large degree of freedom, simple equipment structure, low cost and the like, as well as being able to represent information such as numbers, characters, images, audio and video, and strong security and anti-counterfeiting.

Two-dimensional code technology is a derivative technology born on the basis of one-dimensional bar code technology. The international research on two-dimensional code technology began in the late 1980s and has developed a variety of code systems. There are more than 250 kinds of one-dimensional code and two-dimensional code systems in the world. Symbol in USA and Denso in Japan are both leaders in two-dimensional code technology. At present, the international standards of two-dimensional code system widely used throughout the word include QR code, PDF 417 code, DM code and MC code, as shown in Figure 1.1.

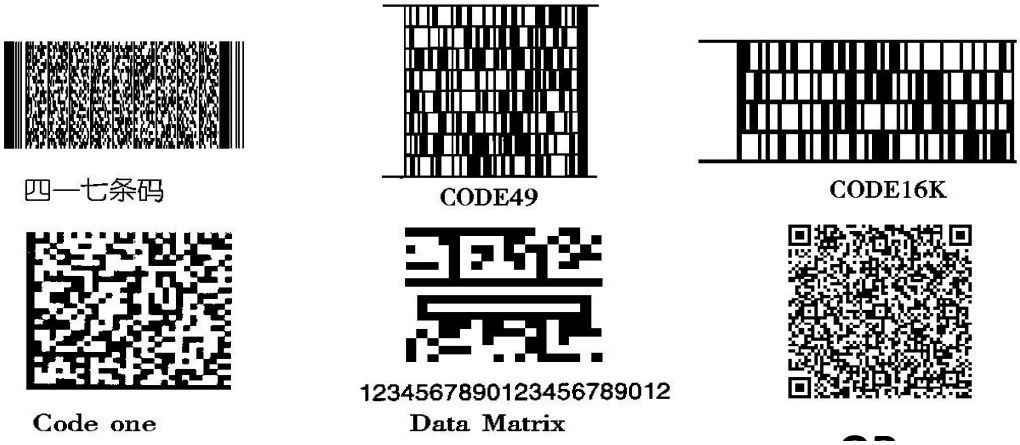

Figure 1.1 International Key Two-dimensional Code Systems

In the 1990s, China introduced two-dimensional code technology, translated and tracked several two-dimensional code technical specifications commonly used, and independently developed some code system technologies. Currently, GM code, CM code, Hanxin code, Longbei code, etc. have been applied, as shown in Figure 1.2.

Figure 1.2 Main Two-dimensional Code Systems in China

At present, from the global point of view, the application standard system of two-dimensional code technology is still not perfect: first, the standard is not systematic; second, the standard is scattered, especially the application standards of various industries; third, the standards of various countries are not unified or interoperable.

2. Application of Encoding and Two-dimensional Code Identification

With the development of new technologies such as Industrial Internet, IoT, artificial intelligence, big data, cloud computing, etc., basic code resource management, as an identifier of the interconnection of all things, becomes a key area which the world's developed economies compete for. Identifiers of the interconnection of all things carried by media such as two-dimensional code are popularized in the world and have gradually developed into one of the core code identifiers of the interconnection of all things.

On December 25, 2018, China Food and Drug Administration issued the *Basic Requirements for Unique Identification of Medical Devices*, a standard for medical device industry, which will come into force on January 1, 2020. Relevant regulation, *Rules for Unique Identification System for Medical Devices*, and standards, *Unique Identification System for Medical Devices - Terminology and Definition* and *Basic Data Set of Unique Identification Database for Medical Devices*, are forthcoming. All of these show that China's medical device industry will fully implement unique identification for medical devices.

According to the *Basic Requirements for Unique Identification of Medical Devices*, the uniqueness of identification is a basic principle. For

medical devices whose production is controlled by serial numbers, the uniqueness of unique identification for medical devices should refer to a single product, which can be achieved by meeting international standards, such as ISO/IEC 15459-4 and ISO/IEC 15459-6, or by other appropriate means. This standard fully considers the development needs of enterprises to go global and reflects its international compatibility and interconnectivity. Zhongguancun Industry&Information Research Institute of Two-dimentional Code Technology (ZIIOT) joined the research and pilot work of this standard as a global code issuer. The IDcode identification system developed by it is an integral part of the international standard of ISO/IEC 15459 series.

On April 12, 2019, approved by the Standardization Administration and centrally managed by the China Logistics Information Standardization Committee, GS1 China, AVIC China Aero-polytechnology Establishment, and Unified Services College of National Defence University PLA China compiled six national standards, namely *Common Military and Civilian Resources - Mapping Requirements for Identification Code*, *Common Military and Civilian Resources - Mapping Requirements for Data Elements*, *Common Military and Civilian Resources - Classification and Encoding - Facilities - Civil Transport Ships*, *Common Military and Civilian Resources - Data Model - Facilities - Civil Transport Ships*, *Common Military and Civilian*

Resources - Metadata - Facilities - Civil Transport Ships, and *Common Military and Civilian Resources - Identification Requirements for Data Supporter*. Their drafts for comments have been completed.

Various objects are connected on Industrial Internet and identification systems adopted are incompatible and contradictory. There are various objects, such as physical objects, virtual objects, people, organizations, etc., and there are many schemes for the identification system of each object itself. For example, there are many objects in manufacturing, including people, organizations, equipment, information and so on. How to connect these objects is the first problem that Industrial Internet needs to solve. We compare the Internet with the identification system of Industrial Internet. Everyone knows it is because of TCP - IP protocol that all computers in the world can be connected and the Internet becomes possible. To connect a large number of objects on Industrial Internet together also needs an integrated identification system. This is an infrastructure problem that needs to be solved first for the industrial development of Industrial Internet.

The identification resolution system of Industrial Internet is an important part of the network system of Industrial Internet and a neural hub that supports the interconnection of Industrial Internet. Its role is similar to the domain name system (DNS) of the Internet. It consists of identification and resolution system, where identification is the ID card of

machines and objects while the resolution system makes use of identification to locate the uniqueness and query the information of machines and objects. Establishing a resolution system to query target network location or system devices of related information with the identification code, and thus locating the uniqueness and querying information of machines and objects by identifying physical resources such as unique identification machines, products, etc. and virtual resources such as algorithm, working procedure, etc. are the premise and basis of realizing the precise connection between global supply chain system and enterprise production system, life-cycle management of products and intelligent services.

Under the EU anti-counterfeiting directive 2011/62 / EU, medicines sold in the EU after February 9, 2019 should have a safety function - unique identifier (UI) in the form of two-dimensional code and should be equipped with tamper-proof devices (e.g. tracing label upon opening pill box). As for the printing quality of two-dimensional code, it is required to reach Level 1.5 (Level C) of ISO/IEC 15415, otherwise the manufacturer needs to provide reasonable explanation. This emphasizes that the manufacturer is responsible for ensuring UI's readability and integrity throughout its life cycle. Therefore, it is necessary to check the readability and accuracy of two-dimensional code in a proper way, and consider the stability of two-dimensional code and its tamper-proof

function in the shelf life.

3. Industrial development status of two-dimensional code

As a high-capacity information storage, transmission and identification technology, two-dimensional code has attracted the attention of the United States, Germany, Japan and China, etc. since its birth, where it is applied not only to the management of certificates, bills, commodities and goods, but to the automation management of industrial production. At the meantime, two-dimensional code equipment, software and testing equipment developed by barcode technology providers, such as Honeywell, have quickly occupied the international market.

In the early 20th century, the application of two-dimensional code in China lagged behind compared with its extensive application in developed countries. In China, two-dimensional code was mainly applied in wireless marketing of enterprises, electronic ticket and certificate, personal mobile phone, etc. and a small number of industrial solutions. There was few large-scale applications in cities. The first large-scale application of two-dimensional code in China was the sale of new train ticket in 2009. At present, two-dimensional code has been widely used in food safety, public transportation, anti-counterfeiting traceability of products, media publishing, storage and logistics, enterprise marketing and so on in China. Shanghai Shentong Metro Group claimed that after

April 19, the two-dimensional code ride of urban rail traffic in Hefei and Shanghai will be connected to each other. This is the first time that Anhui's urban rail traffic joins the interconnection of urban rails in Yangtze River Delta after the interconnection of the Shanghai-Hangzhou-Ningbo Expressway and the two-dimensional code ride of the Shanghai-Wenzhou metro lines. According to statistics, the app "Metro Metropolis" has been downloaded more than 18.52 million times, with more than 14 million registered users and nearly 1.5 million daily active users averagely. Among them, about 250,000 have subscribed the interconnection services of the two-dimensional code ride for Shanghai to Hangzhou and Shanghai to Ningbo. Nearly 10,000 new users have subscribed trans-city and trans-province two-dimensional code interconnection services every week. It is expected that by the end of May, rail traffic enterprises in Shanghai, Hangzhou, Hefei, Ningbo and Wenzhou will further cooperate to promote the interconnection of two-dimensional code among cities and will strive to further embrace urban metros in other major cities in Yangtze River Delta so as to benefit more citizens in Yangtze River Delta and further promote the integrated development of Yangtze River Delta.

Two-dimensional code has become a key technology in the Internet of Things (IoT), causing the influx of traditional IT leaders and directly accelerating the transformation of industrial structure. At present, the

participants in the two-dimensional code industry primarily include code system/coding system providers, reading equipment/software vendors, application system developers, information service providers and various users. Globally, large equipment manufacturers, such as Honeywell, dominate the reading equipment market, and the industry application systems are scattered in small but expensive ways. They are well used in mobile interconnection and e-commerce, while the supporting industries such as information service, quality assurance, certification, insurance, inspection and testing, etc. are relatively backward.

According to WiredRelease COMTEX's information on February 9, Market.us recently released a study report on "global market for bar code reader", which is divided into types (optical imager bar code scanner and laser bar code scanner), application (one-dimensional bar code and two-dimensional bar code), market evaluation, competitive scenarios, key enterprises, and trends and forecasts for 2019 to 2028.

Internationally, some large enterprises, such as Haier, Wal-mart, Toyota, Apple, Alibaba and Tencent, have begun to apply two-dimensional code technology in enterprise management, marketing, payment, etc. China has set up third-party industrial organizations to manage and serve for two-dimensional code industry. Since the beginning of 2012, China has established third-party industrial organizations for two-dimensional code, including special working group, academician

workstation, technology research institute, registration and certification center and so on, which have achieved certain results in the research, standard setting, technological product integration, application demonstration and promotion of two-dimensional code industry. ZIIOT's two-dimensional code registration and certification public service platform has been widely applied in many regions of China, covering industrial manufacturing, agricultural production, transportation and logistics, food safety, urban management, cultural communication, etc. Its industrial influence and public service capacity are increasingly improved.

Two-dimensional code has been highly popularized in developed countries, especially Japan and South Korea. It has been widely used in banking, national defense, customs, taxation, public security, transportation, civil goods, etc. From urban management and service systems to people's daily life services, it has been effectively popularized and applied.

The assembly-line two-dimensional code device, also known as fixed two-dimensional code scanner, is used to read the two-dimensional code identification information of products on assembly lines to replace manual identification and improve efficiency. It is equipped with a software operation display screen, a trigger and alarm device, and an automatic software identification detection system. It can be used to

detect duplicate code and missing code on production lines, so as to ensure zero error identification of products after release.

The public service platform for identification resolution of Industrial Internet is a complete, open, structured and hierarchical industrial service ecosystem. The platform adopts micro-service framework, which can provide socialized master data services for various enterprises and accurately identify materials in various heterogeneous systems. At the same time, it provides application support public services such as knowledge map, application resource pool, qualified supplier system and trusted public resolution for the application construction of secondary nodes and enterprise nodes.

The State Information Center recently released *The Annual Report on the Development of Sharing Economy in China (2019)* in Beijing. According to the report, the transaction volume in the sharing economy market reached 2.942 trillion yuan in 2018, up 41.6% over the previous year. The number of platform employees was 5.98 million, an increase of 7.5% over the previous year. There were about 760 million participants in sharing economy, including about 75 million service providers, up 7.1% year on year. Sharing economy plays an increasingly prominent role as a new driving force in promoting the structural optimization of service industry, rapid growth and the transformation of consumption patterns.

In particular, the application conditions of each single link in the ecosystem have already been met and gradually some applications have been started, but there is no system and mechanism available to connect all links together to form a mature and stable industrial chain. Therefore, the two-dimensional code industry is applied and developed, but its scale effect and industrial agglomeration capability are not achieved.

4. Management of Two-dimensional Code Industry

The wide application of two-dimensional codes in China is obvious to all. New fields and new directions are constantly being expanded, which represents the general trend. Every piece of high-quality technology related to two-dimensional code is expected to bring huge economic benefits and needs to be widely applied. Under this background, it may not be the best way to manage two-dimensional codes by "appealing to arms". It is more urgent for us to achieve mutual benefit and a win-win situation by all parties in the global two-dimensional code industry chain.

In August 2018, ZIIOT was jointly approved by ISO, CEN and AIM Global to officially become a global two-dimensional identifier code issuer, with its issuing agency code being "MA". The IDcode system developed by ZIIOT has become part of the international standard *ISO/IEC 15459 Information Technology - Automatic Identification and*

Date Capture Techniques - Unique Identification.

In the meanwhile, in order to promote the global application of the IDcode standard system, ZIIOT led the establishment of Unified Two-dimensional Code Registration Management Center，UTC Global. UTC Global issues two-dimensional code identifiers to global users, issues and runs international two-dimensional codes, formulates standards, establishes assessment system, etc. This marks that global two-dimensional codes have a unified coding system, and that a unified registration service system has been established. The whole industry begins to enter the stage of standardized development and interconnection, which will guide two-dimensional code technology to play a key role in global trade facilitation, industrial value chain remodeling and the development of digital economy.

On March 5, 2019, according to the unified deployment of China's State Administration for Market Regulation, starting from March 1, 2019, market supervision departments across China shall renew business licenses for enterprises. The new version contains a two-dimensional code. By scanning the two-dimensional code, people can quickly query information of an enterprise, which facilitates all sectors of society to check information about enterprises, further expand the application of business licenses in social management, and lay the foundation for self-discipline by enterprises, supervision by related departments and

social governance.

3. Strategic position of two-dimensional code in global industrial competition

At present, two-dimensional code has become an important identification and entry technology between people, people and things, and things and things to communicate with each other on the information superhighway, and will continue to grow at a high speed in the coming years. Two-dimensional code tends to gradually become a new product identification and a technical means for international goods circulation and mobile interaction. New industries, new models and new formats created by two-dimensional code continue to emerge, penetrate into various fields of national economy and social life, and become an important driving technology for innovation and growth of global economic activities. Two-dimensional code is of great potential value for growing into a trillion-scale industry.

Meanwhile, with the development of Mobile Internet and IoT and the popularization and application of intelligent terminals, network security is changing from IP address control management to network entry security control management. Two-dimensional code has become an important technical means and a new media carrier to realize network entry and network space security control, and it is an important part of

network security system. Information technology represented by two-dimensional code is directly related to the security of global information network, social management and economic development. Promoting the popularization of standardized two-dimensional codes and regulating the development of industrial aggregation are important measures to cultivate new economic momentum and ensure global information security.

Speeding up the development of two-dimensional code technology application is an effective means for enterprises to improve efficiency, expand markets, innovate business models and enhance brand image. It is also an important way to improve the degree of organization of industries and resources, change the mode of economic development, improve the quality of economic operation and enhance international competitiveness. It plays a very important role in optimizing the industrial structure, supporting the development of strategic emerging industries and forming new economic growth points. It is of great significance to meet and enhance consumer demand and has even more far-reaching impact on sustainable economic and social development.

4. Development trend of global two-dimensional code industry

At present, with the rapid development of global information technology, two-dimensional code has become a new item marking

technology, a pass for global trade and an important information infrastructure, an important foundation for international transportation and trade facilitation, a technical support carrier for international information exchange, mutual recognition of supervision and law enforcement, and an unprecedented strategic development opportunity. The industrialization, aggregation and globalization of two-dimensional code have become an important research subject.

The rise of a new round of scientific and technological revolution has greatly changed the world's industrial structure. As an object identifier, an important information carrier and a mobile Internet portal, two-dimensional code is widely used in various fields of production and life, and expected to reach a trillion scale by 2020. The new generation of information technology represented by IoT, Big Data and Cloud Computing, as well as the new economic form and operation mode represented by “Internet +”, are becoming new economic engines, and all major economies and countries in the world have issued relevant policies to promote industrial development. Japan and South Korea put forward “U-Japan Strategy” and “U-Korea Strategy” respectively; the United States put forward “Smart Earth” development strategy; the European Union also formulated the European IoT development strategic plan, and China formulated IoT and Internet development strategy, rapidly becoming the world’s largest market for two-dimensional code

application.

Strengthening communication, coordination and cooperation among all countries, promoting the establishment of a new global trade order, responding to changes in the world's industrial structure, sharing the achievements of new scientific and technological revolutions, exchanging wisdom and solutions among various countries, and building a community of healthy development of global industries are unfailing driving forces for new momentum in the development of the global two-dimensional code industry.

III. Introduction to IDcode

1. Background

With the wide application of two-dimensional code technology in countries all around the world, outstanding issues such as non-interoperability of two-dimensional code standards and non-uniformity of systems have become increasingly obvious. For example, the non-interoperability between different coding systems, different coding standards, and different application systems under the same coding standard, will seriously affect the application efficiency of

the industry and the use of users, making it difficult for applications to advance on a large scale. The globalization and standardization of two-dimensional code have increasingly become the key factors that affect two-dimensional code to better support global trade facilitation, industrial value chain remodeling and digital economy development, so it is urgent to establish a unified coding and decoding system to improve the industry application environment and development environment.

Since 2012, international organizations related to two-dimensional code have started to study the issue of two-dimensional code industry standard interoperability. ZIIOT proposed the idea of two-dimensional code object identifier system (IDcode) based on negotiation with relevant international organizations, studied and established a unified coding and decoding system and interoperability mechanism for two-dimensional codes so that two-dimensional codes can uniquely identify “people, thing and object” on a global scale.

2. Basic concepts of IDcode

IDcode (identity code) is a system for unified management of various object identifiers used to identify any type of object (person, thing and item) with the world’s unique two-dimensional code, namely “two-dimensional certificate”.

IDcode has three core values:

(1) Identity: Each object (person/thing/item) is assigned with a globally unique identifier of the two-dimensional code, which is the two-dimensional code ID card of the “object”.

(2) Interconnection: The mapping and interconnection mechanism between different code systems, coding systems and application systems has been formulated to realize the interconnection among different regions, platforms, systems and code systems.

(3) Security protection: The “semantic structure” anti-counterfeiting and traceability coding features of IDcode provides the public with a secure interactive environment for mobile internet transactions, credible information security application tools for enterprises, solve the deficiency of physical unilateral anti-counterfeiting, and creates a secure environment for the use of two-dimensional codes and the traceability of goods.

3. IDcode idea and characteristics

Compared with other identification mechanisms, IDcode has the characteristics of being multi-object-oriented, associated with the object’s relevant characteristic information, compatibility with various existing identification mechanisms, flexible layering, and strong scalability, etc. The technical advantages of IDcode are presented as follows:

Scientific Coding

IDcode features in layered flexibility and extensibility, and is suitable as a bridge for conversion between different coding mechanisms, and internationally universal.

IDcode is of sound compatibility and ease of use. It can be compatible with global international code systems. Users can directly adopt other coding systems or custom coding methods with only minor changes in coding.

IDcode itself also has a strong semantic nature, standardizing the coding structure and semantic description, which lays a foundation for the future formation of big data, big data mining and analysis.

Safe and controllable

IDcode realizes the control of the entire life cycle of the unified two-dimensional code itentification by uniformly registering and resolution the two front and rear ports. At the meantime, in practical application, ZIIOT and UTC Global maintain the top-level IDcode identification, and each unit is responsible for the IDcode maintenance work under its branch to realize self-management and maintenance.

System interoperability

IDcode has developed mapping and interconnection mechanisms between different code systems, coding systems, and application systems, enabling inter-regional, cross-platform, cross-system, and cross-code

system interoperability, so as to effectively solve the problem of two-dimensional islands and system inheritance development problem, so that the internal functional chains are seamlessly connected and the external supply chains are smoothly connected.

Unique identity

IDcode is compatible with multiple code systems and coding systems, and assigns a uniform and unique two-dimensional code identity to all objects, namely "two-dimensional code ID card", which is globally unique. Through IDcode, the relevant characteristics and information of the object are available.

Opening and sharing

IDcode realizes the internal division of science in the two-dimensional code industry by opening a standardized technical interface to the society. Each role user can easily apply it by calling the interface easily, thus achieving good support for the entire industry chain.

IV. IDcode Technology and Standardization

1. IDcode coding rules

The IDcode coding structure conforms to the international standard ISO/IEC 15459 Information Technology-Automatic Identification and Data Capture Techniques-Unique Identification, it is a tree structure and

consists of three parts:

The first part is user root, which consists of four nodes. The first node is root identifier “MA”, which is a global code recognized by ISO, CEN and AIM. The second node is country and region area code, which conforms to the ISO 3166-1:2013 Code Represents the Name of Each Country and Its Branches. Part 1: Country Code. The third node is user code, which is coded according to user type, general enterprises and institutions adopt the regionalism code of each country, or are coded by each country, the node can be expanded according to application requirements; the fourth node is registration sequence number, and is listed by application sequence;

The second part is identification object category, which is divided into general coding structure and user-owned coding structure. The general coding structure consists of three nodes (see Figure 4.1), and the number of nodes in a user-owned coding structure can be defined by the user (see Figure 4.2).

The third part is user-defined individual code of identification object. Users can determine the number of nodes and the number of bits of each node according to their application requirements.

The first part and the second part are separated by punctuation “.” or “/”, the second part and the third part are separated by punctuation “.” or

"/", and the nodes of each part are separated by punctuation ".".

IDcode coding supports combinations of Arabia digital and English alphabets. The schematic diagram of data structure is shown in Figure 4.1 (general coding structure) and Figure 4.2 (user-owned coding structure).

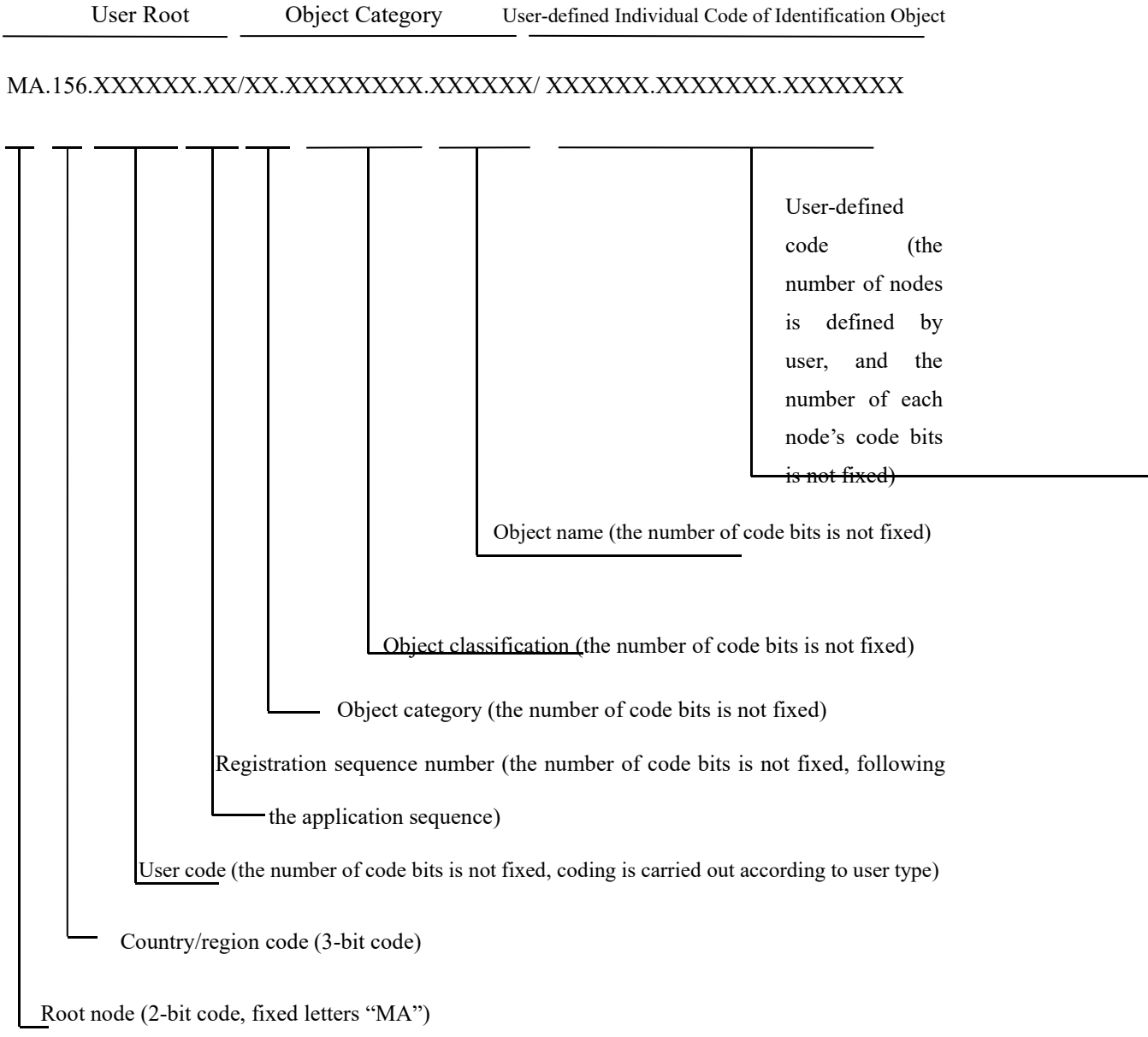

Figure 4.1 Schematic diagram of two-dimensional code identification coding data structure (general coding structure)

For example: MA.156.110101.8/20.36550104.01/20170630.0010

In which MA.156.110101.8 represents unit root, 20.36550104.01 represents object category, 20170630.0010 represents user-defined individual code of identification object.

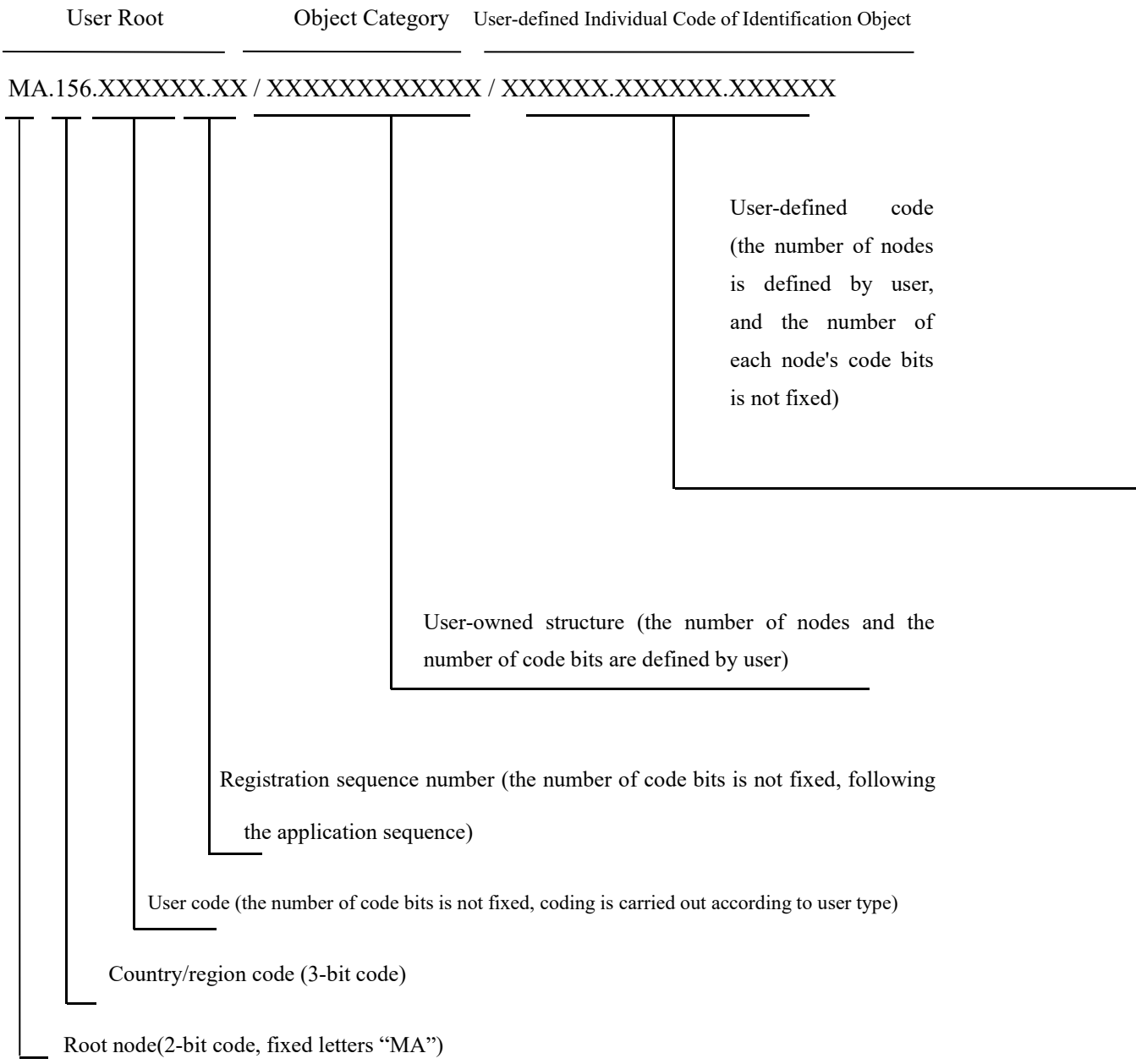

Fig. 4.2 Schematic diagram of two-dimensional code identification coding data structure (user-owned coding structure)

For example: MA.156.110101.8/203655010404/20170630.0010, in which MA.156.110101.8 represents user root, 203655010404 represents user-owned object category, 20170630.0010 represents user-defined individual code of identification object.

IDcode is featured by flexible layering, good compatibility and scalability. It can be used as a meta-identification mechanism for the exchange between existing coding systems, and support the two-dimensional code of various code systems, such as GM code, Longbei code, Hanxin code, QR code, and DM code. It is compatible with various coding systems, such as OID, Handle, Ecode, customized coding systems of government departments and industry organizations, as well as other user-defined, individualized coding systems of different unit entities.

2. IDcode resolution network

IDcode platform builds a distributed global two-dimensional code identification chain network (GICN) based on blockchain technology, and builds distributed, regional, multi-level identification nodes worldwide. When analyzing networks, identification nodes define and describe the identification object structurally according to the coding information, analyze its content from multiple dimensions such as time, space and behavior, and then realize data synchronization among all identification

nodes through the global two-dimensional code identification chain network (GICN) .

3. IDcode security features

IDcode security features are demonstrated in two aspects: One is the security of generation terminal. User-owned coding structure scientifically achieves the global uniqueness and traceability of two-dimensional code identification, and establishes a virus database filtering mechanism to ensure the security and reliability when generating two-dimensional code. The other is the security of analysis terminal, it also establishes a virus database filtering mechanism, which can timely shield and prohibit the analysis of unsafe content; timely, accurately and quickly locate the two-dimensional code applicant and user after security risk occurs, and take emergency measures such as shielding access and offline processing to ensure the security of analysis process.

4. Research and development of IDcode standards

In July 2016, ZIIOT proposed a comprehensive framework of two-dimensional code standards based on IDcode system (see Figure 3.4), began to organize the formulation of various standards for two-dimensional code industry, including basic standards such as two-dimensional code object identifier coding rules, and carried out activities to develop application standards and certification standards of

two-dimensional code for different industries, such as transportation, agricultural equipment, railway facilities, household appliances maintenance, traceability services, electronic license plates and resident health cards.

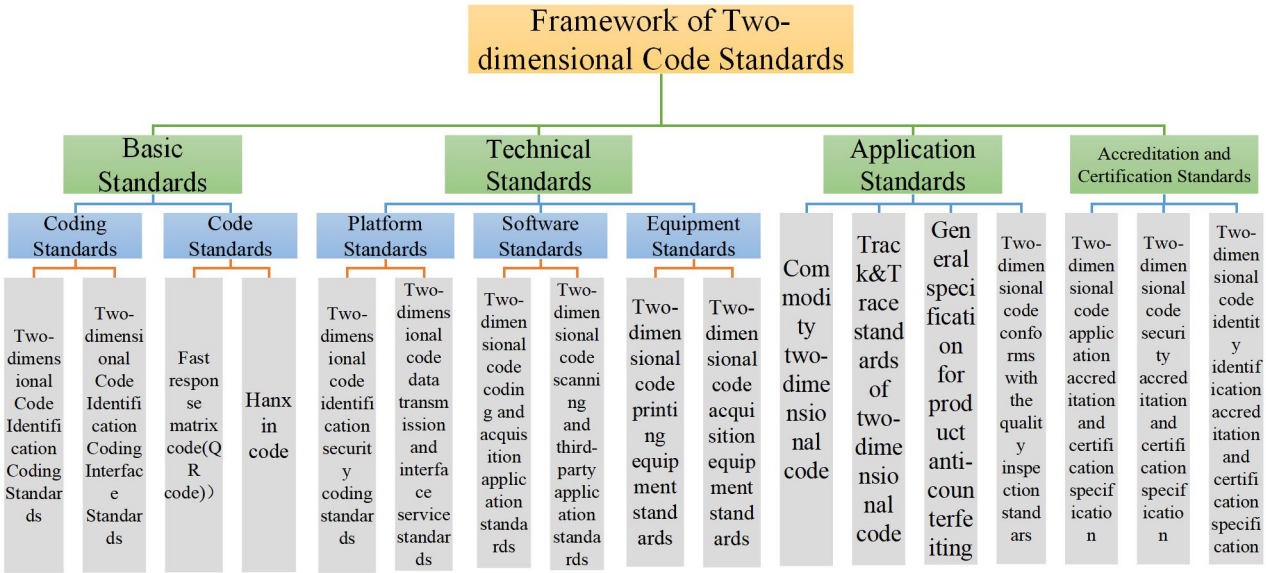

Figure 4.3 A Comprehensive Framework of Two-dimensional Code Standards

On August 1, 2018, the IDcode coding system became a part of the international standard *ISO/IEC 15459 Information Technology, Automatic Identification and Data Capture Techniques, Unique Identification*. The ISO/IEC 15459 series of standards are the most widely used coding and identification standards in the world. Based on the IDcode coding system,

ZIIOT has participated in or led the formulation of national standard GB/T 33993-2017 *Commodity Two-dimensional Code*, industry standard YY/T 1630-2018 *Basic Requirements for Unique Identifier of Medical Devices*, T/CIIA 001-2018 *General Technical Requirements for Tracing*, T/CIIA 002-2018 *Requirements for Management of Tracing Service*, T/CECC 3-2018 group standard *General Requirements for Two-dimensional Code Object Identifiers*, CQC9221-2016 evaluation standard *Technical Specifications on Evaluation of Two-Dimensional Code Registration and Certification Platforms - Management of Two-dimensional Code Application - Requirements*, etc. In cooperation with relevant Chinese ministries and commissions, ZIIOT also formulated more than 20 industry standards, which cover transportation, supervision on drug traceability, agricultural equipment, and so on. Besides, it plans to establish a complete two-dimensional code standard system in three years.

V. IDcode Application and Management

IDcode system provides global services, and provides all types of users with two-dimensional code identity identification registration, resolution, platform application, accreditation and certification, and other application services.

1. IDcode registration

Any type of unit entity users can register to apply for IDcode, no matter they have two-dimensional code or not. Users can register through online self-service (www.idcodeglobal.com) or go to various national registries to submit relevant information for on-site registration.

Firstly, a unit entity user registers as IDcode platform users, that is, getting the unit root IDcode, which is suitable for the unit entity identification, introduction, publicity and other purposes; then, the unit entity user registers the object IDcode for the “object” to be identified, and the object IDcode is suitable for the object identifier, introduction, anti-counterfeiting, traceability, sales and other purposes.

2. IDcode resolution

IDcode platform provides basic resolution function, and provides public users with resolution and traceability services. The information related to the identified object is obtained by inputting IDcode identifier. Users can get a variety of resolution information of identification objects through many ways, such as PC client terminal query, mobile phone client terminal query, system plug-in, multi-format document embedding and machine automatic identification.

IDcode platform provides a unified basic resolution interface API for better data exchange within the industry or between industries, laying the foundation for data interconnection and interworking between industries

and systems.

3. IDcode platform and industry service

Based on the IDcode identification system, ZIIOT built a global public service platform for identifier management to provide unified, public and authoritative identification and registration service; created IDcode identifier resolution top international node, China top national node and five top national nodes (South Korea, India, Canada, Myanmar and Laos); set up service agencies in various provinces and cities of China to promote the standardized application of two-dimensional codes. By May 2019, it has established secondary nodes in 23 provinces and cities of China, and conducted demonstration projects in such fields as transportation, agriculture, machinery, medical equipment, petrochemicals, and traceability of important products. Currently, more than 60,000 institutions and enterprises have registered on the platform and applied it as demonstration projects, including Haier Group and its global suppliers, Aucma, Guangzhou Daily, and China Tobacco Hebei Industrial Co., Ltd. The number of categories of registered two-dimensional code identifiers exceeded 200,000, which cover industrial manufacturing, agricultural production, transportation, logistics, cultural communication, urban management, food safety and many other fields. Cumulative number of two-dimensional code identifiers applied reached nearly 10 billion. In addition, IDcode identifier resolution system

has attracted a large number of well-known experts, research institutions, technology companies and service providers in the industry, and therefore possesses comprehensive service capabilities in industrial research, architecture planning, technical support, consulting, training and other industrial services.

4. IDcode accreditation and certification

IDcode establishes an accreditation assessment system, which carries out accreditation assessment on the qualifications, abilities and levels of personnel, enterprises and institutions involved in IDcode system, and divides them into three categories:

First, personnel category: including the level of practitioners, training lecturers, accrediting auditors, evaluating auditors, etc.

Second, enterprise category: including service-oriented providers' (SP) qualifications, standard products, application-oriented enterprises' logo compliance, normalization of application management, etc.

Third, institution category: mainly including the accreditation and certification organizations that carried out IDcode accreditation business.

Figure 4.4 examples of various certification certificates

5. IDcode registration and management

(1) Global management and code issuing agency-- ZIIOT

ZIIOT is an international code issuer recognized by three international organizations: International Organization for Standardization (ISO), Comité Européen de Normalisation (CEN) and AIM Global. Its assigned issuing agency code (IAC) is “MA”, and is responsible for the management and maintenance of IDcode system. The code “MA” will be first used to distribute unique two-dimensional code identification to global users. ZIIOT is an international code issuer juxtaposed with the The Global Language of Business (GS1) , the Institute of Electrical and Electronics Engineers (IEEE) , the Universal Postal Union (UPU) and other large international organizations.

(2) Code issuing branches in various countries

UTC Global will set up code issuing and operating organizations in

various countries around the world. At present, UTC China has been established, and many branch issuing agencies, such as UTC Korea, UTC India, UTC Canada, UTC Laos, UTC Myanmar are under construction. UTC Global plans to set up branch issuing agencies in more than 50 countries around the world by 2020.

6. IDcode international industry summit

An international two-dimensional code industry development summit was held to form international consensus. At the 2018 International Two-dimensional Code Industry Development Summit, global two-dimensional code issuing service was officially launched. India, Canada, South Korea, Laos and Myanmar were authorized to set up branch issuing institutions. Representatives of institutions from more than 10 countries including India, Russia, France and Canada agreed to establish a two-dimensional code industry international cooperation organization with China as the initiator. The organization will follow the purpose of consultation, contribution, shared benefits and win-win collaboration, promote the building of global two-dimensional code distribution management mechanism and industry governance system, build a global community for developing the two-dimensional code industry, and lead two-dimensional code technology industry to better serve the world and human kind by starting from issuing two-dimensional codes. The 2019 International Two-dimensional Code

Industry Development Summit will be held in Foshan City from August 23 to 25.

VI. Cases study of IDcode application

1. Main application areas

Since its launching, IDcode platform has provided code registration and distribution services for hundreds of thousands of government organizations, enterprises, institutions and social organizations all over d the world, and has a wide range of applications in many industries, such as industrial manufacturing, agricultural production, urban management, public transport, medical and healthcare, product traceability, food safety, media publishing, warehousing and logistics, and enterprise marketing. IDcode starts from product identifier to further help companies achieve channel optimization, inventory management, production management, intelligent after-sales service, integration of cross-industry resources, targeted marketing and other value applications, create an integrated identifier value system that cover raw material processing - product production - transportation - after-sales service- terminal consumption, reshape traditional industry business model, and boost economy transformation.

2. Application status in different countries

(1) South Korea

Based on IDcode system, UTC Korea has established a national certification and traceability system to provide each of the authenticated goods (e.g. cosmetics) with a unique two-dimensional code identity identification, and provide third-party traceability and anti-counterfeiting certification for all chain processes such as commodity production, distribution/inventory management. When consumers receive a product, they scan the two-dimensional code on the product to visit the imitation (determination) page and verify the authenticity of the product.

(2) India

Based on IDcode system, UTC India promoted the establishment of China-India import and export trade two-dimensional code registration and certification platform, provided China-India import and export products with two-dimensional code registration, certification and traceability and other public services, built China-India import and export trade two-dimensional code registration and certification industry system, and gradually constructed a complete industrial ecology. It has built a two-dimensional code industry system with unified standards and interconnection between China and India to promote the development of "Made in India" business.

(3) China

UTC China has carried out pilot projects to apply two-dimensional code in transportation services, urban management, product traceability, supply chain management, and targeted poverty alleviation services.

1) Two-dimensional code identifier application and support service in the household appliances industry

Background: China's household appliances industry formed an industrialized and centralized development model in 2000. Famous brands such as Haier, Gree and Aucma have emerged at home and abroad. Market competition becomes increasingly fierce. Product updates increasingly speed up. As a large number of new products enter the market, management is gradually lacking in household appliances repair and management, communication with consumers and other fields. There emerge more and more market complaints. Manufacturers are unable to conduct quality identification and responsibility tracking in the face of disorder production information. A new means is urgently needed to solve the problems faced.

Pain spots of the industry:

(1) For home appliances manufacturers, there are too many upstream main parts suppliers. There is no reference data for their the quality of these suppliers' products.

(2) There is no precedent, standard and method for reference in the

industry.

(3) Information about the upstream and downstream of the industry is blocked, which makes it impossible to form data on product life cycle.

(4) There is no convenient and effective communication channel with consumers.

Solution: Uniformly identify suppliers on different platforms with IDcode coding system, form upstream and downstream supply management and control means with product manufacturing enterprises as the core, collect data on product life cycle based on the open-source characteristics of main parts, incorporate quality responsibility into production chain, and implement production responsibility extension system to reach seamless connection between production quality and after-sales quality, realize controllable product quality across the whole life cycle, and ensure brand value and brand strength. Once this model is used, it has produced significant effects. It has been imitated by many home appliances companies.

Application case: Haier Group’s two-dimensional code unified management platform.

2) Two-dimensional Code Identifier Application and Support Service in the Agricultural Product Industry

Application cases: Agricultural delicacy management project of IoT facilities of the Ministry of Industry and Information Technology, national tea tracing service platform, northeast China ginseng market tracing platform, Huaying agricultural delicacy management project, Xinjiang Jinghe lycium chinense tracing project.


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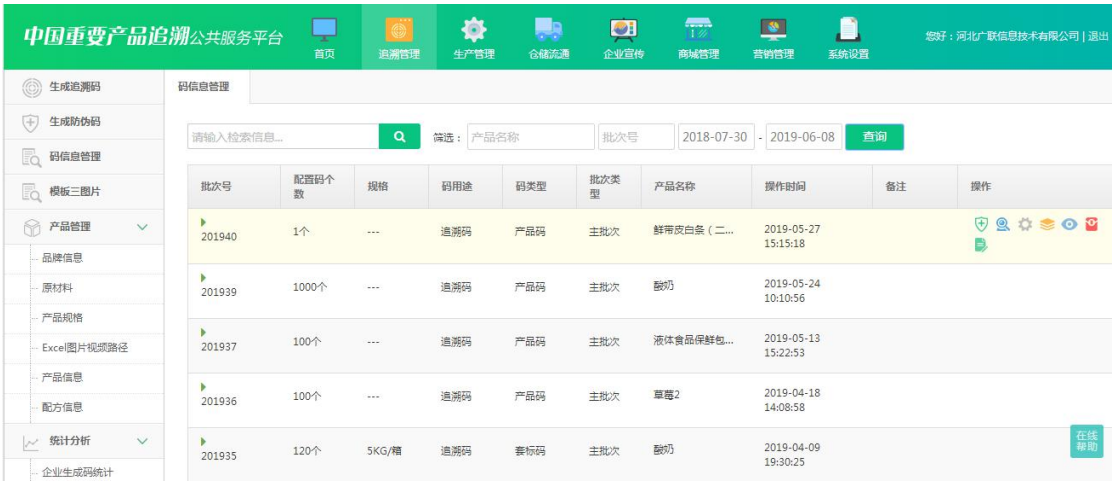
3) Two-dimensional Code Identifier Application and Support Service in the Food Industry

Application cases: Chifeng Mengdu beef and mutton tracing, dessert Flower product tracing, eel tracing in Guangdong.



4) Two-dimensional Code Identifier Application and Support Service in the Medicine and Medical Device Industry

Application cases: Pilot project of unique identifier standard for medical devices of the National Medical Products Administration, drug tracing platform of the National Administration of Traditional Chinese Medicine, and management platform for the distribution of medical health cards in Jilin.

5) Two-dimensional Code Identifier Application and Support Service in the E-commerce Industry

Background: In recent years, China's e-commerce has developed rapidly. It has experienced different development stages including B2B, B2C and O2O, and formed a complete industrial chain consisting of raw materials, factories, logistics, warehousing and retail based on Internet services. However, the last mile of information has never been reached. There are multiple information islands in each link, so a complete industrial chain of information cannot be formed. The anti-counterfeiting, traceability and reputation of the entire e-commerce industry are at risk.

Characteristics of the industry:

(1) There are many e-commerce platforms, including national, local and industrial ones, in which lurk many unknown channels.

(2) Standards for products and transactions are lacking.

(3) Channel management is uncontrollable.

(4) Products are uncontrollable.

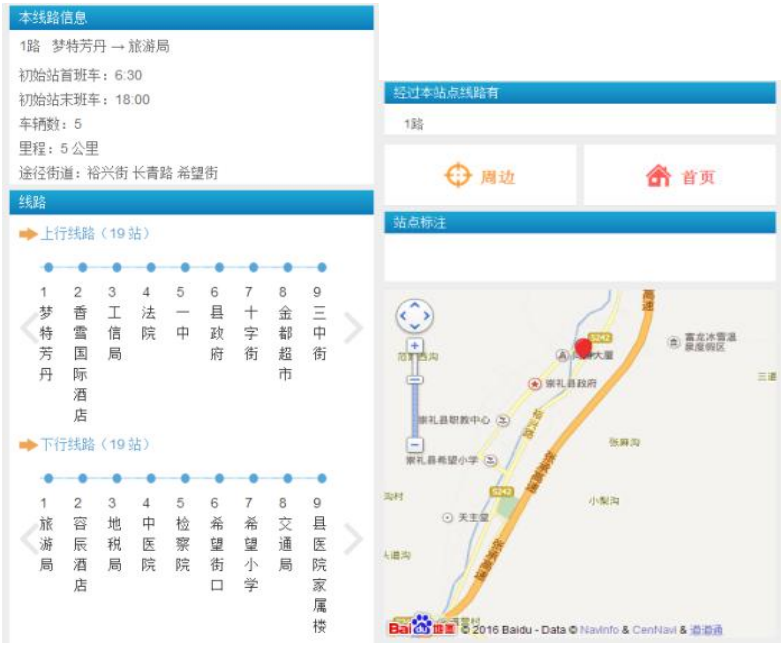
Solution: Create product identity based on IDcode coding, develop F2C e-commerce model relying on factories, build new channel management and logistics management and control modes through blockchain digital signature, link up information of the whole industry

chain, form industry business information standards. Truly ensure the authenticity and controllability of the last mile of information by taking advantage of Internet of Things, big data and 5G technology, and carry out a thorough upgrade of the future e-commerce industry.

Application case: Chifeng Mengdu beef and mutton e-commerce tracing project

6) Two-dimensional Code Identifier Application and Support Service in the Transportation Industry

Application cases: bus and bicycle in Shijiazhuang, research on the two-dimensional code identifier standard system of the Ministry of Transport.



7) Two-dimensional Code Identifier Application and Support Service in the Logistics and Supply Chain Industry

Background: At present, China's management of logistics supply is extensive, which is mainly reflected in the handling of the relationship between supply and demand. This will result in improper management of logistics, unclear supply flows, uneven distribution of supply effects, and ultimately the waste of resources. China has a great population, and extremely low per capita resource share. These problems in logistics supply should be dealt with at top priority.

Solution: Identify resources, power and demand in a standardized and measurable way with IDcode coding system, form a unified and timely market-wide information sharing linkage mechanism, and control the reception and distribution of goods with IoT technology to collect and control data in all nodes of logistics business and achieve real-time control, regulation and warning of the quantity of resources, logistics flow, and the quantity of demand.

Application cases: Cold chain pilot project of the Ministry of Industry and Information Technology, lead-acid battery recycling management project of Ministry of Environmental Protection

8) Two-dimensional Code Identifier Application and Support Service in the Community Management Industry

Application cases: Shijiazhuang's intelligent population management platform, population two-dimensional code identification

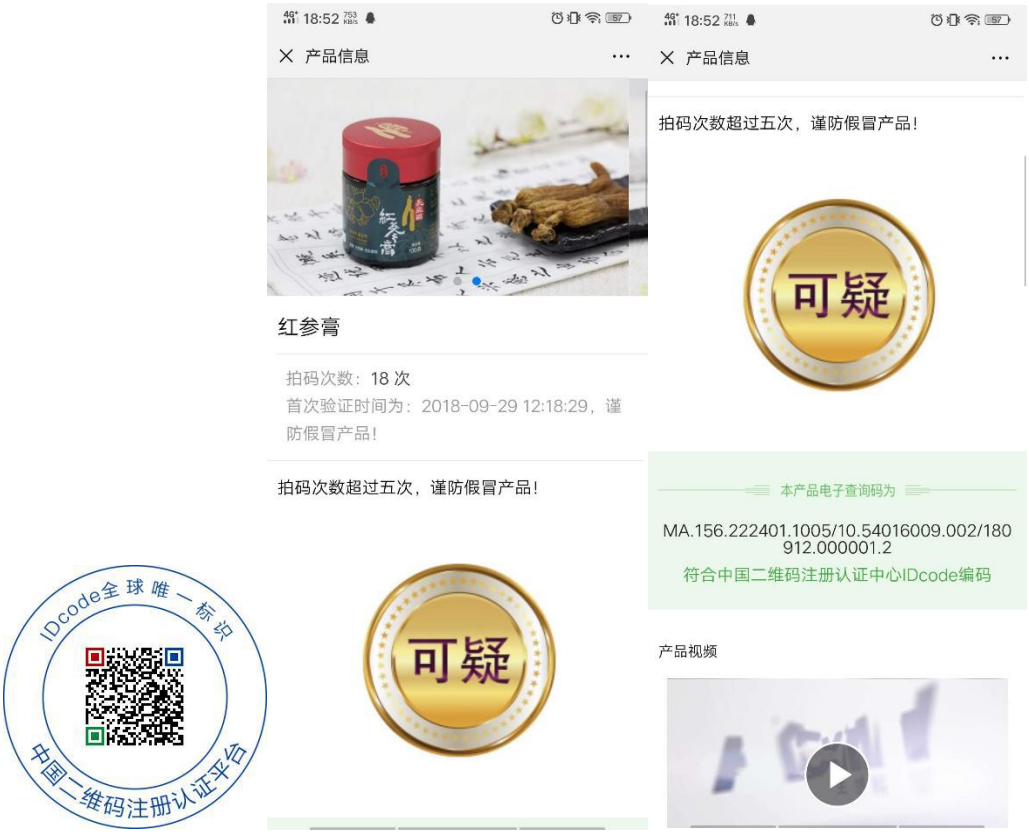
platform of Jilin's public security organ.

9) Two-dimensional Code Identifier Application and Support Service in the Trade Industry

Solution: Establish service standards based on trade business with product two-dimensional code identity as the smallest unit information carrier of global trade, including commodity display, logistics management, payment management, certification and traceability, credit management, enterprise certification, service supervision, tax

management in import and export, inspection and quarantine, form a two-dimensional code product data center and standard service center for global trade to provide the most basic Internet services for transnational, cross-regional, cross-cultural, cross-language trade.

Application cases: Two-dimensional code registration and certification platform for SMEs in Guangdong, Kexian product management platform.



10) Two-dimensional Code Identifier Application and Support Service in the Marketing Industry

Background: China's Internet is developing rapidly. The new media industry is rising rapidly. Emerging markets consisting of production

enterprises, new media service providers, market players and consumer terminals are prosperous. However, publicity value is over-squeezed behind the prosperity. The market shows increasingly evident sign to return to rationality. The marketing industry is faced with a bottleneck.

Pain spots of the industry:

(1) The conversion efficiency of the value of publicity has fallen dramatically.

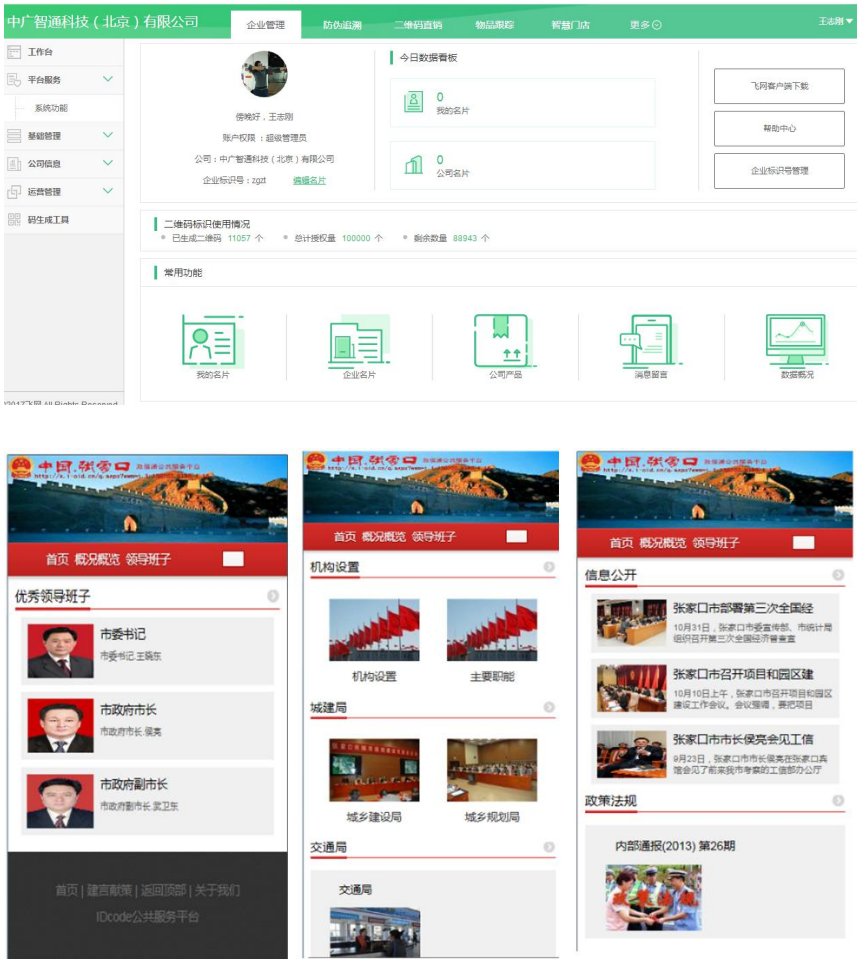
(2) Membership mechanisms are not interoperable. There are great difficulties in cosmopolitanizaion.

(3) Marketing subject are not clear and have poor linkage.

(4) The guarantee mechanism is not perfect and the risks are uncontrollable.

Solution: Establish a certification platform for production enterprises, marketing service providers and market entities, identify their products, services and resources, conduct unified supervision, coordination and analysis on their marketing activities, and build a unified marketing demand management platform to achieve a new marketing model featured unified brand and unified management.

Application cases: Aucma’s marketing and after-sales management platform, Shangxintong platform, and Fiwan platform.



11) Transportation Service

UTC China and China Transport Telecommunications & Information Center have jointly set up a two-dimensional code public service platform for transportation, which realizes the unified registration, filing, resolution, management and distribution of two-dimensional code identification in the field of transportation, unifies the two-dimensional code standards in the transportation industry, and promotes the standardized application of two-dimensional code in the field of transportation.

In January 2019, China Transport Telecommunications &

Information Center and ZIIOT jointly undertook the task of “Research on the Application of Two-dimensional Code Standard for Transportation” assigned by the Science and Technology Department of the Ministry of Transport (Task No. 2019-16-061). The research of this subject fills the gap in China’s two-dimensional code standard for transportation and guarantees the secure development of national pillar industries. It promotes the orderly development of the transportation industry, forms an aggregation effect to create new momentum for economic growth, promotes the integration of industry service systems and platforms, and regulates market environment and ecological mechanisms of the industry.

12) Urban Community Management

Based on IDcode system, the Smart Chongli Two-dimensional Code Public Service Platform and Big Data Center for the 2022 Winter Olympic Games is built in Chongli District, Zhangjiakou City, in order to

promote the urban management, population management, information-based tourism, transportation services, food traceability and other information-oriented applications in Chongli District, Zhangjiakou City, promote the effective integration of government management and public services, propose innovative ideas and methods for social management, and promote the construction of smart city and information-based Winter Olympics.

Figure 5.1 Some two-dimensional code identifications in Chongli District

A good community environment requires the active participation of every resident. Just a scan with mobile phone, residents can manage service information, find community activities, check business operations of enterprises, etc. This helps achieve democratic management and supervision in a simple and convenient manner, effectively improve the

transparency of community party affairs and community work, and enable residents to enjoy community service and supervise community work at zero distance.

In Shijiazhuang's intelligent population management platform and population two-dimensional code identification platform of Jilin's public security organ, communities formulate a series of standardization systems and link them in each two-dimensional code based on actual situation, including standards for the construction of party organizations, grid management, urban inspection, security check in workplace, service by enterprises in trade areas, and property management. The staff only needs to handle affairs against standard systems, which brings greatly improved work efficiency and accuracy.

13) Targeted poverty alleviation service

The "Internet + Targeted Poverty Alleviation" information service platform is a targeted poverty alleviation information service platform

based on IDcode system. The platform carried out refined management of all information in the whole process, such as information about those living under the poverty line, poverty alleviation process records, until the poverty alleviation is completed. At the same time, it realized paperless office work, provided public-oriented poverty alleviation platform; combined agricultural products traceability certification system and e-commerce systems to help poor villages sell sideline products online and in cities. Now, it has been implemented in many cities such as Xinyang, Luohe and Tianmen.

VII. IDcode construction and application guidelines

1. Guidelines for the construction of branches of code issuers

UTC Global shall develop the code allocation program for code issuing agency branches, open the interface of registration and resolution service platform, and establish corresponding management rules, including registration acceptance, audition, distribution, data capture procedures, and promote the construction of various code issuing agency branches.

(1) National code issuing agency branches

UTC Global shall audit the qualifications and application materials of applicants from national code issuing agency branches. The detailed procedure is shown below:

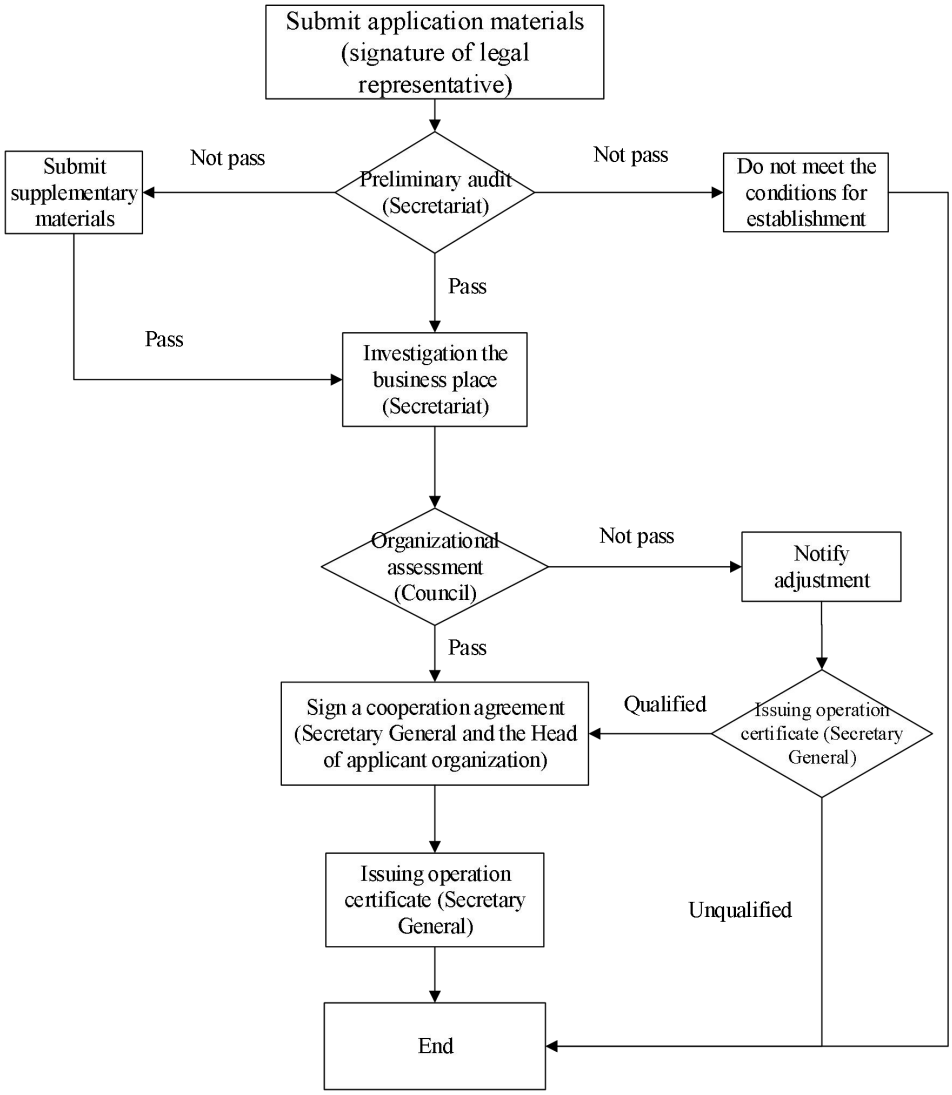


Fig. 7.1 The application procedure of branches

After being established, national code issuing organizations should promote the implementation of work from six aspects:

First, identification chain nodes construction: They should construct management nodes to provide two-dimensional code data link services and certification services for China and its surrounding area. Regional, industry, platform enterprises and other types of code issuing agency branches should be constructed;

Second, industrial policies research: They should assist government departments or industry organizations to study policy measures on the application of two-dimensional code technology and industrial development;

Third, standards formulation: They should develop local standards on two-dimensional code according to the UTC standard system.

Fourth, education and training: They should organize two-dimensional code industry experts to carry out professional training, popularize two-dimensional code industry knowledge and business development skills;

Fifth, global data network nodes construction: They should plan and build large-scale global distributed data synchronization network nodes based on the two-dimensional code industry system;

Sixth, application and marketing promotion: They should carry out relevant two-dimensional code application promotion activities by combing the country's superior industry and regional characteristics.

(2) Other types of branches of code issuers

UTC Global and its branches shall assign codes to applicants from other types of code issuing organizations, and open platform standard interfaces. If the applicant has already established a service platform or

needs to build a new service platform, the docking construction should be carried out according to the standard interface. If the applicant does not need to build a service platform, then its sub-accounts in the application area or industry shall be set up.

After being established, the code issuing agency branches should first analyze the application needs of the region or industry, sort out and classify the identification objects by person, thing and object, and issue a unique two-dimensional code identity identification, namely "two-dimensional code ID". These objects generally include entity objects and virtual objects.

2. Guideline for enterprise application

The enterprise application based on IDcode system should be carried out according to the following steps:

Step 1: Register to get authorization. Submit materials on IDcode platform for registration, so as to get authorization for use.

Step 2: Get the two-dimensional code identification. Users can choose to obtain two-dimensional code identification directly from the IDcode platform, or dock with IDcode platform technology to obtain two-dimensional code identification according to their own needs.

Step 3: Resolution of two-dimensional code distribution. Users shall distribute the obtained two-dimensional code identifications to the objects

to be managed respectively, and establish a link with the application system for analysis.

Step 4: Application development. Establish the application system of vertical industry subdivision field with supporting units, provide all-round application solutions for industry users, and enhance the service ability of IDcode to the industry;

Step 5: Qualification assessment. Users can apply for two -dimensional code related assessment service from the third-party certification organizations authorized by UTC Global, in order to get corresponding credit rating.

VIII. Prospects

1. Construction of basic network

The service platform (www.idcodeglobal.com) will be improved to speed up the construction of global distributed data identification chain nodes. By 2020, the nodes construction in most countries and regions around the world will be completed.

2. Construction of service system

More code issuing organizations will be set up in major economies to provide IDcode-related services for local enterprise users. By 2020, code issuing organizations will be established in 50 countries, and IDcode

will be used by 10 million enterprises in the world.

Resource pools for industry application will be created. Professional and powerful industry application solutions partners will be gathered to provide industry users with more comprehensive and direct application services in different industries.

3. Construction of technical system

Technical standards and application standards for various industries will be developed according to the ISO/IEC 15459 series of international standards and IDcode system requirements.

Researches will be carried out to establish IDcode accreditation and certification, inspection and testing, and other supporting technical service systems.

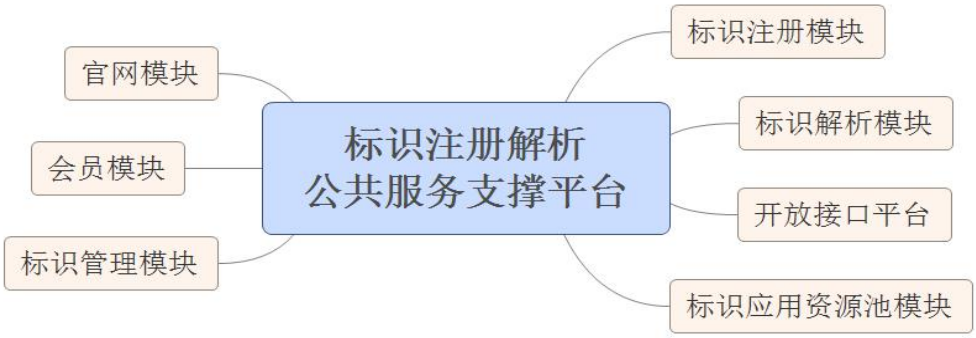


Figure 8.1 Sections of the two-dimensional code registration and resolution public service platform

(1) Website section: provide content publishing, management and display services for official websites, and facilitate external promotion

and publicity as the official website of operators.

(2) Membership section: provide registration, login, access application, operator review, membership behavior statistics and other services for users of the platform.

(3) Identifier registration section: provide users with unified identifier registration application and resolution setting service.

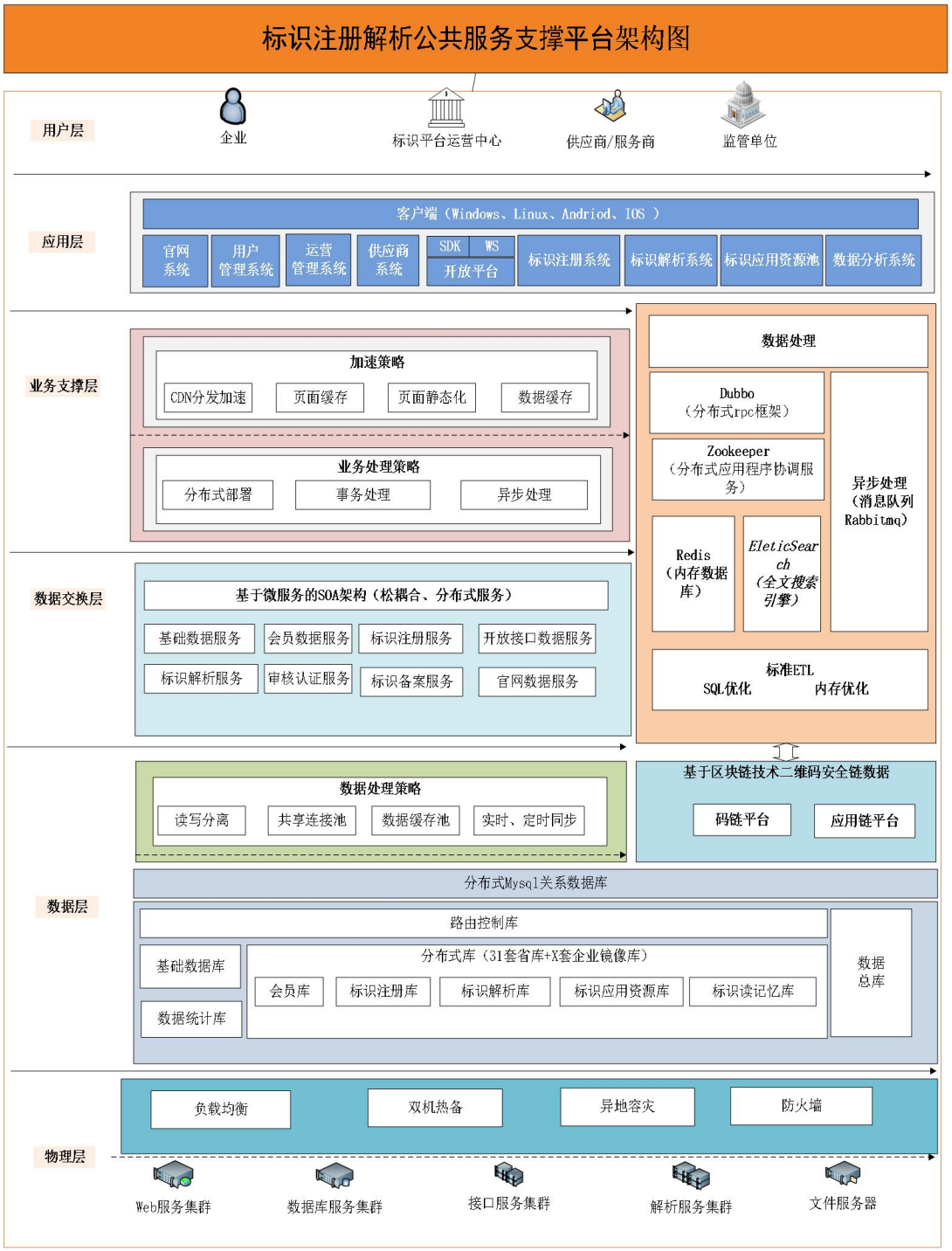
(4) Identifier resolution section: provide unified resolution services on identifiers registered by users.

(5) Identifier operation and management section: provide services for platform operations, including identification, resolution management, and statistical analysis of identifier data.

(6) Identifier open platform: provide interface services for technology providers, facilitates the access of applications to the platform, and provide integrated identifier application services for enterprises.

(7) Identifier application resource pool section (ecosystem): provide a docking and interaction platform for application technology service providers and users. The applications of technology service providers can be published to the resource pool, so that users can select and satisfy their demands for applications. The resource pool can also be used to release personal demands, so that technology service providers can meet the demands. In this way, IDcode application ecosystem is established.

The following figure presents the technical architecture of the platform:



4. Industrial services

International two-dimensional code exchange activities, seminars

and exhibitions will be held to promote the exchanges of IDcode technologies and application innovation among countries. Training materials and courseware will be complied. IDcode technology and application personnel training activities will be held with the support from universities, training institutions, enterprises and other organizations in various countries.

The application and popularization of IDcode coding system can bring multiple benefits, including promoting the digital and intelligent operation of enterprises, promoting the healthy and orderly development of industries, cultivating and supporting innovative enterprises, and promoting the accumulation of industrial Internet industry.

(1) M2M and the Internet of Vehicles have the greatest endogenous driving force and relatively mature commercial elements. Market demand, cost, standardization, technology maturity, and business model are the main factors that affect the scale-up of IoT applications. M2M market and the Internet of Vehicles market enjoy strong endogenous power, increasingly mature technical standards, and basically ready conditions for comprehensive promotion. Therefore, they will be the leaders of IoT applications.

(2) Concepts and technologies such as “digital twinning”, “digital mapping” and “augmented reality” proposed in the industry sector are

achieved through digitizing information generated from application and integrating it into the life cycle management of products/equipment for analysis and prediction, thus further enhancing the capabilities and value of industrial equipment.

(3) Industry applications will continue to grow steadily, with huge room for improvements. They will still be an important area for developing IoT. In other areas such as industries, agriculture, electricity, transportation, logistics, security, and environmental protection, there are broad space for improving the applications of IoT.

(4) The era of the Internet of Everything is fully open. The growth of global Internet connectivity has entered the stage of dynamic conversion. The global Internet is shifting from “everyone is connected” to “everything is connected”. IoT, as the extension of the Internet in terms of network and application, makes possible the perception, real-time control, precise management and scientific decision-making of the physical world.

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