NIOT Platform and its Applications

IoT Lab, Computer Network and Information Center,
Chinese Academy of Sciences

Tian Ye
tianye@cnic.cn
2017-06-06
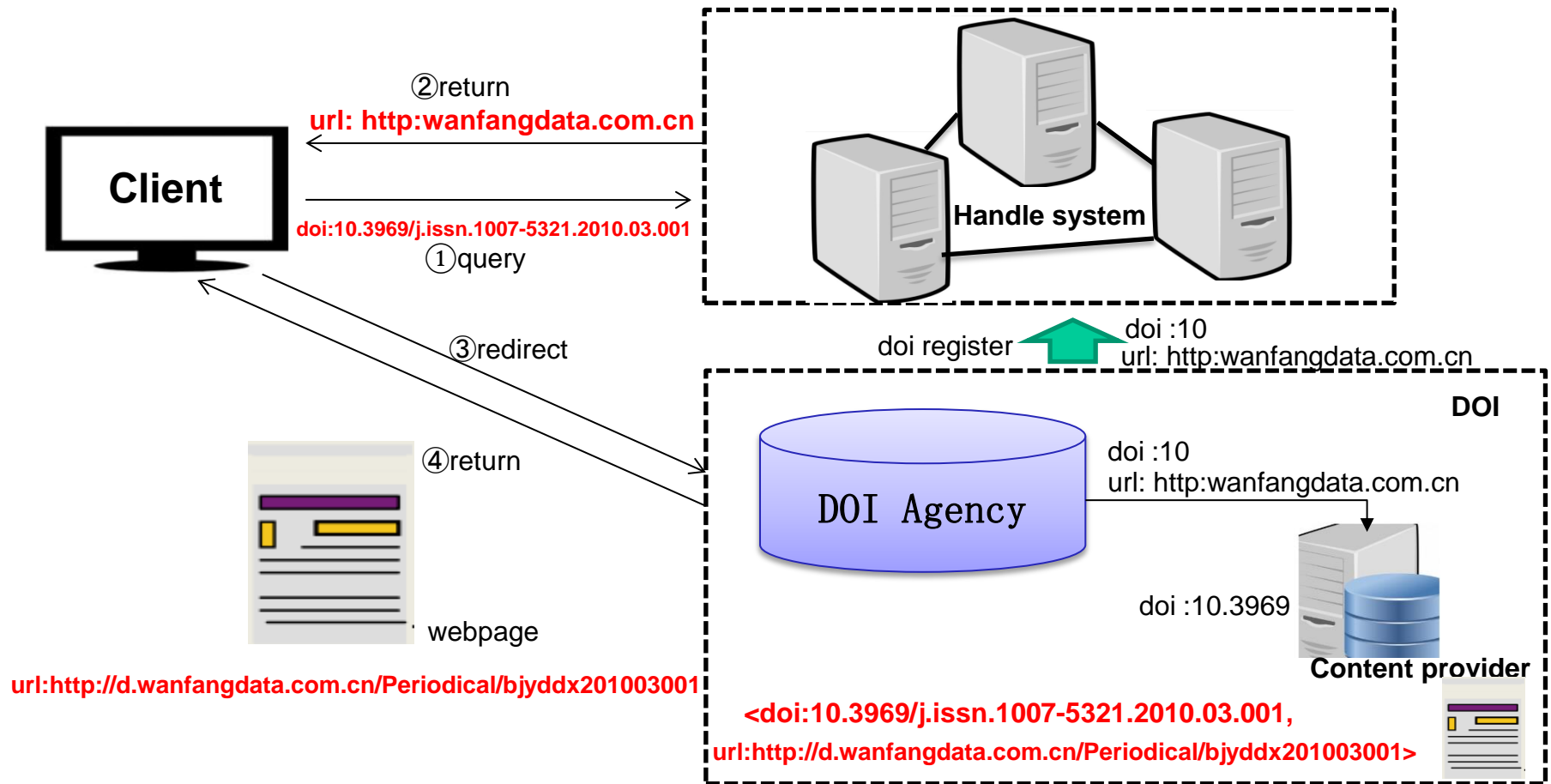
Contents

- Background

- Challenges

- Solutions

- Applications

- Introduction of NIOT
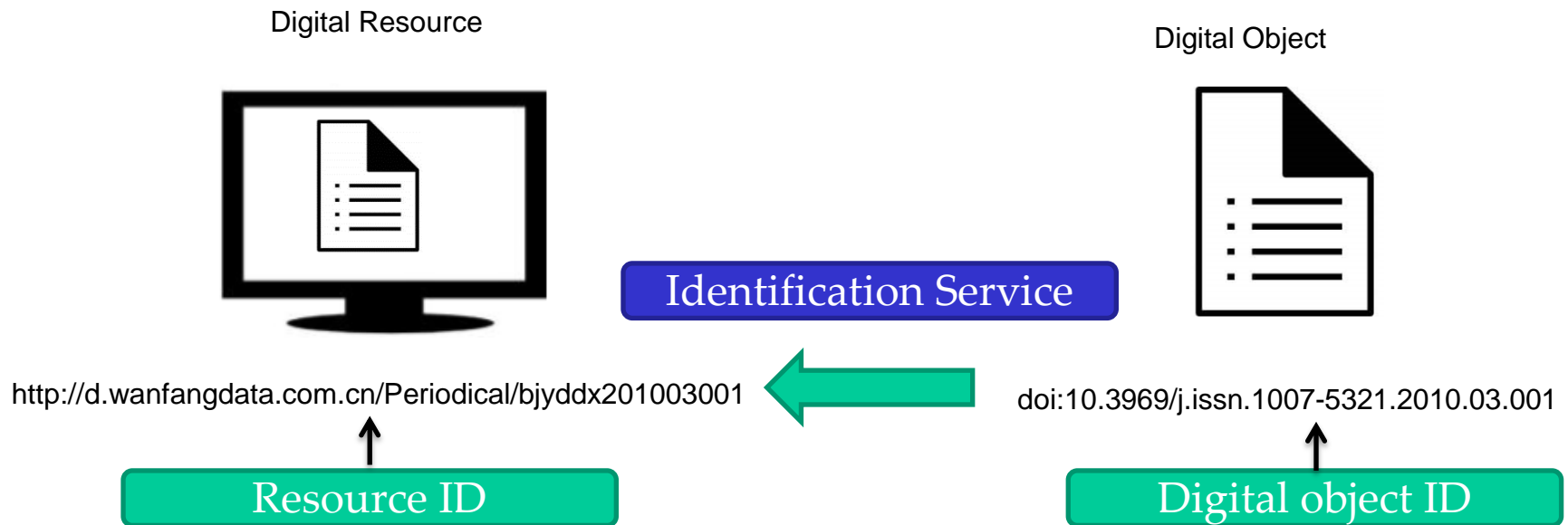
Background
-Research Data Identification

- DOI is widely used for the identification of the digital objects, especially the digital editions. DOI is a typical application of the Handle system.
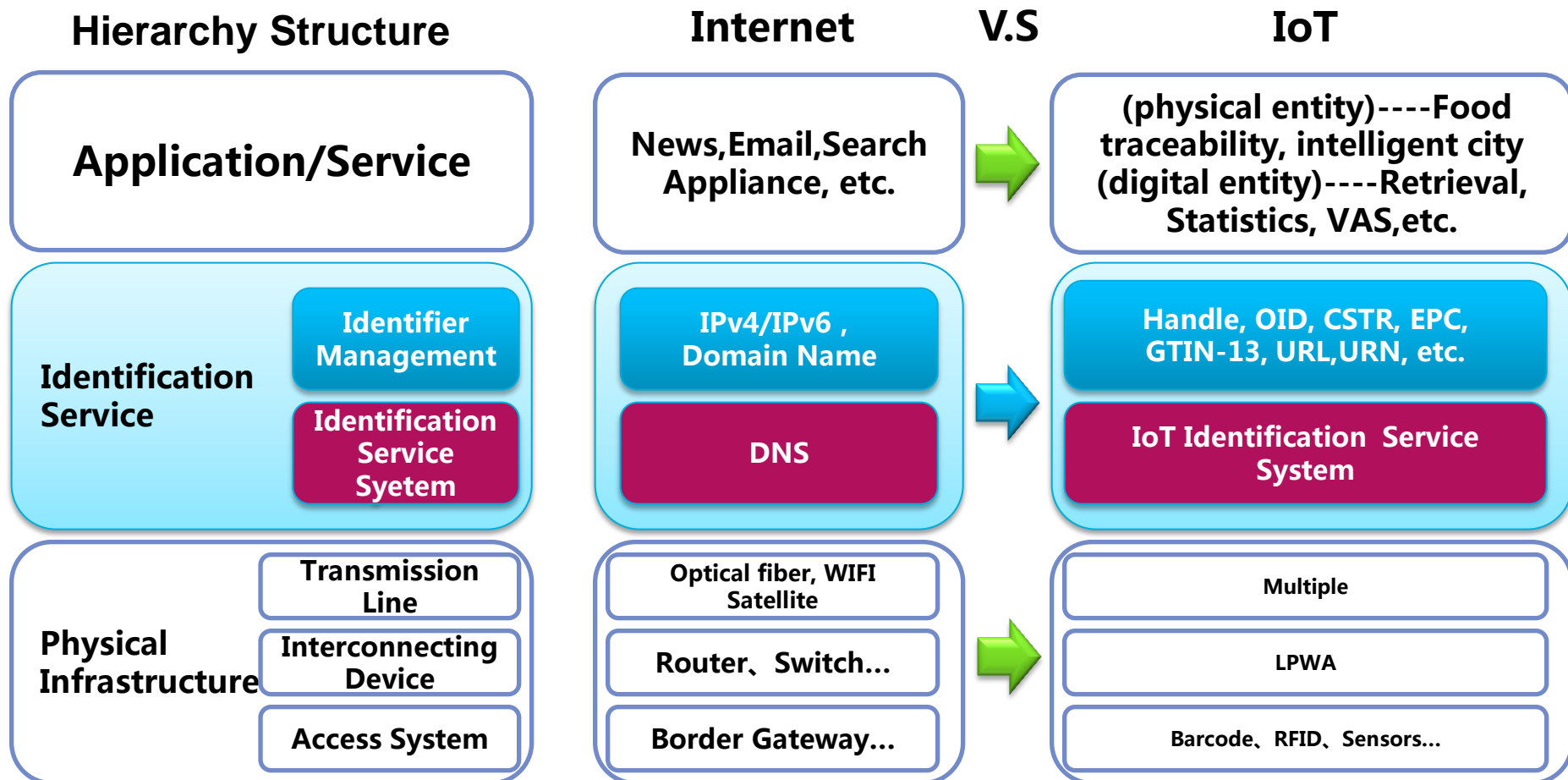
②return
url: http:wanfangdata.com.cn

Client

doi:10.3969/j.issn.1007-5321.2010.03.001
①query

Handle system

doi register

doi :10
url: http:wanfangdata.com.cn

③redirect

DOI

④return

doi :10
url: http:wanfangdata.com.cn

DOI Agency

doi :10
url: http:wanfangdata.com.cn

webpage

doi :10.3969

url:http://d.wanfangdata.com.cn/Periodical/bjyddx201003001

Content provider

<doi:10.3969/j.issn.1007-5321.2010.03.001,
url:http://d.wanfangdata.com.cn/Periodical/bjyddx201003001>

- For DOI, the digital object is the paper whose id is the DOI number, the resource is the webpage whose id is the URL. Thus, the identification service is realized as getting the resource using the DOI number.

Digital Resource

Digital Object

Identification Service

http://d.wanfangdata.com.cn/Periodical/bjyddx201003001

doi:10.3969/j.issn.1007-5321.2010.03.001

Resource ID

Digital object ID

Background -Identification Service

- The identification service is NOT a new notion
- In the Internet, the identification service is the DNS

Hierarchy Structure	Internet	V.S	IoT
Application/Service	News,Email,Search Appliance, etc.	→	(physical entity)----Food traceability, intelligent city (digital entity)----Retrieval, Statistics, VAS,etc.
Identification Service — Identifier Management / Identification Service Syetem	IPv4/IPv6 , Domain Name / DNS	→	Handle, OID, CSTR, EPC, GTIN-13, URL,URN, etc. / IoT Identification Service System
Physical Infrastructure — Transmission Line / Interconnecting Device / Access System	Optical fiber, WIFI Satellite / Router、Switch... / Border Gateway...	→	Multiple / LPWA / Barcode、RFID、Sensors...

Challenge-interconnection inside the digital object identification

- For some reasons, some other identification systems appeared to identify the digital objects

- There are several ID systems for the digital resource management in China, such as DOI system, CNOID system, and CSTR system (Chinese Science and Technology Resources).

- *The interconnection between these identification systems bring a big challenge.*

doi:10.3969/j.issn.1007-5321.2010.03.001

	Prefix		Publishers	Unique Code of
1.2.156	Displine Code		Code	Science Data

CSTR:×××××.××.×××...×××
  Code
  Type
  RA
  Header
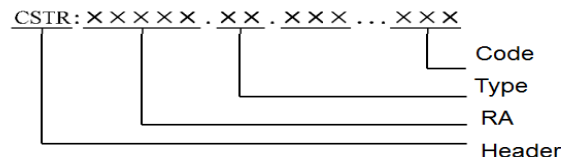
International specification (RFC)

China National Standard

《**Information Technology- Scientific Data Citation**》

《**Science and Technology Resource Identification**》 **GB/T 32843-2016**
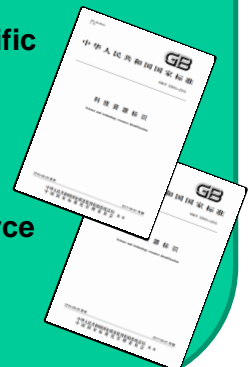
Challenge-interconnection with other IoT applications

- There have been a number of heterogeneous identifiers contribute to various domain in the IoT area, besides the research data application, each identification system has its own service framework.

- *How to range between the heterogeneous identification systems when the various application need to change the information*
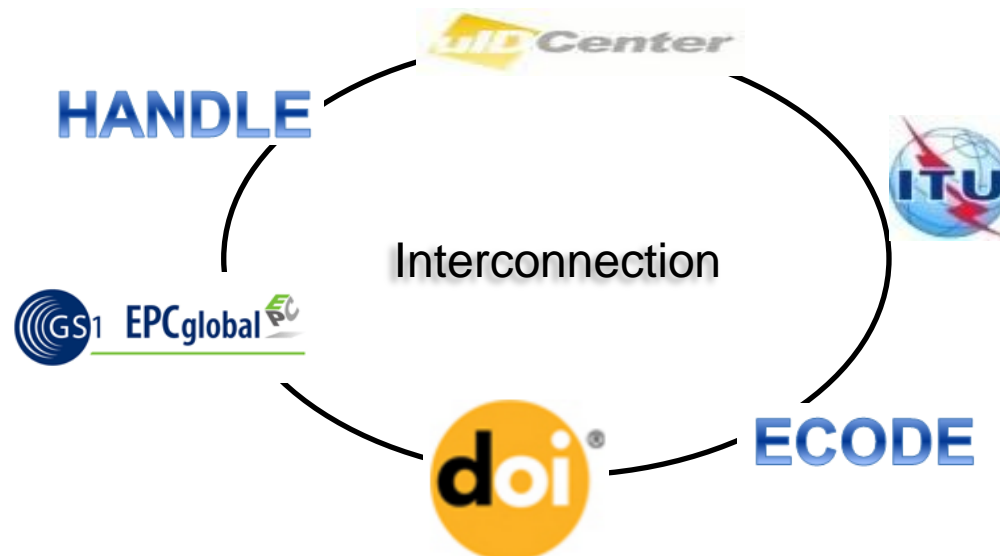
Solutions-NIOT: IoT ID management and public service platform

- NIOT is a unique ID platform in China.

- The root node of the NIOT can interconnect with other international ID systems through a p2p network.
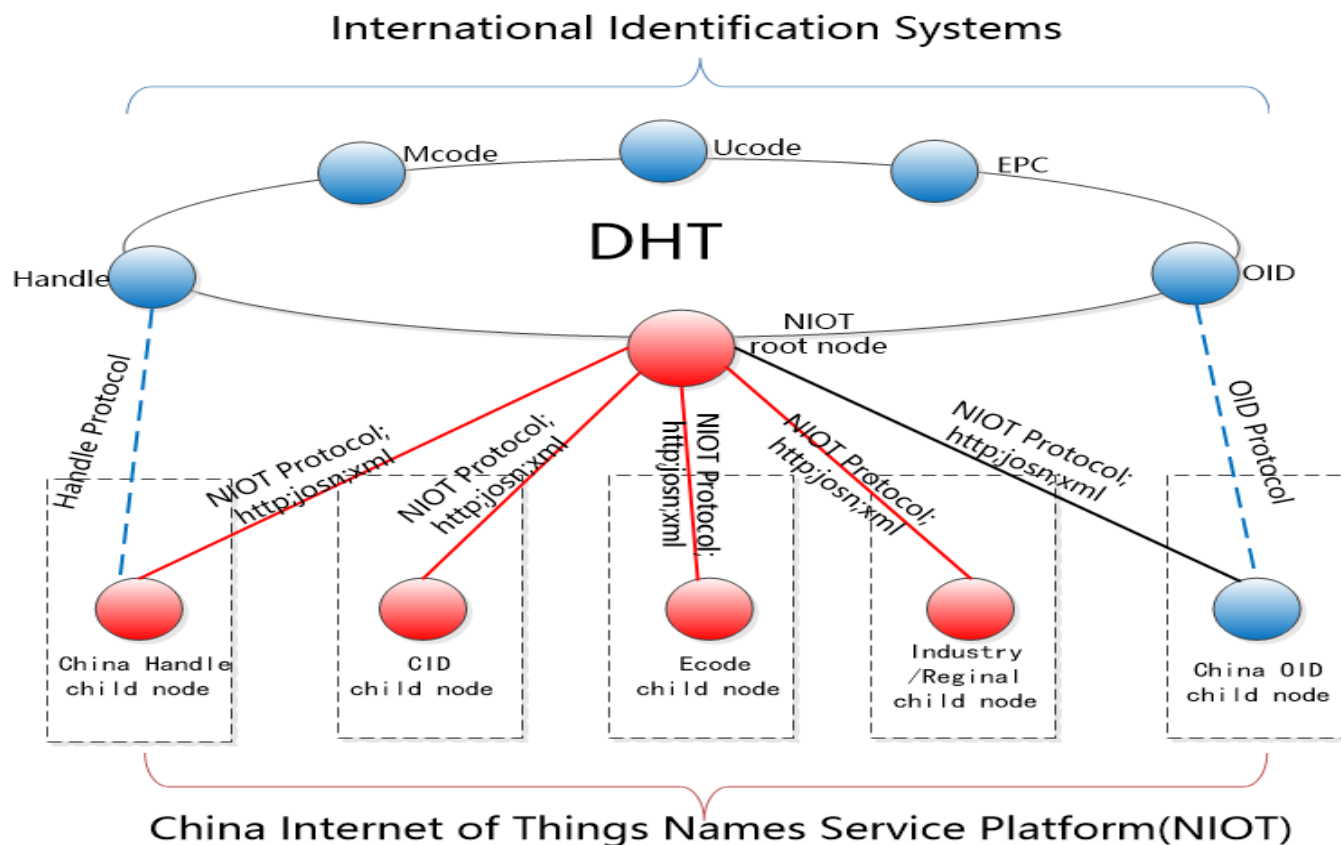
International Identification Systems

China Internet of Things Names Service Platform(NIOT)

- The identification service adopt the layered architecture.
- Every node is able to operate independently.
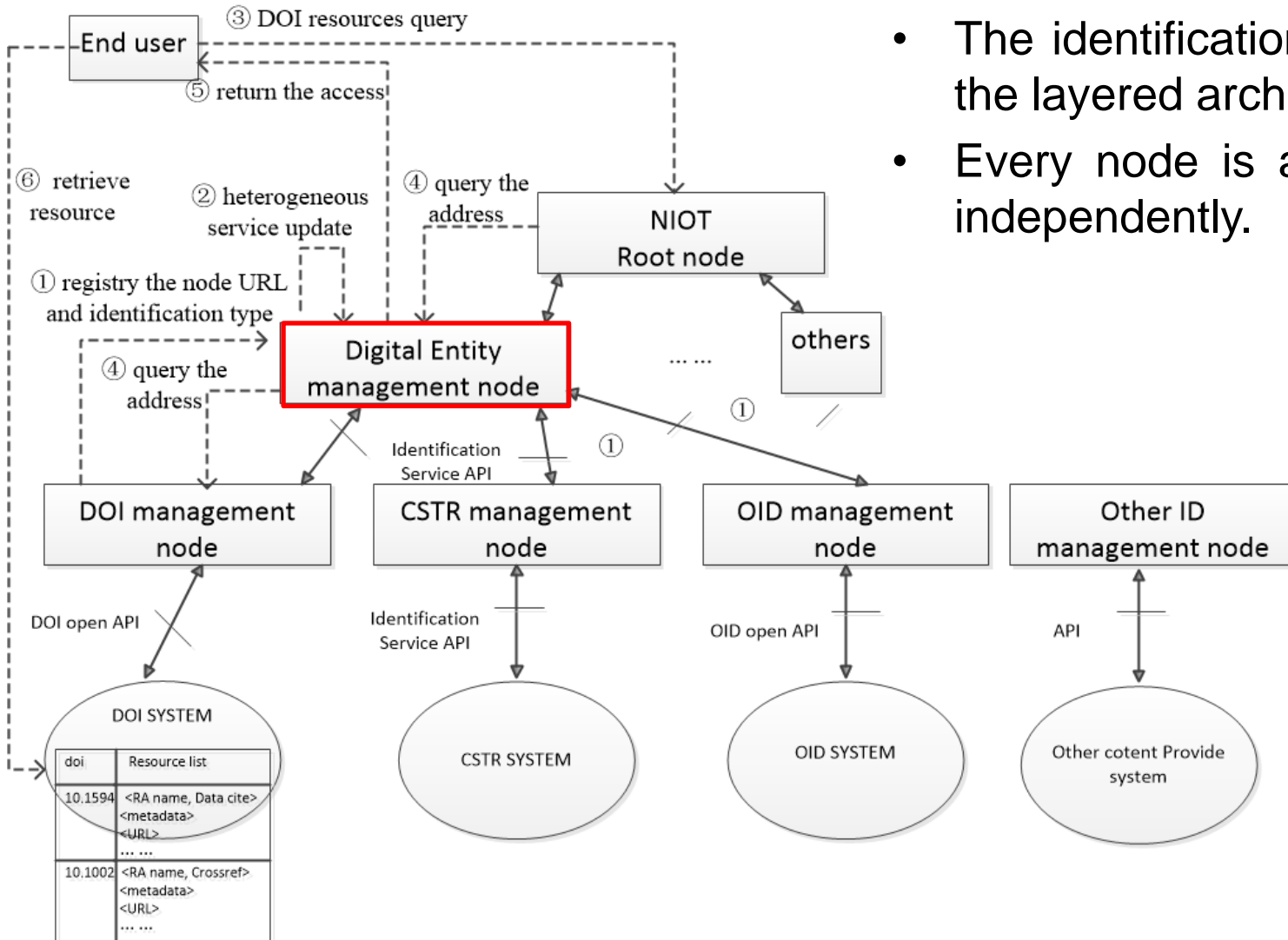
Solutions-Core Service

The key points of the **IoT identification service**:

- **Heterogeneous Identification Service**

  Propose an identifier conflict detecting model and the criterion algorithm method to solve the collision problem of the identification and to provide compatible service.
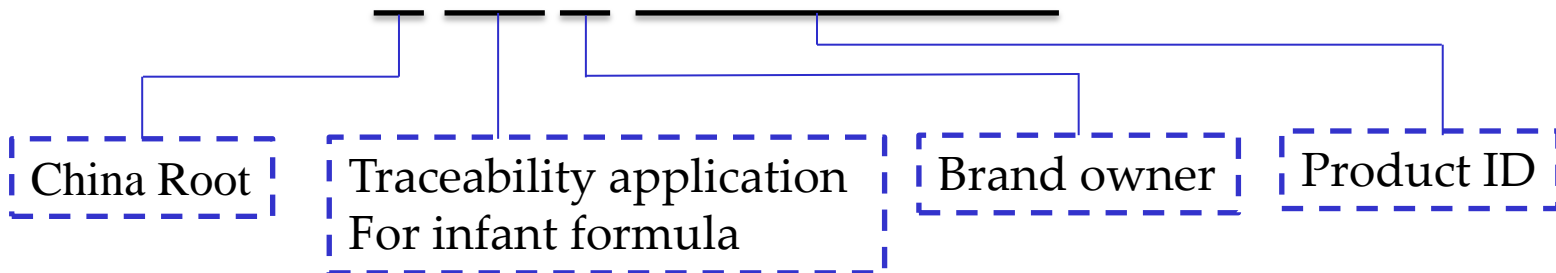

- **Distributed Name Services**

  Develop a hierarchy architecture，including the root node and child nodes, each child node is docking to its upper hierarchy，providing identifier mapping, storing and access.
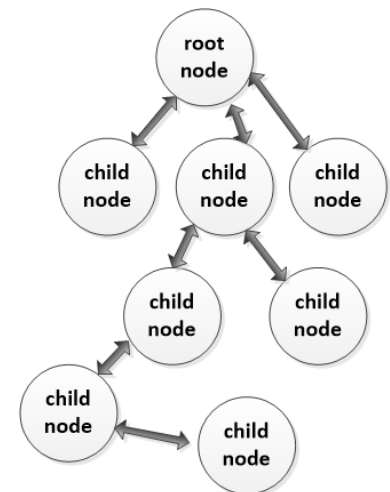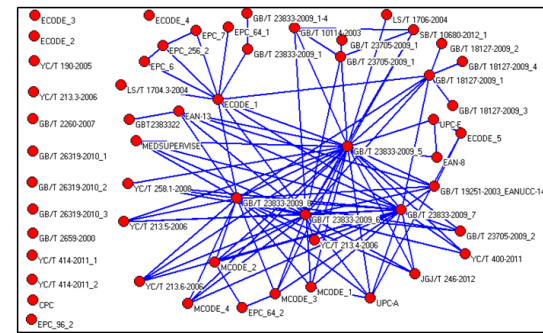
Solutions-Identification Data

Handle identifier in the application of the infant formula traceability
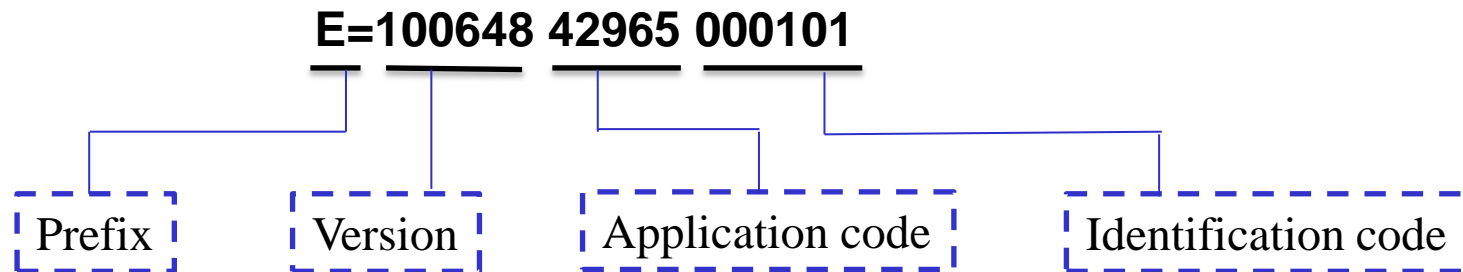
86.1000.11./69016092958216

China Root

Traceability application For infant formula

Brand owner

Product ID

86.1000.11./69016092958216 →

http://hdl.cndona.cn:8080/handleSystem/milk/milk.action?handleId=86.1000.11/69016092958216

niot

CHINA INTERNET OF THINGS NAME SERVICE PLATFORM

Solutions-Identification Data

Ecode identifier in the application of the Wine traceability

E=100648 42965 000101

| Prefix | Version | Application code | Identification code |

E=10064 842965 000101 →

http://www.iotroot.com/query Ecode?code=1006484296500 0101&vnsi=norm&type=1

CHINA INTERNET OF THINGS NAME SERVICE PLATFORM

Solutions-Identification Data

NIOT identifier in the application for the Gaoqiao small commodity traceability

[niot:] gq:177c02a814744e068250282c6b779d481611

Protocol ID

child node ID

Small commodity ID
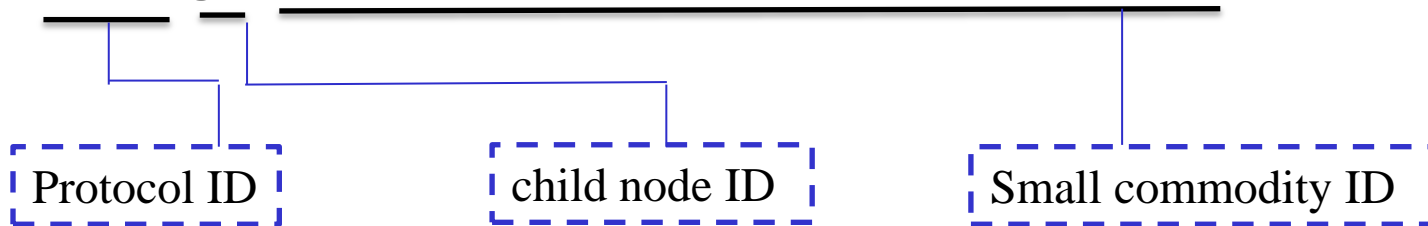
gq:177c02a814744e068250282c6b779d481611 → http://gq.cniotroot.cn/c/177c02a814744e068250282c6b779d481611

CHINA INTERNET OF THINGS NAME SERVICE PLATFORM

Applications

There are a number of various applications based on the identification service.

---- Smart Agriculture

---- Food Traceability

---- Supply Chain Management

---- Industrial Internet

… …

- Based on the IoT identification service to realize the management of and analysis of the various data information to support the smart agriculture.


<argi-product_traceability ID, argi-production_data ID>

1005.camera.huadufarm.cniotroot.cn

1003.temp.huadufarm.cniotroot.cn
2002.temp.huadufarm.cniotroot.cn
1003.pm25.huadufarm.cniotroot.cn
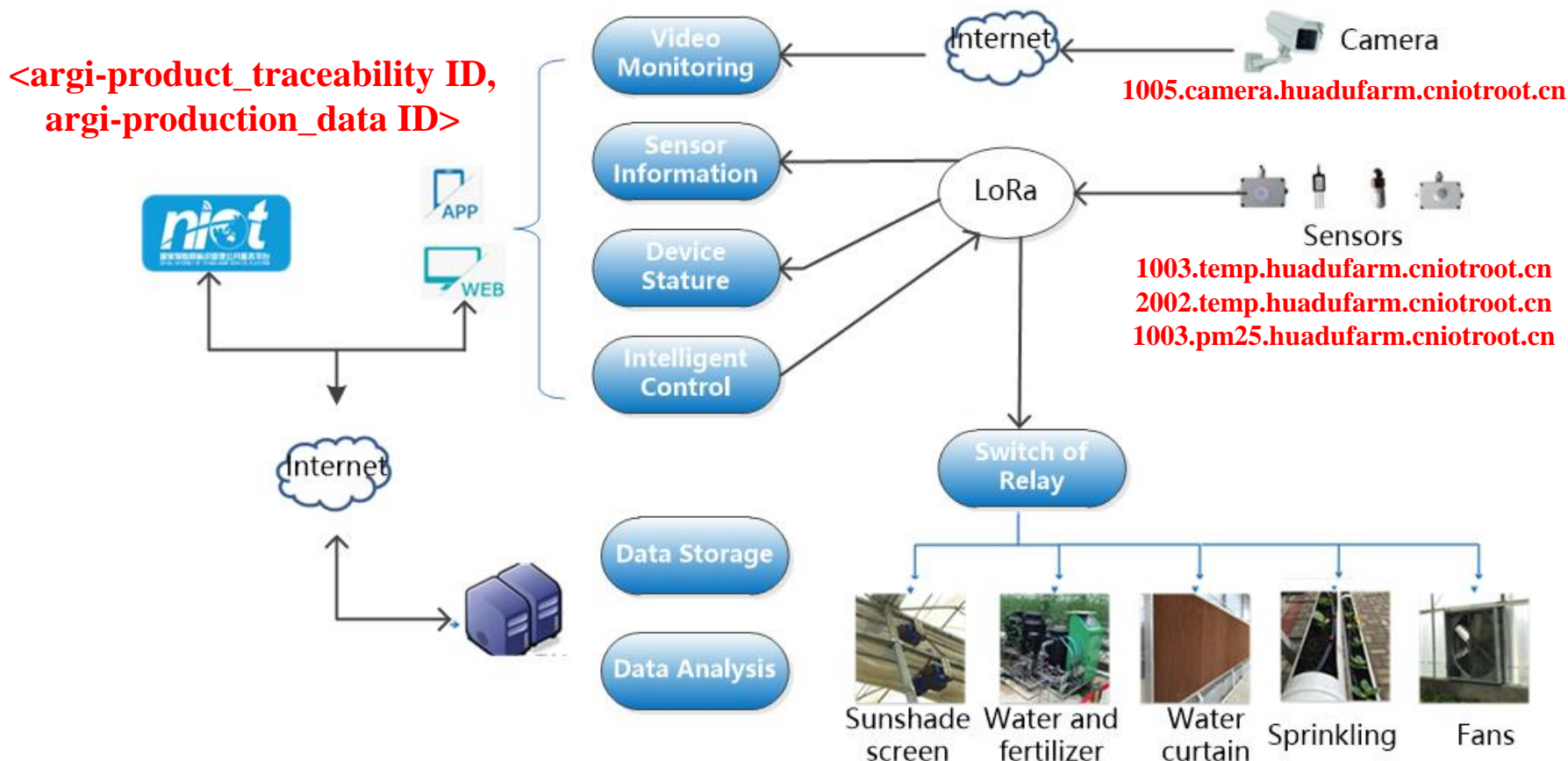
Applications-Industrial Internet

- In the Internet of Industry, the IoT identification system develop the identifier for in-progress item in every step during production. The manufactures and the end-user are able to capture the information of the product in the whole supply chain which improve the management of the production

<industry-product ID, process_data ID>

<industry-product ID, supply-chain_data ID>
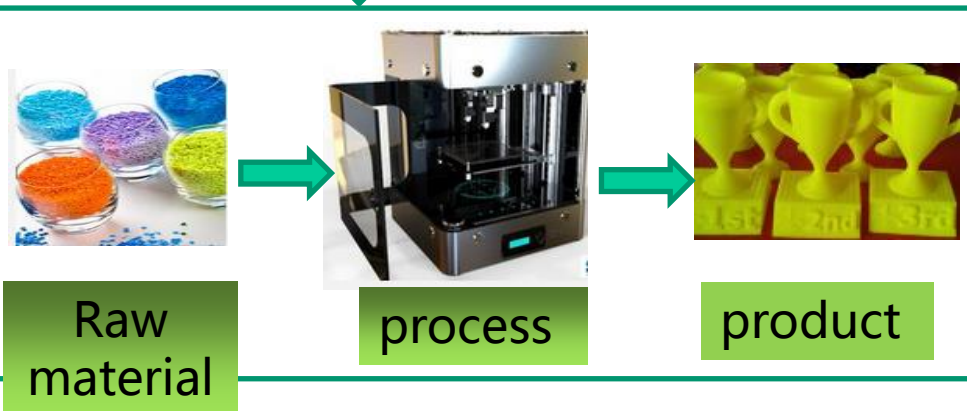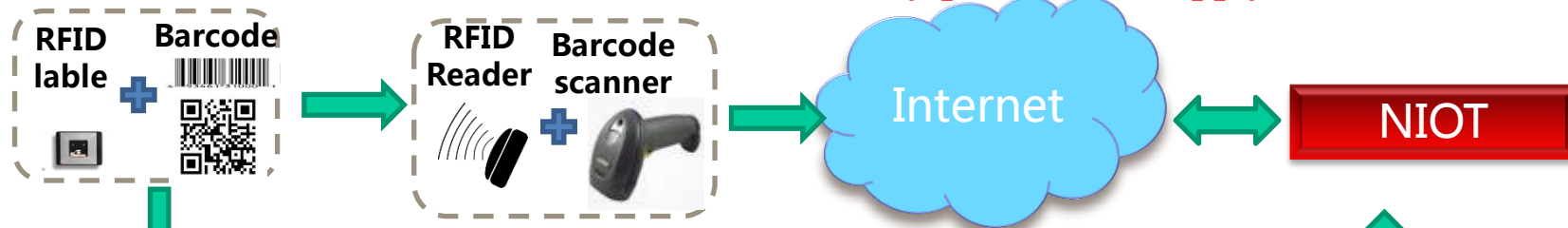
Introduction of NIOT

- The China Internet of Things Names Service Platform (NIOT) is the national identification service platform which is approved by the NDRC（National Development and Reform Commission）in 2012 to fully support the IoT industry development.

GS1 China

**China Academy of
Electronic Technology Information**

**China Academy of
Information Communication Technology**

Introduction of NIOT

- Construction Situation
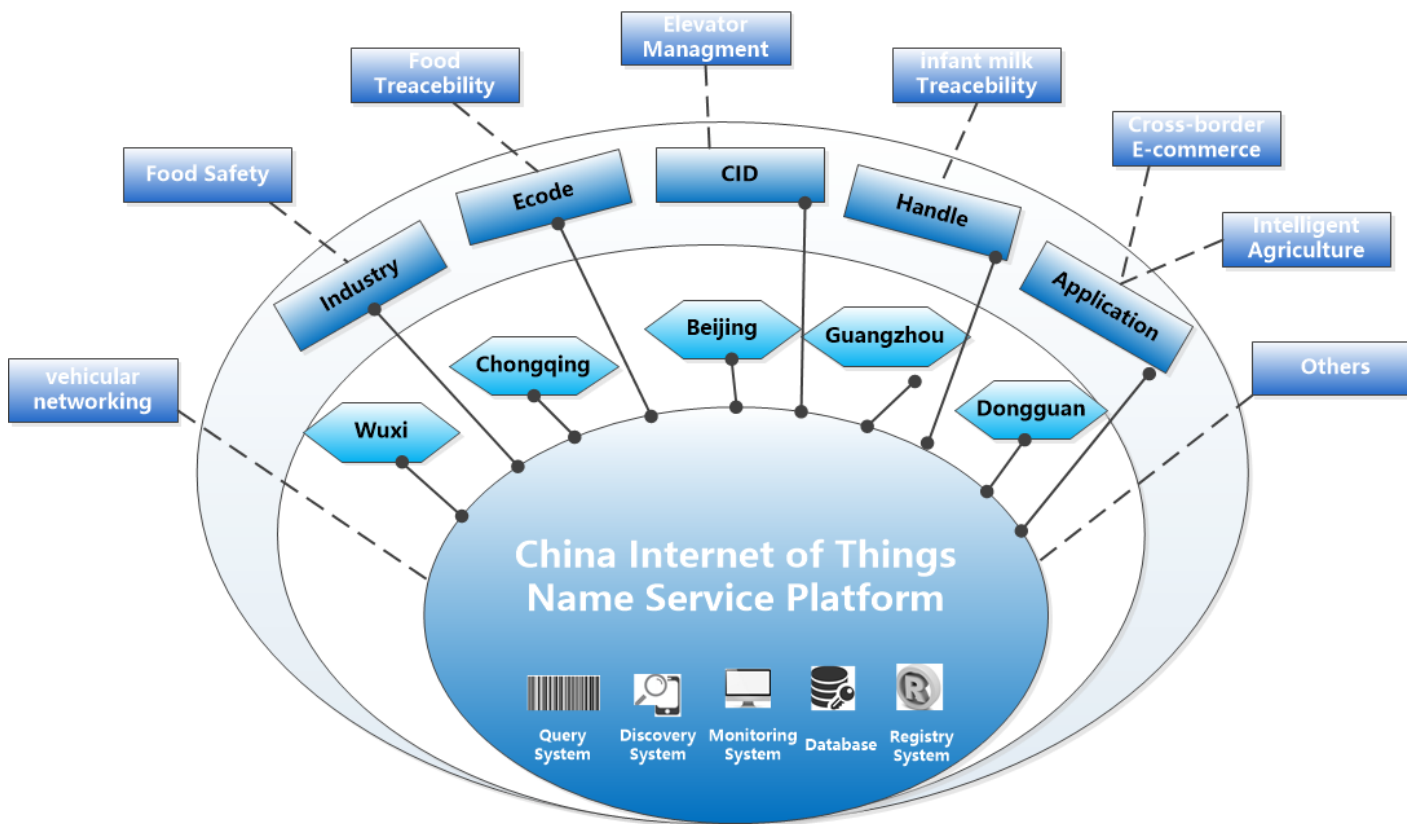
Node Construction

5 root nodes already constructed. 3 identification system child nodes and dozens of the application platform .

Service Data

The number of registered identifier is over **1.0 billion** , the sum of query is over **1.2 billion**.

THANK YOU

4 Zhongguancun Nansijie, Haidian District, Beijing 100190,China

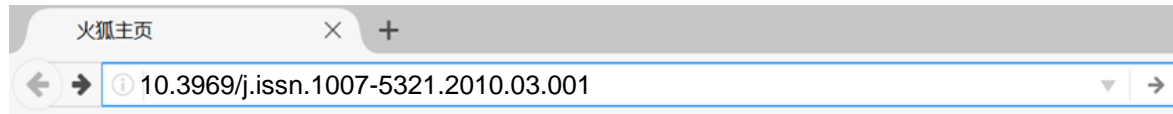P.O.Box 349

www.cniotroot.cn

For Example

- **DOI resolvation**

The doi resources can be easily obtained either by tapping the DOI on the doi webpage or through the search engine.

For Example

- **Hdl resolvation :**

The doi resources can be obtained by hdl, such as 86.1000.486.3986/…..

The cstr resources can be obtained by CSTR, such as cstr.xxx.xxx.xxx

- **Hdl:[niot]**

The same digital objects with two different identification systems, the resources can be easily got by the NIOT, one id is the doi, the other is the cstr. Both of them can be found through NIOT

For Example

- **Hdl:[niot]**

The same digital objects with two different identification systems, the resources can be easily got by the NIOT, one id is the doi, the other is the cstr. Both of them can be found through NIOT