

Standardization of identifier management in e-commerce

Position paper for **W3C Workshop on Web Payments: How do you want to pay?**

24-25 March 2014, Paris, France

Bo Yuan^{1,2}, Ye Tian^{1,2,*}

¹Computer Network Information Center, Chinese Academy of Sciences

²China Internet Network Information Center (CNNIC)

No. 4, South 4th Street, Zhongguancun, Haidian district, Beijing 100190, China

{yuanbo, tianye}@cnnic.cn

1 Introduction

With the development of personal devices and electronic commerce, new way and new pattern of Internet consumption are emerging. Customers want to shop online anytime and anywhere. Other participants want to complete the related transactions online too. Firstly, they all need a way of payment which is convenient and secure. Secondly, counterfeit and management are significant problems in e-commerce, so they want to know the information of the product lifecycle as much as possible. Lastly, customers need privacy and other participants need protection of business secrets. To meet the requirement a wide range of stakeholders may build e-commerce architecture in which they can authenticate, communicate and share information with each other.

There are a lot of stakeholders play different roles throughout the supply chain such as manufacturers, logistics providers, retailers and government. Most of them manage their own information of the product which is heterogeneous, for example the production date, transportation route, sales price and sales receipts. However, the information is usually used for inner management while not shared and presented to the customers eventually. It's difficult to integrate of heterogeneous information. One solution is using organized identifier (ID) for information management, but a variety of IDs in different fields cannot be unified either. To improve the situation, there are three problems here: 1) how to organize the information based on ID; 2) what should be shared with others; 3) in what way is the information exchanged.

In this paper, we propose to start the standardization of information management and exchange based on ID, which standardize the way of using and supporting IDs in different aspects of e-commerce. As well, it standardizes the communication among all the roles. This standardization can not only provide customers more information of products but also provide stakeholders a way of authenticating and

*Corresponding author: Ye Tian
China Internet Network Information Center
Email: tianye@cnnic.cn

communicating with each other.

2 Standardization of identifier management

According to the analysis in the last section, a series of standards are required for the standardization of identifier management in different fields of e-commerce. We suggest starting the standardization work in three aspects, as shown in Fig. 1.

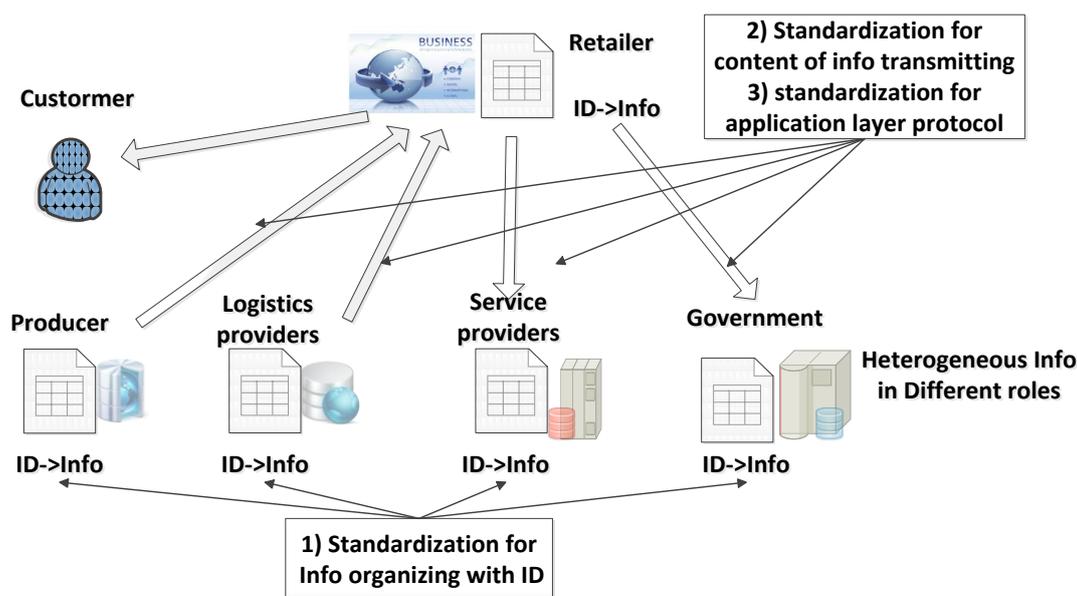


Figure 1. Overview of standardization works

2.1 Information organizing with identifier

In e-commerce, the information is heterogeneous. Firstly, the information may contain different kinds of contents, for example:

- ◆ Producer: production date, raw materials, instruction and so on
- ◆ Logistics providers: transportation route, storage location and so on
- ◆ Retailers: price, payment and so on
- ◆ Government: taxes, receipts info and so on.

Secondly, the formats of information may be not same among different companies even with same content.

Information cannot be shared due to the heterogeneity of contents and formats. To solve the problem, we propose using ID to mark and organize all the information. Ideally, only one uniform identification system is needed, but it's very difficult to find an identification system which is compatible with all the use cases. So in practical, the standardization may suggest adopting one of the identification systems which are mature and widely used. It should be noticed that the IDs must be diacritical, i.e. have overlap as little as possible with each other.

2.2 Content of information transmitting

With IDs which represent information of the products, the information can be shared among the stakeholders and presented to customers. However, there is another problem: what should be shared among different roles. The standardization here should standardize the transmitting content. For example:

- ◆ Producers must provide the production info to retailers
- ◆ Logistics providers must provide the logistics info to customers
- ◆ Retailers must provide the payment info to customers
- ◆ Retailers must provide the sales info to service providers
- ◆ Retailers must provide the taxes and receipts info to government
- ◆

From this point of view, a series of standards are needed to standardize or suggest the content of communication.

2.3 Application layer protocols

After standardizing the content, we also need to unify the application layer protocols of information transmitting. As mentioned before, when different roles in e-commerce communicate with others, they face a variety of heterogeneous resources. To avoid repeated work of supporting different protocols for heterogeneous resources, web of things^[1] is proposed to manage the resources based on RESTful services architecture^[2]. But in practice there are many different ways to implement the web of things, so we suggest standardizing the application layer protocols of information transmitting. Stakeholders can provide services based on this standard and communicate with others through the uniform application layer protocol instead of implement various protocols. Furthermore, this standard can also benefit the customers and developers of client applications. Customers with different devices (especially mobile devices) such as smart phones, tablets and desktop computers can query information and pay for the bills only if the devices are compatible with the standard application layer protocols. The developers of client applications can concentrate on the main functions only if they follow the standard instead of the considering the type of devices.

The standard of application layer protocols should contain the existed popular protocols including but not limited to:

- HTTP for accessing RESTful services
- Protocols based on HTTP such as SOAP
- JavaScript APIs for virtual objects

Some of the heterogeneous resources may be not simple text such like multimedia resources. So we need to consider how to present the resources. The standard of application layer protocols should contain the way of information presentation. For example, HTML5 is a potential consideration for supporting the information presentation to participants in e-commerce.

3 Support for identifier management

Information management and transmitting based on ID can upgrade the architecture of e-commerce and make payment convenient as mentioned before. Now the core issue becomes how to support various services for ID based architecture. The IDs belong to different stakeholders and emerge different formats, so the services can be divided into the following steps:

- ◆ Step1: identify the IDs (which identification system they belong to)
- ◆ Step2: find the server address which provides services for these IDs
- ◆ Step3: communicate with the server to get information related to these IDs

This is the procedure of naming service. To support the services of IDs, we have launched a project “China public platform for identifier management and service in IOT”. This platform provides public service for IDs based on the traditional domain naming service (DNS), through which IDs from different roles in e-commerce can be resolved and the interaction among roles become efficient.

The public platform adopts the architecture of RNS^[3] which is designed and developed based on DNS architecture. As shown in Fig. 2, the public platform contains the following components.

- Resolver: dealing with resolution requests from client including name conversion, sending query packet and receiving the response packet. It can be called by any kinds of applications.
- Name server: storage entity of various resource records and provides responses to queries.
- Information server: be consisted of a repository of all the detail information corresponding to a special resource.

To be compatible with various kinds of IDs, the public platform use two-stage ID which is consist of standard ID (SID) and resource ID (RID). The resolution mechanism is based on DNS mechanism but with two stages too. The SID resolution returns the semantic description for each naming scheme, and the RID resolution returns the address of corresponding information server.

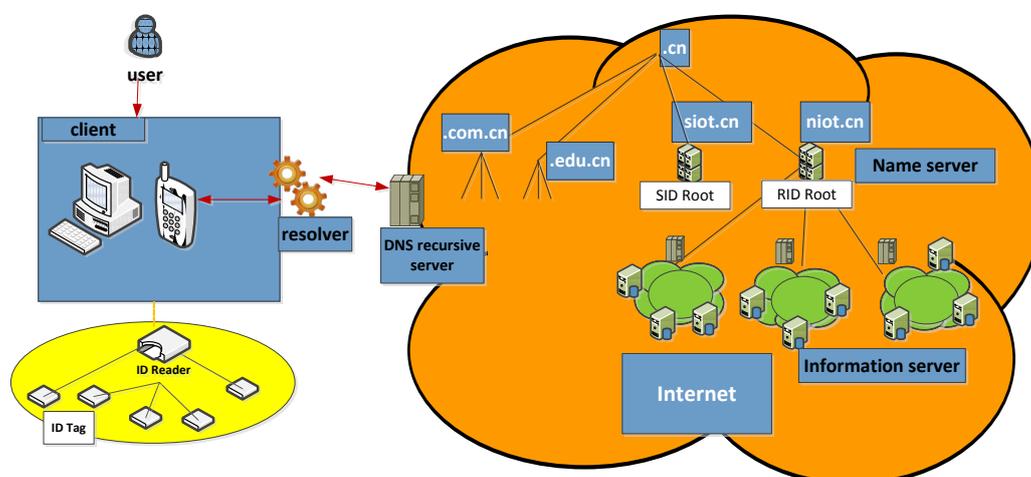


Figure 2. Architecture of the public platform

Fig. 3 shows the architecture of the platform, the following interactions as examples are shown to illustrate the service providing for IDs to improve the efficiency in various aspects of e-commerce.

- (1) Customers from different devices can query the information of all stages such as producing info and logistics info with ID through the public platform.
- (2) Customers can query sales information from different retailers and complete payment with ID through the public platform.
- (3) Service providers can query sales information and authenticate customers with ID through the public platform.
- (4) Government can manage the taxes info and receipts with ID through the public platform.

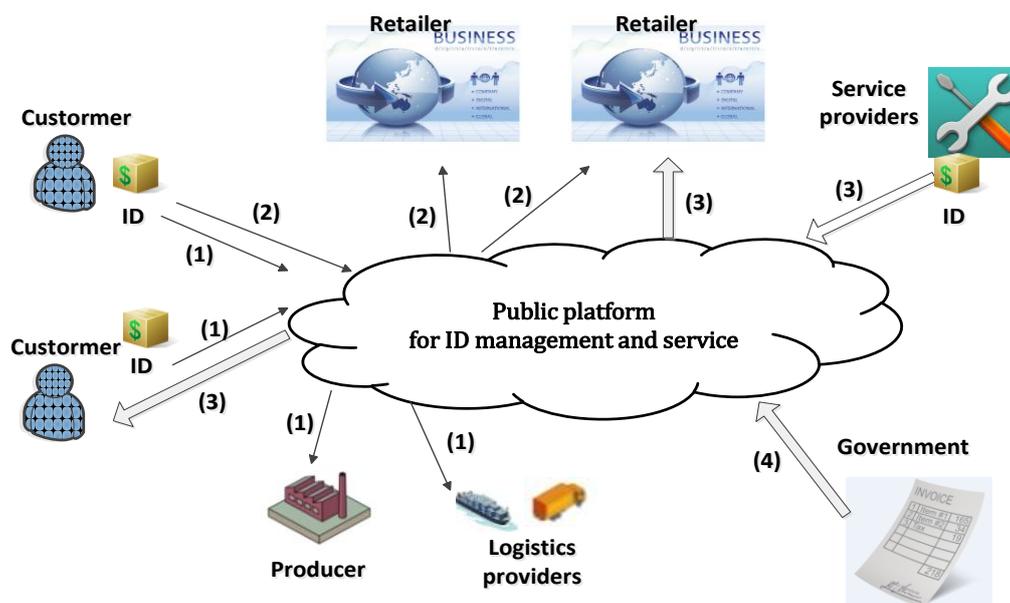


Figure 3. Supporting for ID management by public platform

Future works

One of the future works is starting the standardization as mentioned previously in this paper. The standardization of information organizing with ID and application layer protocol may have the higher priority. The other future work of ours is about the public platform. The project of public platform has been launched. The further work around public platform may be providing service to stakeholders in practical as much as possible. Standardization works will make service providing efficient.

References

- [1] http://www.w3.org/community/wot/wiki/Main_Page
- [2] Leonard Richardson, Sam Ruby, RESTful Web Services. O'Reilly (2007)
- [3] Ye Tian, Yang Liu, et al, RNS: A Public Resource Name Service Platform for the Internet of Things. IEEE International Conference on the Internet of Things (iThings), 2012.