

Virtual private network for wellness sports information

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Abstract To this day, active discussions and attempts were made to develop the IT foundation in order to ensure growth and advancement of the sports related industry and to ensure individual companies marketability and enhancement. In particular, development of the system in the current high-speed network in Korea that enables effective linkage and sharing of sports related information, and the system effective management and operation are certainly important issues. In order for the developed IT infra in Korea to act as a growth driver for the sports industry, it is important to develop structured and user-friendly information network to make an effort to connect these information networks in an integrated manner. Development and linkage of effective information network in the sports field are expected to become an important medium for satisfying diverse demands for the sports. This research propose a virtual private network for the development of large capacity for the sports related information based on the nation technological capability

Keywords Sports information · Information network · Virtual private network

1 Introduction

Sports are a jointly shared culture in the world in the sense that there are standardized technologies and rules worldwide. As such, sports already have a huge following in the

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market, and are also emerging as an important business along with the rapid growth of the IT industry. Recently, as sports industry is recognized as a high value added industry that will lead the future, demand by the consumers who want to obtain information related to sports is increasing. Consumers who are hungry for the sports related information are investing considerable time and effort to search for the necessary information on the Internet. To satisfy their desire for information, the Korean government (Ministry of Culture, Sports and Tourism) developed a sports industry related portal site that offers sports related information, statistics and analyses [7].

To this day, active discussions and attempts were made to develop the IT foundation in order to ensure growth and advancement of the sports related industry and to ensure individual companies marketability and enhancement. In particular, development of the system in the current super high network in Korea that enables effective linkage and sharing of sports related information, and the system effective management and operation are certainly important issues. In order for the developed IT infra in Korea to act as a growth driver for the sports industry, it is important to develop structured and user-friendly information network to make an effort to connect these information networks in an integrated manner [8]. Development and linkage of effective information network in the sports field are expected to become an important medium for satisfying diverse demands for the sports.

Accordingly, in order to guarantee effective use of sports information, it is necessary to build an infra that enables organic information sharing and interchange, to provide the core infra to the developers of the sports related institutions such as private companies, universities and research centers. Moreover, it is necessary to play the role of a leader when it comes to the user-centered information network. This research seeks to propose the network for the private virtual sports information network for the development of large capacity for the sports related information based on the nation technological capability, for the dispersion of the specialized sports information and for the development of high-speed network.

The paper is arranged as follows. Chapter 1 describes briefly the research scope and the contents of the paper. Chapter 2 gives the related works for our study. In chapter 3, we propose a logical network deployment scenarios for the sports information network. In chapter 4 and 5 we give a numerical field analysis of the proposed logical network. Finally, chapter 6 summarizes and concludes our study.

2 Method

To propose the network for the private virtual sports information network, this research used the research method called the meeting of experts. During this meeting, opinions of the researchers and experts were gathered together to hold discussions on the overall contents and network development of the virtual information network. For the experts advices, a group was formed with researchers who specialize in sports information and sports related field, university professors, researchers and university professors who studied IT information and network information network, and other experts in Korea. Meeting of experts carried out as mentioned above was conducted as below mentioned, and the matters pertaining to the scope of the virtual information network was set.

- Contents of the meeting of researchers: Agreement on all the elements that need to be provided when building sports information network, and on the conditions needed for the effective operation of the information network

- Contents of the meeting of experts: Discussion on the sports for the sports information network, scope of linkage when it comes to the sports and IT, and technical measures for the network development

3 Analysis

3.1 Current status

Recently as the sport industry is perceived as a high value-add industry that can lead the future, demand by the consumers who want to obtain sport related information is increasing. Consumers who are hungry for sport industry related information spend significant time and effort to obtain necessary information while traveling around the world via Internet aimlessly. Likewise, the need for specialized site that can satisfy this type of demand for information is being discussed.

Moreover, providing sport industry related statistics and information is essential factoring in the size of the sport industry and in order to develop policies from diverse areas that are suitable. In addition, sport portal site that anyone can use anytime, anywhere whether the beneficiaries are sport industry related companies, public organizations and others so that they can leverage the Internet environment to use information needed for company management activities, policy making and so forth at the just right time [3].

Amidst this situation, the government (Ministry of Culture, Sport and Tourism) constructed industry portal site to satisfy user demand for information. This sport industry portal site offers sport industry related information, aggregation of statistics and analysis information. An operation system that provides diverse and specialized information on the Korean sport industry and that continues to renew the information that consumers want is being constructed. In particular, information demanded by the government and sport industry organization through the composition of Community Pool, Information and Service is provided in a multi-dimensional manner. Moreover, effort is being made continually to lay down the basis for multi-dimensional analysis based on the sport industry business model by providing sport industry information [1].

Along with the advancement of the informatization society, timely access to resourceful information is being emphasized to secure company competitiveness. Effective use of information communication network is perceived as a means for companies to survive. Likewise, active discussions and efforts continued to be made regarding the construction of the information communication base in order to ensure growth and advancement of the related industries and to ensure and to improve market value of individual companies when it comes to the sport industry as well. In particular, construction of the system that enables sharing and effective linking of the sport related information that is available in the Korea super speedy network today, and effective operation are certainly key policy initiatives. In order for the constructed IT infrastructure in Korea to serve as sport industry growth lever, it is essential to make effort to construct structured and user-friendly information network as well as connect each information network in an integrated manner .

The explosive growth in information following the advent of the informatization society is not an exception in case of the sport industry as well and emphasized that it is possible to positively contribute to the sport advancement by expanding general public scope of choice when it comes to the physical training related information produced and created through informatization and sport related information [4]. Moreover, network construction following informatization is gaining attention as an essential element for the growth of

regional society [9]. Accordingly, it is also true that there is a possibility that negative side symptoms such as decreased quality of applicable information or user confusion as well as user burden may result due to the drastic increase in sport information [6].

However, construction and connection of the organic and resourceful information network for the sake of the Korean sport industry are expected to serve as important mediums for satisfying diverse demands for sport. However, it is possible to claim that the level of Korea sport industry network is still at the beginner level. Since most of the sites are operated centered on their organizations, linkage with other organizations is very weak. Thus, the reality is that the integrated synergy of the sport industry is not ensured [5].

3.2 Limitations of the existing networks

Decentralization and acceleration based on nation technological capability are required when it comes to the sport industry related information due to the nature of the sport industry information system that handles large amount of specialized information. To guarantee these, it is necessary to construct infra that enables organic information sharing and exchange in order to provide core infra to the developers of the sport industry related organizations such as economic, industry, research cooperation both in and out of Korea. Moreover, it is necessary to play a leading role as user centered integrated information network.

However, numerous integrated information network of sport industry today merely list down related information and offers merely search function. Thus, it is difficult to provide new service through information processing. Moreover, integrated information network of sport industry today does not allow groups that compose information and community to exchange information organically due to the in-born limitation of information and due to the limitations of the network technology. Accordingly, the only method that exists today is for the supervising organizations to provide merely contents in a one-sided manner. Basically, organizations and individuals who comprise integrated information network of sport industry cannot produce contents jointly for distribution. Moreover, it is difficult to utilize produced contents to provide the Mashup measures that can make the third contents.

To overcome these problems, it is necessary to develop digital contents by combining together with the media by combining together organically the sport industry information and services based on IT technology, expand Internet broadcasting, and diversify into online sport education, and virtual sport experience business by capitalizing on the advancement of the multimedia. These will likely to ensure drastic growth going forth.

3.3 Model for the development of next generation integrated information network of sport industry

- *Integrated information network of sport industry* (Fig. 1) : First is that it is based on the data exchange method (RSS, Atom, RDF and others) of the flexible format that is based on the standard and XML along with the method for generating/sharing individuals knowledge easily using blogs. Second, Open API environment and open structure, as shown in Table 1, that are based on the Web service that uses REST, SOAP, WSDL, XML-RPC and others are adopted as core elements. Through this, advancement to open system linked model and platform based service model is being pursued. Third, data

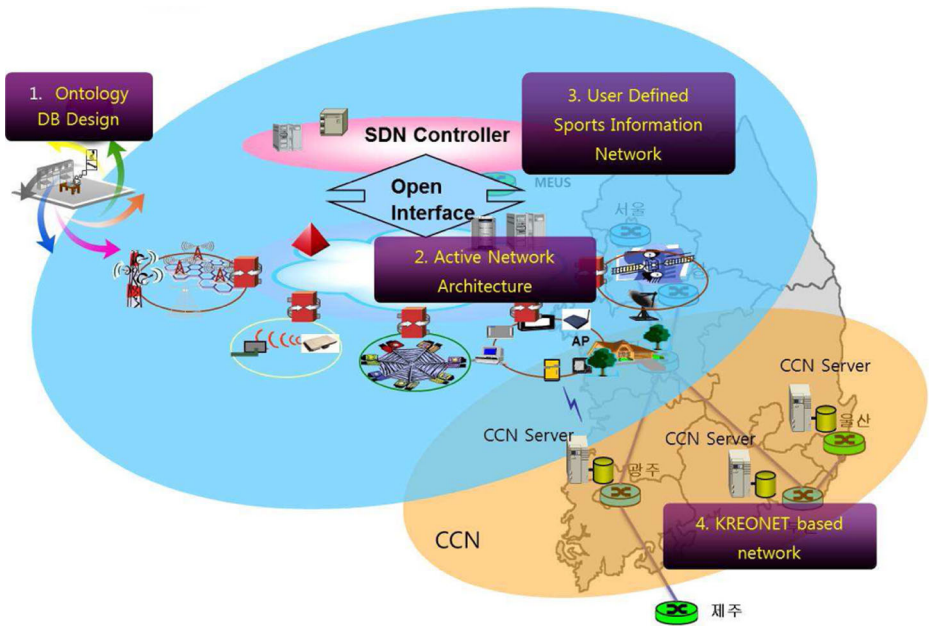


Fig. 1 Deployment scenario for virtual sports industry network

Table 1 Proposed OpenAPI for sports industry networks

Open API	Contents
Search	Search result XML/RSS Format
Online storage	Based REST API Save infrastructure
Online storage	Based REST API Save infrastructure Real-time update Mobile support
Location information	Location information of sports industry Cooperate with Map Open API
Cloud	Computing service Based server virtualization
Exntended RSS	Web-based RSS Reader Real-time update
OpenSocial	Common API for social app Real-time update
UCC	Common API for UCC App
Flexible payment	Common API for electric payment
OpenCertify	Certification API for sports goods and equipment

centered software integration and light programming model are pursued after through open API, as well as Internet based service centered software environment.

- *Open API*: In general, as shown in Fig. 2, Open API (Open Application Programming Interfaces) is that which opened up own company API to the outside in the form of Web service. This facilitates bringing information and function easily from the outside to use them. API is what enables user to search VODs that are otherwise scattered around the integrated information network of sport industry by tag, user, popularity and category by utilizing them. Moreover, CCN API provides total solution such as VOD upload, deletion, modification and searching so that VOD service will be enabled at a third party. In case of small companies and sites that cannot make VOD



Fig. 2 A Mashup using Google MAP OpenAPI

platform due to limited financial means, it is possible to add on VOD section easily anytime.

4 Logical network management framework

4.1 Topology schema

As the topology class which expresses the configuration of logic network, it has trunk class as a subordinate class. Trunk class consists of two classes; Vlan class which contains logical information for management of Carrier Ethernet trunk and interface class which physical information. Figure 3 illustrates a complete view of topology schema. It has the class to control the trunk class. As a UML diagram of topology schema, it shows specific parameters which are used in the class. Each parameter has been defined using enterprise MIB information. The logic network has been configured based on based on the definition of PBB-TE technology.

The performance monitoring class has the following subordinate classes; Throughput, Frame Loss and Frame Delay. It consists of Frame Loss Class, Fame Loss Ratio and Fame Delay Variation.

The fault management schema which is aimed to manage logic network faults has the following subordinate classes; Fault Verification, Power, Fault Notification, Fault Isolation and Fault Detection. Power Class includes Power Status Class which can analyze current power

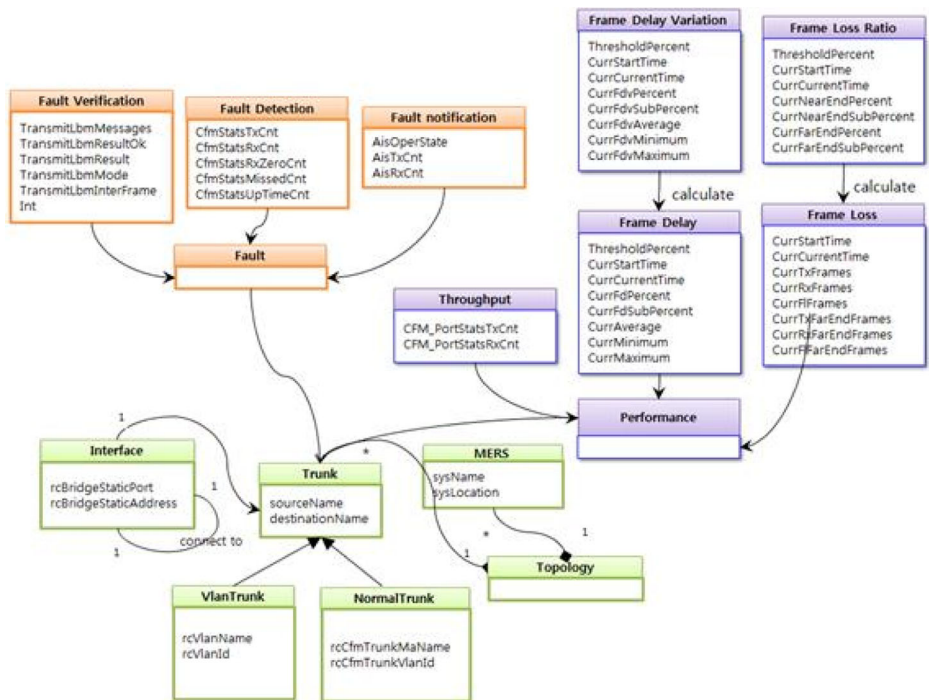


Fig. 3 Management class diagram schema

supply status and control the warning process and Warning Threshold Class. Fault Isolation Class has Linktrace Messages Class which can figure out network faults by analyzing LTM/LTR messages and Linktrace Relay Class.

4.2 Database design

The logic network management framework established in this paper consists of three databases. As shown in Fig. 4, it is comprised of `mers_info`, `xxx_topo` and `xxx_inter` databases. The database table which should be created first after the establishment of framework is `mers_info`. It contains Router configuration, performance, fault management table names as well as basic information on MERS equipment. Interface Information database is a database table in which MERS interface information is stored. It is also automatically created when MERS equipment is added just like topology table. It is automatically named in the form of `OOO_inter`.

As shown in Fig. 5, router topology information is the most important part in management framework. The logic network in which MERS equipment is configured across the nation can be precisely understood. It can be understood at a sight that it consists of router equipment and trunk in Daejeon and Gwangju. In addition, MAC address, Vlan ID and port number which are essential in configuring PBB-TE can be checked.

```
mysql> show tables;
+-----+
| Tables_in_mers |
+-----+
| BUS_inter      |
| BUS_topo      |
| DJN_inter      |
| DJN_topo      |
| GWJ_inter      |
| GWJ_topo      |
| SEL_inter      |
| SEL_topo      |
| mers_info      |
+-----+
9 rows in set (0.01 sec)
```

Fig. 4 Database items

MERS–SEL Topology Information

Trunk Port	Trunk MdName	Trunk MaName	TrunkSourceMac	TrunkDestMac	Trunk VlanId	Trunk ReVlanId
192	Trunks	DJN–SEL–P	00 24 43 97 73 DF	00 24 43 BE 83 DF	2001	2001
193	Trunks	DJN–SEL–S	00 24 43 97 73 DF	00 24 43 BE 83 DF	2002	2002
192	Trunks	SEL–GWJ–P	00 24 43 97 73 DF	00 25 C3 D3 C3 DF	2009	2009
193	Trunks	SEL–GWJ–S	00 24 43 97 73 DF	00 25 C3 D3 C3 DF	2010	2010

Fig. 5 Router topology information

5 Conclusions

This research analyzed the realities of the sport industry information system and information network in Korea to propose the following when it comes to the measures to realize sport industry information integration.

First, DB for sport industry related information that factored in the Ontology is being developed. In other words, it is necessary to design a DB that factors in the Semantic Web. That is, foremost focus should be placed on providing information that is most needed for user and to process vast amount of information that exists in the integrated information network in order to provide customized information to user.

Second, once the DB related to the sport industry that factored in the Ontology is developed, it is necessary to build RSS/Atom based active network that enables exchange of organic information among them. As contents syndication technologies such as RSS and Atom get combined, it is possible to distribute the information generated from sport industry information network in an increasingly organic manner. Through this, it is necessary to realize distributions core platform that produces and re-produces contents.

This paper also investigated a framework in which a logic network is described and managed by particular application based on science and technology research network resource specification. As a result, a schema through which topology, performance and fault information can be systematically managed in accordance with international standards has been completed. In addition, database has been created based on the schema which has been designed in accordance with international standards, and a network management framework through which a logic network can be managed has been built. Then, information has been brought from the current Carrier Ethernet equipment and provided to an administrator.

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