Medical Healthy Information System-Based on IPv6 Platform

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Abstract:-Internet is very popular recently. Not only most of people are interested in Internet but also the technologies of wireless, xDSL, and cable modem is better than before. For these reasons, we realize that IPv4 addresses are less and less each year. Today, every country begins to research and study the new generation protocol. Especially in Asia which gets IPv4 Address not too much study IPv6 very hard. In Taiwan, some ISPs and units have been gotten 13 IPv6 addresses; the rank is the third in Asia area. By the way, the units of Research and Development in Taiwan are Academia Sinica, Ministry of Education, ChungHwa Telecom, National Dong-Hwa University, and so on. Taiwan Government announced the protocol of network will use IPv6 in 2008. We have to notice the development for the protocol right now. One will discuss how to use and research IPv6 to be the platform for a medical healthy information system.

Key-words：IPv6, medical healthy information system

1. Introduction

1.1 Background and motive

The network IP Address has an insufficient phenomenon to use so far, especially with the area of Asia, such as mainland China, Japan, Taiwan, Korea S., because one large IP address, in order to be taken up first by American-European countries. To solve the problem that IP is insufficient, have a lot of network software that address change come out development Network Address Translation successively and apply to each organization. But use the still unable solve of the network with insufficient address completely of the technology that the address changes, what entity IP and virtual IP practical application are had is widely different , unable to totally make use of technology that the address changes to overcome . So in order to produce the IP position that can not be used up, supporting internet network communication protocol IPv6[1] of new generation produces, have been proposed the network communication protocol of new generation by IETF (Internet Engineering Task Force). There are 128 bits to address the location internet network node IPv6, it is up to 2128 bitsto fix the location space, real IP seat is the 128th power of 2, the figure seems not to feel, the real quantity may let every thing of every one people have internet network communication protocol address (Internet Protocol, IP) . So from individual several assistant (PDA) in future, cell-phone , wrist-watch , electrical home appliances products can have a unique IP address, can make the latest information or transmit information and get to carry the host computer near from carry and control managing far through the wired or wireless network .

Taipei creates the wireless network new capital, the light pole in the street, traffic number will have

disposed nearly 2300 and connected and fetched the box (AP) wirelessly, it is estimated that can reach the accumulation people's coverage rate of 90 recently, representatives walk in the street of Taipei, you can receive and transmit the message whenever and wherever possible through the network. One that Skyhook wireless lies in Boston creates the company and announces to the outside on June 20, 2005 newly, have no circuit to utilize by 802.11 radio signals that device AP-Router sent out, find out the PC, individual is a several assistants (PDA), the wireless radio frequency distinguishes (RFID) labels, the any wireless wide-band accurate position of the device of network (Wi-Fi), known as accuracy and surpass traditional GPS (GPS).

If everyone can have IP , the pedometer building IP in one persons who imagine you bringing on one's body both, amount of exercise that the ones that can just not merely calculate every day for you in its function walk, may pass network materials that walk store database, count and analyze and can also make a reservation .

Weight machine, the body fat machine has IP, you only need to stand in 50 seconds of above, can store the relevant data in the database, do not need through inputting artificially, can tell you the weight state now at any time through the network and then, if you are reducing heavily and can be being offered your correct diet and sport by database, make you heavy in more efficient reducing.

1.2 Purpose

Our main direction made is:

1. A network structure that uses IPv6 to be mainly platform of construction[2]. The network platforms of one IPv6 of construction and IPv4 protocol very applicable to all, the mechanism disposed (Stateful Auto-configuration) automatically through IPv6 the whole state, the user disposes the agreement through similar IPv4 dynamic host computer (Dynamic Host Configuration Protocol, the function that DHCP) can be having wireless or limited cyberspace to establish but lines immediately while obtains IP address and does not need to be manual.

2. The database server uses three layers of structure. Input the height , weight , age , waistline , buttocks , body fat through the network browser, it calculate your Waist Hip Ratio(WHR), Body Mass indexes(BMI) , body fat rate, and generate useful healthy database,

1.3 Limit

The time limited desire is infinite , this research strives to be perfect in the course of carrying on, but probably still there are the following restrictions again: 1.The non- single host computer of network structure can be reached, this research adopts the single sub network (Single subnet with link-local address) with address of one linking machine in protocol network model of IPv6, that is to say that has IPv6 communication protocols on the same at least two nodes of network sector, the middle does not need the router .

1.4 The key noun definition

This research counts and uses the following several important nouns, define as follows respectively now[4,5,6] :

- The fourth edition of internet network communication protocol (IPv4):

Presents Internet Protocol edition (called 4th edition of IP or IPv4) is after RFC 791 issued in 1981, there is no too great change. IPv4 verifies it is a strong, apt to carry out communication protocol and can operate each other, it passes and can adjust the network into a common program in common use to test too, the size is equivalent to today's internet network.

- Sixth edition of internet network communication protocol (IPv6):

The internet network project task promoted the group (IETF) to especially develop a set of communication

protocol and standard for this, called IP Version 6 (IPv6)[9,10,11,12,13]. New edition, was called ' IP - the new generation (IPng) ' in the past, adopted a lot of IPv4 communication protocols to upgrade the concept which proposed the method. IPv6 especially avoids increasing the new function in the design, tries not to influence the upper strata and lower floor communication protoco.

- The Network Address Translation (NAT):

NAT technology can let local transmission control protocol computer and equipment , share the common internet network communication protocol address , translate IP address[7,8] among the networks each other, but does not influence each other , is like the independent individual. NAT can be allowed and have the computer of the private network to reuse the address to let inside enterprises, and offer address turning to and balanced load of TCP traffic, in this way the merger between the internet networks is more smooth-going .

- AP-Router:

The router[3] is a kind of network equipment joining a lot of networks or the network section, not only can carry on the data information between different networks or the network section ' translate ', can also let them read the data which know the other side each other , thus form a bigger network in succession . Router is a basic equipment that use between the computers conveying exactly network different information to used for, IP protocol that we used is to link different IP addresses together with the function of the router, let IP of two different network sectors can be interflowed and managed. Having no circuit on the market can increase the function of sending out the network signal again by the device , become have on-line main structure of network , that is to say wireless base platform that we are generally called.

- Wireless wide-band network (Wi-Fi):

Another name of IEEE 802.11b, it is by a " wireless inclusive alliance of network very much of second " by name (Wireless Ethernet Compatibility Alliance, the industry term released of organization that WECA), Chinese is translated into " wireless inclusive authentication ". It is the wireless transmission technology of a kind of short distance, can support the radio signal that Internet inserts within the range of several hundred feet. With the development of technology, and appearance of standard, 802.11a of IEEE and 802.11g ,etc. of IEEE, IEEE 802.11 the standard act as Wi-Fi already.

- Waist Hip Ratio (WHR):

WHR =Waistline / buttocks, fat indexes of man; WHR> 0.92, women fat index WHR> 0.88.

- Body Mass Index (BMI)

The value amount of body: The greater the number value , such as height / the square of value of the weight , BMI index , the fat rate of body , waist hip rate ,etc. (i.e.: diabetes , heart blood vessel disease -),the more probability to suffer the chronic disease.

2.Literatures review

2.1 Brief introduction of IPv4 and IPv6

- Package structure and head fields were showing in Figure 1.

Version (4)	Internet Header Length (4)	Type of Service (8)	Total Length (16)
Identification (16)	Flags (3)	Fragment Offset (13)	
Time To Live (8)	Protocol (8)	Header checksum (16)	
Source Address (32)			
Destination Address (32)			
Options (Variable)		Padding (0-24)	

Figure 1. Package structure and head fields

- Internet Header Length

We see from IP package head field that 6 lines of front are header to mark the length of head (IHL), so we know that the length is that 6 of 4bytes are 24bytes as 6 each one 32bits.

- About the types of service, here means that IP package is conveying the service type that the course is being required to serve the type (TOS), having it altogether by 8 groups bit, the association of each one bit represents different meaning respectively as showing in Figure 2.:

000.....	Routine	Establish IP Order，Set as o in advance， otherwise number value has priority high
...0....	Delay	Delay Postpone requiring，0 is the normal value, 1 is required for being low
....0...	Throughput	Traffic Required，0 is normal value, in order to require high 1
.....0..	Reliability	Dependability is required, 0 is normal value, in order to require high 1
......00	Not Used	Have not used

Figure 2.Types of Service

- Total Length

Number value includes marking the total of the head and data for the total length of the package (TL).

- Identification

Discern that yard (ID) has only discernment yard of one 16bit each IP package. The level of the network of OSI is talked about: Will be dismantled one and become form of the package to send when the data that the procedure produces should be conveyed through the network, when the package is recombinant, this ID is the basis.

- Flags

The discernment marks of 3 bits that the mark (FL) uses when make best up in the transmission course of the package as showing in Figure 3.

000.	When this value is 0 , show that has not been used at present。
.0..	When this value is 0 , show that the package can be cut apart , can't be cut apart for one。
..0.	It is 0 o'clock to act as a value, it is the last package that this value shows this package for 0, if one expresses that thereafter there are packages cut apart.。

Figure 3 discernment marks of 3 bits

- Fragment Offset

Fragment Offset (FO) after the package is cut, because the situation of the network or other factors are influenced , order that reach can cut the same order originally, while cutting, will do a good job of the record of the localization for each passage , could sit in the right seat while recombination. FO is 0 without cutting.

- Time to Live

We will all be met to establish in a lot of networks to extend the time (TTL), will act as a piece of things, after being given TTL value and regards second as the unit, will time , if the things have not been dealt with yet when reach TTL value, will be abandoned. However, not every TTL regards time as the unit, such as TTL of ICMP protocol, with jumping the figure of the station (Hop Count) and running the unit in the route course of the package. TTL is it after standing, will lower into a number value to jump through one while being every. So when the package fails to reach the destination because of some reasons in the course of transmitting, can prevent it from being packed with all the time on network.

- Protocol PROT

It is used in package in protocol (PROT) this network protocol type, it arrange like: ICMP , IP ,etc.. Protocol on use here protocol of Internet, this and procedure protocols of upper strata (for instance: FTP, POP, etc.) is different. Every protocol and code name are as follows:

```
ip      0       IP              # internet protocol, pseudo protocol number
icmp    1       ICMP            # internet control message protocol
igmp    2       IGMP            # Internet Group Management
ggp     3       GGP             # gateway-gateway protocol
ipencap 4       IP-ENCAP        # IP encapsulated in IP (officially ``IP'')
st      5       ST              # ST datagram mode
tcp     6       TCP             # transmission control protocol
egp     8       EGP             # exterior gateway protocol
pup     12      PUP             # PARC universal packet protocol
udp     17      UDP             # user datagram protocol
hmp     20      HMP             # host monitoring protocol
xns-idp 22      XNS-IDP         # Xerox NS IDP
rdp     27      RDP             # "reliable datagram" protocol
iso-tp4 29      ISO-TP4         # ISO Transport Protocol class 4
xtp     36      XTP             # Xpress Transfer Protocol
ddp     37      DDP             # Datagram Delivery Protocol
idpr-cmtp 39    IDPR-CMTP       # IDPR Control Message Transport
rspf    73      RSPF            # Radio Shortest Path First
vmtp    81      VMTP            # Versatile Message Transport
ospf    89      OSPFIGP         # Open Shortest Path First IGP
ipip    94      IPIP            # Yet Another IP encapsulation
encap   98      ENCAP           # Yet Another IP encapsulation
```

- Header checksum

Header checksum that examines the main and for examining and misusing number value, with so as to ensure package is it reach to receive correct. After the package begins to convey, receiving the end host computer will examine the remaining package to will utilize this examining value, if everything seems errorless, will send out the information of confirming, and show that it is normal to receive.

- IPv6 package structure and head field as showing in Figure 4

<table>
<tr><td>Version (6)</td><td>Traffic Class (8)</td><td colspan="2">Flow Label(20)</td></tr>
<tr><td colspan="2">Payload Length (16)</td><td>Next Header (8)</td><td>Nope Limit (8)</td></tr>
<tr><td colspan="4">Source Address (128)</td></tr>
<tr><td colspan="4">Destination Address (128)</td></tr>
</table>

Figure 4 IPv6 package structure and head field

- Traffic Class

It is can be used in the nodal router initially and label and distinguish different IP package classifications and priority to transmit this field of the classification (TC), used for offering multi-form difference service for IP package.

- Flow Label

The news flows the mark (FL) needs the package array that especially deals with of the router for which source node is labeled, Such as decided at the higher level but not officially announced quality service or immediate service non- , flow as to news mark host computer or router that function does not support should establish 0 of this field when the initial package, keep intact while conveying the package and neglect while receiving the package.

- Payload Length

Length of the package (PL)

Next Header

The next one marks the head (NH) and labels the attitude in this next IPv6 type of marking the head of marking the head, use the value similar to IPv4 protocol.

Compare IPv4 and IPv6

P f k ` b F Ms 1 ^ o b k l q o b d r %B oq bf kk a bi ab k Rl kq fe r%a r/ b- * Fl a- b_ kv qq fb qp f&b the package head. IPv6 reduces fields from 14 to 8 and has regular length(40 bytes). Thus, router deal with IPv6 package speed very fast to omit judge shelf movement , head of length at least, improve route efficiency.

Position expression method of IPv6

IPv6 at the address, divide it into 8 (Segment), each section is made up of 16 bits, so must you with colon (:) Separate, for example:

wxyz: wxyz: wxyz: wxyz: wxyz: wxyz: wxyz: wxyz

One pair of colons: : Show continuous 0 not regular in quantity , for example:

1234: 0001:0002: 0040:0000: 0000: 0000: 0001
abbreviateto 1234:1:2:40::1

IPv6 Auto Configuration mechanism as showing in Figure 5

(1).the FE80 " first code of conduct

F q j r p q _ b I f k h * I l ` ^ i F Ms _ b d f k t f q e FE80, in order to " establish automatically " in the course, first yard used temporarily. Having reached q e b c l i i l t * r m p q b m) q e b ` l j m r q b o ` ^ k _ b ^ c q b o q e router gets the first yard of another group, will replace and lose FE80.

%/ & + D b k b o ^ q b ¦ B R F * 3 1 ¦ ^ a a

The form of the network MAC address very much of second, former 24 bits represents manufacturers; And then 24bits represents the serial number. IEEE makes another kind of new address form, expands the length accounted for of the serial number as 40bits, this kind of total length is called EUI address of 64bits. In order to keep the compatibility with existing 48bits MAC address, can change 48bits

J > @ ^ a a o b p p f k q l B R F * 3 1 ^ a

Figure 6 is showing the situation

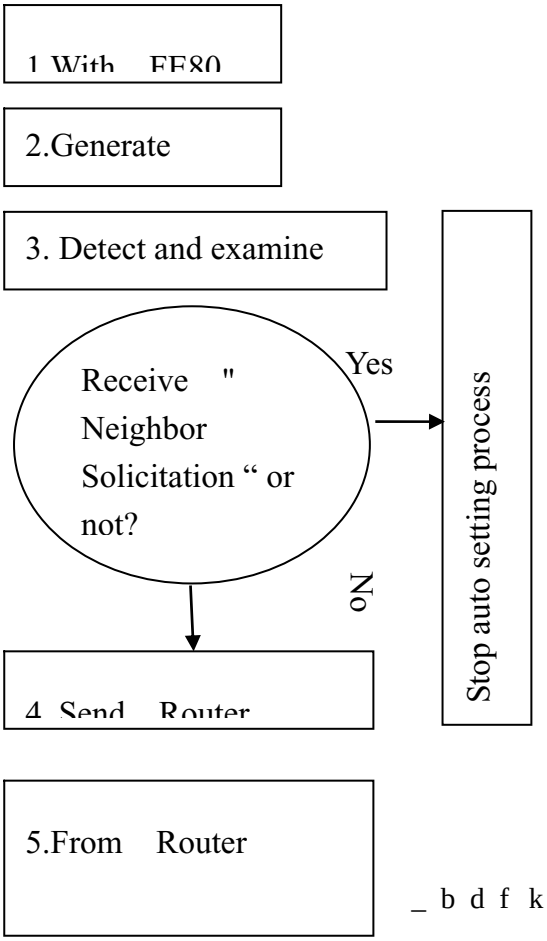

Figure 5 Ipv6 Auto Configuration mechanism[15]

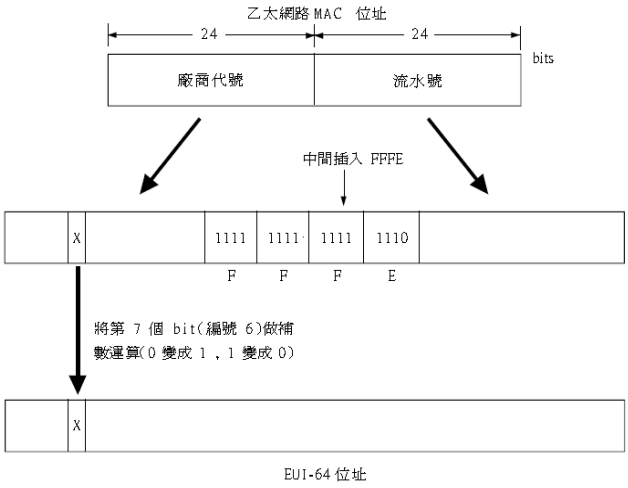

Figure 6 Change 48bits MAC address into EUI-64 address

(3).Detect and examine the address of repeating(DAD)

Under the environment of normal IPv6, receive the computer of the package of “inviting the sweet-smelling neighbor " (Neighbor Solicitation) can learn according to the purpose address of this package whether oneself is a target invited. If right, give the package to the other side to reflect “sweet-smelling neighbor announcement " (Neighbor Advertisement); If oneself is not a target invited, abandon this package. Utilizing above-mentioned characteristics, the computer regards one's own IPv6 address (addr1) as the purpose address, see off and "invite the sweet-smelling neighbor" the package give the same other computers of sectors of network, then wait for other computers and reflect "the sweet-smelling neighbor announcement ". If receive and react, show that addr1 has already been used by other computers, must change to be established the address artificially at this moment. But under most situations, should be unable to receive "sweet-smelling neighbor announcement" and react, in other words, the computer can use this address of addr1. This kind detects and examines movements reused in IPv6 address and is called DAD (Duplicate Address Detection, detect and examine the address of repeating).

(4).Send “ invitation router “ package

The computer sends “ invitation router “ (Router Solicitation) the package gives the routers of sectors within the same network, ask it to reflect the package of “ router announcement “ (Router Advertisement), include “ first code “ with “ preserve the floodgate and say “ (Default Gateway) information in “router announcement” package.

(5).Obtain another first code from " router announcement " package, replace FE80 The computer obtains " preserving the floodgate and saying " information and the another first code from " router announcement " package, replace original " FE80 " with this first code, then a new IPv6 address emerges, this new address is a real address that is used for joining the outside network (usually refers to the internet network).

(6)Single subnet[14] with link-local addresses

This establishes and only needs to install IPv6 communication protocol on at least two nodes of the same network sector (also called linking or sub network), do not need middle router.

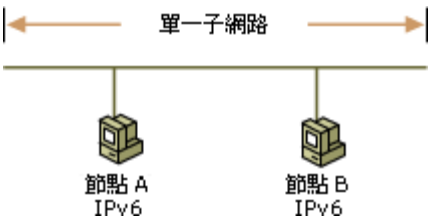

Figure 7

Node A and B computers are showing in Figure 8 and Figure 9 individual.

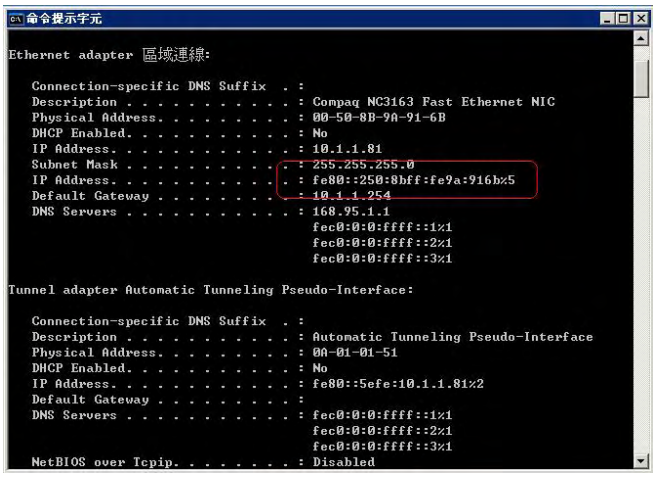

Figure 8 Computer A

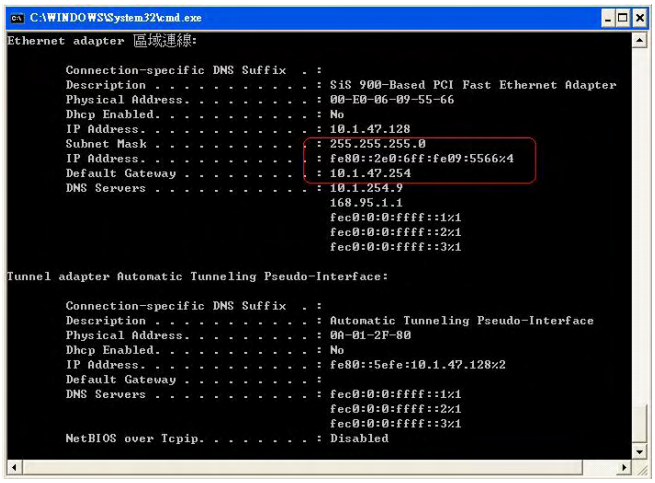

Figure 9 Computer B

We carry out the following step link copies of machine host computer use IPv6 is it pick briefly to come in two (exchange ' ICMPv6 Echo require ' and ' Echo is replied ' message). A host ping B host computer is showing in Figure 10.

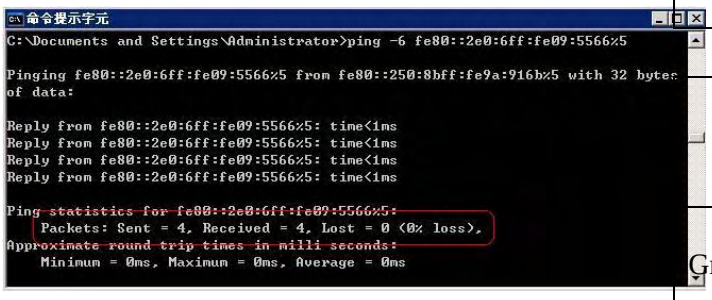

Figure 10 A host ping B host

Packets: Sent =4, Received =4, Lost =0 (0% loss)

The expression method used when being discerned code with the address in appointed area is Address%ZoneID. The above is showing the test of interflowing with sector IPv6.

2.2 Medical healthy information system

The system that base on IPv6 platform regards prevention and health care service as the research[20], direct against periodic health examination, keep healthy with the body on ordinary days for main fact and lasting record and management.

- The database planning is showing in Figure 11,12,13,and Figure 14

	Attribute Name	Data Type	Allow NULL	Remarks
User's Serial Number	User_id	mediumint (8)	NO	Primary key
Name	Name	varchar (8)	NO	
Inscroll Name	username	varchar (12)	NO	
Password	password	varchar (12)	NO	

Figure 11.Table Schema 1 (User)

	Attribute Name	Data Type	Allow NULL	Remarks
Group Serial Number	Group_id	mediumint (8)	NO	Primary key

Group Classification	Group_type	tinyint(4)	NO	
Group Name	Group_name	varchar (40)	NO	

Figure 12.Table Schema 2 (user_group)

	Attribute Name	Data Type	Allow NULL	Remarks
Serial Number of Group	Group_id	mediumint (8)	NO	Primary key
User's Serial Number	User_id	mediumint (8)	NO	

Figure 13.Table Schema 3 (group)

	Attribute Name	Data Type	Allow NULL	Remarks
Serial Number	Healthy_id	mediumint (8)	No	Primary ken
User's Serial Number	User_id	mediumint (8)	NO	
Age	Age	int (5)	NO	
Height	Tall	int (5)	NO	
Weight	weight	int (5)	NO	
Blood	Blood_type	int (5)	NO	
Sex	Sex	int (5)	YES	
Diastolic Pressure	d_pressure	int (5)	YES	
Systolic Presuure	S_pressure	int (5)	YES	
Fat amount	Fat_amount	int (5)	YES	
Excpt Fat amount	Excpt_amount	int (5)	YES	
Total water content of body	Water	int (5)	YES	
Remarks	ps	varchar(40)	YES	

Figure 14.Table Schema 4 (user_info)

2.3 Language and tool that the development system uses

During the later stage of 2.0 editions of Internet Information Server, Microsoft has already begun open beta and tested the technology named Denali. Microsoft is while issuing 3.0 editions of Internet Information Server, named this technology Active Server Pages formally. ASP (Active Server Pages) is a kind of technology developed out by Microsoft, this kind of technology carries out and describes the operation logic of yard of the procedure of language (Server-Side Scripting) through the end of the server, produce the content of the webpage file dynamically, for various kinds of browsers to read. While writing ASP procedure, will is it use a certain procedure language is it write the procedure yard to come to select usually, then through the procedure yard with the special label coming area, put into general HTML file. Once the user reads ASP file through the

browser, the server will be carried out procedure yard in the file, then after operation, spread and get back to the browser the result of operation with standard HTML form. ASP (Active Server Pages) belongs to a kind of webpage server technology, though Microsoft has already developed ASP.NET technology of future generation, but in the technology of the webpage of end of the server at present, ASP still has certain positions, because the simple characteristic apt to study, up to now, ASP is still one of the best choices of beginning to learn the end webpage technology of the server. ASP technology is to carry out in Web server, but the course which it does not need compiling, can imbed Script HTML label in procedure yard and set up dynamic webpage and webpage database directly, make the webpage not only a static webpage again, but become webpage technology of structure Web application program of principal and subordinate of a kind of setting-up. ASP technology is different from HTML, VBScript, webpage technology of customer end , such as JavaScript and DHTML ,etc., only need to browse through Script procedure that procedures can show the content of web pages or carry out the customer end, ASP is the technology of the server, the user is insufficient to need to have a look around the procedure, it needs a Web server to carry out ASP procedure, because ASP is the webpage technology of laying rivers and mountains of Microsoft, only Microsoft Web server PWS , IIS support the development environment of ASP procedure at present. Whether can use various kinds of procedure language, come procedure yard to write ASP, for instance. VBScript, JavaScript, Perl, Tcl, Python,etc.. The website server procedure of Microsoft has already established good VBScript and key procedure of literal translation of JavaScript (or been called the engine). If use other languages, then you must install the key procedures of literal translation of these languages separately, then do proper settlement in the website server.

2.4 Database system

The database , for the gathering of a lot of materials, namely a place that can preserve a large number of materials sets , and database administrative system (DBMS) Storing in order to offer general materials of interface managing database that users can be efficient and convenient under actual operation in not needing to understand the database is all right Write down with the most basic characters shelf, but very arduous if it will later asked while looking for or dealing with that there are many materials, deal with in order to let the materials be convenient and so management is stored through an efficient way, in order to manage and operate ! ! In order to be up to the communication between every database, so SQL is a common grammar on the standard database, in order to make the user more convenient and manage and deal with!! SQL is that one is used for dealing with the standardization program language of the related type database specially. It born on 1970 times latter half, edition of SQL-92 (SQL2) up till now, because of common grammar, so can be in common use no matter in MS-SQL , ORACLE , DB2 , ACCESS , PostgresSQL , MySQL ,etc.. Through flat several kinds of grammars that often see, can probably deal with general materials management and on-line interdynamic procedure to write ! ! Whether why spend ACCESS. ACCESS is a database system in Microsoft Company Office series. Function of it include, set up neat materials form, materials is it deal with , make to materials that need inquiry , output of materials print form to make correctly. In addition, the interface had of ACCESS, it is simple and easy very in operation. If cooperate and go to a little more enter skill use of steps, we can finish an independent database administrative system

rapidly quickly.

3. System designing and planning

IPv6 platform relies mainly on IPv6/IPv4 Dual Stack network. Way operation that usable Dual Stack way IPv6 and IPv4 coexist under the same sub network. The phenomenon is shown in Figure 15.

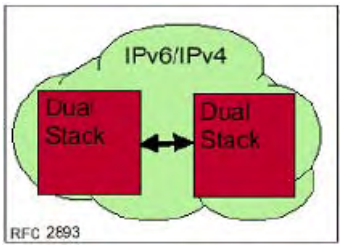

Figure 15

Even across another network domain, it also still can communicate through Tunnel way as shown in Figure 16.[7,19]

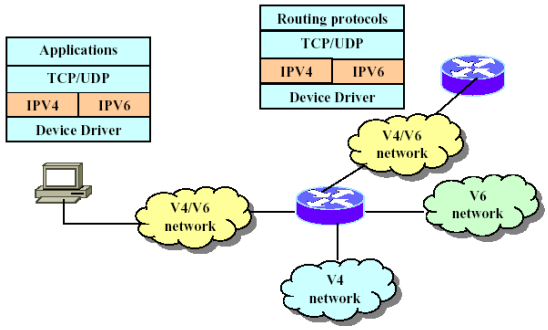

Figure 16

One on-line system of construction[15.16][7,18], can offer and reduce heavy relevant information correctly directly , input the height , weight , age , waistline , buttocks , body fat through the network browser, it calculate waist Hip Ratio (WHR), Body Mass indexes (BMI) , body fat rate, and if becoming, last database not serious storing materials, log-in measures the index every day to reduce the heavy ones and can surf the Net at any time through this interface, noting down and making at any time must reduce center , but share correct effective reducing the heavy method with reduce the heavy ones more together, can offer doctor the materials to analyse to solve the question met while reducing heavily .

4. Conclusion and future

IPv6 ripe network protocol serve , is it use generally so to feel at present quite already, but a lot of main capital construction of network has been all already quite perfect, software manufacturers add IPv6 in the operating system one after another , the domestic and international many big factories of network are developing the network equipment of a lot of IPv6 Ready, 2004, 2005 too, IPv6 summit meeting in 2006 is all held in Taiwan, the era of IPv6 can be said and close more and more, certainly we do not want to be absent in such a distinguished gathering . We use Windows 2003 Server and ASP.NET successful purpose to achieve us, the medical information system taking ' IPv6 as platform of the construction '.

Medical information system, we use the simplest idea, ' write down ' with ' analyse ', write down every day's health, analyse a section of data during that time, used for checking whether our body is in health status, we have chosen some to measure the equipment healthily, store data entry materials stock that measure it, is it reach idea of us to analyse materials that store through simple procedure.

IPv6 is the medical information system of the platform in our construction, can advance towards the goal of wireless transmission, transmit through the wireless in follow-up, can let this system be used more conveniently. In the future, the platform also can be used in many applications. Such as, on-line healthy preventive and detective system, the nursing staff looks after and commits suicide the patient's

self-study website making, and other scientific applications. Therefore, how to enhance more technologies can be used in the platform is important in the future. The system can increase and warn the function automatically, can convey information through the wireless information equipment.

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