# CENG 334 Computer Networks

# Assignment Report

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#### What is INTERNET?

INTERNET is a global system of interconnected computer networks that provides to serve its all end users over the world by using the standard Internet protocol suit (TCP / IP protocol). It can be also defined as a network of networks which consists of millions of private, public, academic, business, governments networks... internet also can be defined as a big information library which includes many sources for the end user . Then, the internet can be used for entertainment or e-commerce, or some services like online banking, online shopping, purchasing tickets...as we can understand from this definitions, Internet is a most important part of the world wide communication and moves along to become one of the most important needs of the life.

#### History of the Internet in Turkey

The first step of the Internet into Turkey was occurred at 1986 by establishing a BITNET connection between Ege University in Izmir and the European Academic and Research Network (EARN) in Italy. The network was named the Turkish Network of Universities and Research Institutes (TÜVAKA). At 1989, the first activity is started to establish an Internet Protocol (IP) based network. At 1991, the initial request for the connection was sent to NSFNET and CERN. All of them accepted the request; however Turkey preferred to NSFNET. The most important reason to choose NSFNET is the time difference between Turkey and USA which will increase the traffic delay. Also, the other reason, vision of TUBITAK and NSF are same. In 1993, the Middle East Technical University (METU) and the Turkish Scientific and Technical Research Council (TUBITAK) established a dedicated 64-kbps Internet connection between METU and NSF. Simultaneously, TR-NET is formed by METU and TUBITAK to promote the use of Internet. At 12 April 1993, the Internet is started to generally use. After that time, use of internet increased quickly so the link is upgraded to 128-kbps from 64-kbps in October, 1995. After that issue, TR-NET proposed a plan which includes technical, organizational, and funding components to address the growth issue. For the technical component, a creation of a triangular backbone is thought. The backbone will connect to three important cities in Turkey which are Ankara, Istanbul, Izmir. For the organization component, layer service which provides to organization was proposed. For the funding model, government support was needed to build the backbone and provide operating funds in the short term. At the end of 1996, Turk Telecom put TURNET in place and TR-NET gave its mission to the TURNET. After that, TURNET was used for a long time. Then, it's name was changed to ULAKNET, then ULAKBILIM. Today, TTNet and ULAKNET is used as the main internet backbones.

#### **Backbones**

Backbone provides to expand the internet all over the world. The Internet backbone is the principle data routes between large interconnected networks and main routers in the internet. It can be also defined as a central conduit designed to transfer network traffic at high speeds in computer network. The goal of the designing to the network backbones is to maximize the reliability and performance of large-scale, long-distance data communications. Backbones typically consist of network routers and switches which are connected by fiber optic or Ethernet cables. The backbone is formed of some cables which are under the sea or over the land or satellites. Computers normally do not connect to a backbone directly. These backbones are connected by Internet service providers or large organizations networks and computers indirectly access the backbone.

In Turkey, the first Internet access is provided at 1993 over the ODTU. After that time, at January 1994 Ege University, September 1995 Bilkent University, November 1995 Boğaziçi, and February 1996 İTÜ were participated into the internet backbone in Turkey. After that time, TURNET is established to integrate the universities. Today, this foundation is still providing to communication of the academic and public institutions. However, the name of TURNET was firstly changed to the Ulaknet, then Ulakbilim. After that, at February 1998, Türk Telekom started to establish the national internet backbone with the goal of providing to the individual and commercial internet access. The infrastructure of the commercial backbone was made by Alcatel Teletaş. Today, the backbone is managed by TTNet.

Firms which provide Internet service, gives service to the end user by using the TTNet backbone. However, some firms can make connection with the TTNet by using satellite because of the some problems of the infrastructure. Besides this situation, TTNet and Ulakbilim have been bought internet link connection from the firms which provide the international Internet service.

#### **Point access of ULAKNET**

The map shows the point internet access over Turkey. The international backbone integrates the main backbone of Turkey between Ankara, Istanbul, izmir. The internet is expanded from these points to the universities and public foundations.



#### **Point access of TTNet**

It shows the international backbone of TTNet. There are lots of cross communication points between TTNet and Ulaknet. It means many foundations use the Ulaknet and TTNet simultaneously.



#### **International ISP Backbone**

It shows a firm's backbone which provides internet service in Turkey. In the below, as we can see, the firm connected to main backbone of Turkey into three points which are Istanbul, Antalya, Izmir. Also, it has an international communication over Frankurt.



#### **Today's Internet in Turkey**

Turkey has had public Internet access since 1993, although experimentation at Ege University started in 1987. The first available connections were dial-up. Cable Internet has been available since 1998 and ADSL since 2003. Today, the most widely used Internet service is TTNET ADSL2+ which is provided by Turk Telekom in Turkey. It speeds from 1 mbit/s to 16 mbit/s. Also, VDSL2 service is offered by TTNET with speeds at 32 mbit/s to 100 mbit/s. At the same time, there are lots of alternative broadband companies, such as SmileADSL and Biri. Superonline is offering fiber broadband in limited areas in 8 cities by offering up to 100 mbit/s speeds. Furthermore, UyduNET is relatively wide but not universal coverage of cable Internet. It offers speeds from 1mbit/s to 20mbit/s. After June 2009, 3G Mobile Networks approved from Ministry of Transport and Communications, Mobile Networks started to raise their popularity in Turkey. Price policies of the cellular network companies are almost same with the broadband companies. TTNET's monopoly and perceived excessive pricing have received numerous criticisms from users over the years.

#### Gateway to other countries

A network gateway is a system that provides to communication between two networks that use different base protocols. A network gateway can be implemented completely in software, completely in hardware, or as a combination of both. Network gateways can operate at any level of the OSI model according to the types of protocols they support. Routers can be shown as examples of special cases of gateways. The other name of gateway is known as protocol converters. It can operate at network layer and above. The job of a gateway is to convert one protocol stack into another. Its job is much more complex than that of a router or switch.

In turkey we have 4 different gateways which are :

link	speed	<u>link</u>	<u>speed</u>
ODTU-USA	512 kbit/sec.	Boğazici UnUSA	256 kbit/sec
EGE UNAlmanya	256 kbit/sec.	Koc UnivUSA	128(?) kbit/sec
Bilkent UnUSA	256 kbit/sec.		
ITU-USA .	256 kbit/sec		

1. Gateway for the academic foundation.

2. TURNET gateways for the commercial foundation and internet service providers(ISP)

Number of link	link	speed
2 links	Istanbul to USA	2MBit/sec and 512 kbit/sec
3 links	Ankara to USA	2MBit/sec and 512 kbit/sec
1 link	Istanbul-Ankara-Izmir	2MBit/sec
1 link	Turnet Ankara-ODTÜ	512 kbit/sec
1 link	Turnetİzmir	2MBit/sec

- 3. Gateways which are used by some of firms which has contrat with Turnet to get the direct international connections.
- 4. The other link.

#### **Connection types**

Packet switching, circuit switching networks are used for the backbone.

Some of access network types in Turkey:

1-twisted pairs e.g. ADSL (up to 8Mbps)

2-fiber optic cables

3-LMDS (wireless base station

4-Free Space Optic (optical wireless) (to 25Gbps up to 5km)

#### How the data can be transfer over the Internet

When a piece of data (eg. a Web page) is transferred over the Internet, the data can be divided into a lot of pieces which is called packets. Then, a header is added to each packet. These headers provide to know where the data came from, where it should end up, and how it fits in with the rest of the packets. Each packet is sent from one computer to another computer until the destination is found. Until the destination is found, the other computers decide to which computer will next receive the packet. These packets can follow the different routes, not need to use same route always. The packets are examined at the destination. If there is any packets which is missed or damaged, the acknowledge message is sent. The situation continues until all packets are received. After all packets are received, the packets are translated into their original form. Each computer has software called TCP/IP (Transmission Control Protocol/Internet Protocol) to connect to the Internet. This protocol is responsible for receiving, sending and checking packets.



The physical connection through the phone network to the Internet Service Provider might have been easy to guess, but beyond that might bear some explanation.

The ISP maintains a pool of modems for their dial-in customers. This is managed by some form of computer (usually a dedicated one) which controls data flow from the modem pool to a backbone or dedicated line router. This setup may be referred to as a port server, as it 'serves' access to the network. Billing and usage information is usually collected here as well. After your packets traverse the phone network and your ISP's local equipment, they are routed onto the ISP's backbone or a backbone the ISP buys bandwidth from. From here the packets will usually journey through several routers and over several backbones, dedicated lines, and other networks until they find their destination.

#### **IP Addressing**

Each host on a TCP/IP network has a unique 32-bit logical address that is divided into two main parts which are network and host. The network ID provides to identify a network. Also, if the network is the part of the Internet, the networked must be assigned by internet network information center (InterNIC). An Internet Service Provider (ISP) can obtain blocks of network addresses from the InterNIC and can itself assign address space as necessary. The hostID identifies a host on a network and also is assigned by local network administrator.

#### **IP Address Format**

32-bit IP address is grouped eight bits at a time, separated by dots, and represented in decimal format (known as dotted decimal notation). The minimum value for an octet is 0, and the maximum value for an octet is 255.

• Basic format of an IP address is shown below



#### Range of IP addresses used in Turkey

```
195.174.96.0 - 195.174.127.255 - TTnet
212.253.0.0 - 212.253.255.255 - Superonline
213.204.64.0 - 213.204.88.255 - YIMPASNET
195.174.96.0 - 195.174.127.255 - Ultranet (kablo)
213.194.96.0 - 213.194.99.255 - TR-BNET
212.174.0.0 - 212.175.255.255 - TR-TELEKOM-990407
195.87.153.0 - 195.87.153.255 - KOCNET-NETWORK
195.174.0.0 - 195.175.255.255 - TR-TELEKOM-960902
212.29.107.0 - 212.29.127.255 - VESTELNET
62.29.0.0 - 62.29.127.255 - TR-DOGAN-20000427
144.122.0.0 - 144.122.255.255 - METU-NET
62.248.32.0 - 62.248.47.255 - KABLONET
212.64.192.0 - 212.64.223.255 - TR-ATLAS-990420
217.164.0.0 - 217.165.255.255 - AE-EMIRNET-20010405
212.103.160.0 - 212.103.166.255 - GEGANETNET
213.254.128.0 - 213.254.148.255 - DEKSAR (Barracuda)
213.153.211.0 - 213.153.215.255 - TNN-NET1 (turk net)
194.27.48.0 - 194.27.49.255 - TRATAUNI-NET (ulak net)
62.85.129.0 - 62.85.129.255 - RTNET-CYPOP-2 (rt net)
217.131.0.0 - 217.131.255.255 - TR-SUPERONLINE-980319
213.14.57.0 - 213.14.72.255 - VESTELNET
213.43.129.0 - 213.43.255.255 - IXIR
193.140.40.0 - 193.140.47.255 - DAU-NET
213.243.0.0 - 213.243.15.255 - DOL
212.58.0.0 - 212.58.15.255 - DORUKNET
193.192.98.0 - 193.192.118.255 - NETONE-NET
213.153.251.0 - 213.153.255.255 - TNN-NET1
212.146.128.0 - 212.146.175.255 - ANET
212.174.242.0 - 212.174.243.255 - KAYNET
212.175.244.0 - 212.175.245.255 - MAYA
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#### **KEY ORGANIZATION**

#### 1) Telecommunications Service Providers

• **Türk Telekom**. Türk Telekom is the national telecommunications services provider. It keeps a monopoly of both domestic and international telecommunications lines and services. Türk Telekom had been a division of the Ministry of Transport and Telecommunications before it was reorganized as a private company.

- Satko, ComSat, Erenet. Satko, ComSat, and Erenet are three companies that are licensed as Intelsat Business Service providers by Türk Telekom. They provide international leased lines via satellite in partnership with MCI/WorldCom (ComSat), Sprint (Satko), and Digex (Erenet).
- **TurkCell & TelSim.** In 1993, Türk Telekom signed a contract with two comissions for the provision of GSM cellular phone service. These commissions were TurkCell (Telekom Finland, Ericsson, Penta, Çukurova) and TelSim (Detecom, Alcatel, Siemens, Teletas, Simko).

#### 2) Government organization

**Ministry of Transport and Telecommunications (MTT).** MTT is the Ministry responsible for a broad collection of infrastructure issues, including roads, maritime infrastructure, and telecommunications. MTT is responsible for sector policies and regulation through two offices:

1) General Directorate of Communications is the regulatory body for wired communications.

2) General Directorate of Radio Communications is the regulatory body for spectrum management.

**State Planning Office.** The State Planning Office is an office of the Prime Ministry which is responsible for setting policies for state spending. Also, It is responsible for reviewing and approving the annual investment programs and five year plans of state...

**Turkish Scientific and Technical Research Council (TÜBITAK).** TÜBITAK is an organization that is principally responsible for funding scientific and technical research in Turkey. In this aspect, it is comparable to the United States' National Science Foundation. TÜBITAK was an early partner with METU in setting up the initial Internet connections in Turkey. Although it continues to fund university connections through one of its research centers. It is known as the National Institutional Network and Information Association (ULAKBIM), TÜBITAK got out of the Internet business in 1996.

#### National Institutional Network and Information Association (ULAKBIM).

ULAKBIM was formed as a TÜBITAK research center in 1996. ULAKBIM's goal has been to provide basic communication between all Turkish universities, the goal was reached within three years of its inception through the ULAKNET network .

**Electronic Trade Commission (ETKK).** At 1997, The Electronic Trade Commission was formed to achieve a goal which is to serve as a central coordination point for a number of studies on electronic commerce that were being carried out in Turkey.

#### 3) Academic organizations

**Middle East Technical University (METU).** METU which is located in Ankara, played a leading role in the establishment of the Internet in Turkey. It was served as main Internet Service Provider for many years. For a short time, METU was chosen as a member of the consortium by Türk Telekom to build the first Internet backbone at Turkey. Its role has been decreasing in recent years as commercial providers, Türk Telekom, and government organizations assume responsibility for both the operation and planning of the Internet. Today, METU still continues to hold responsibility for the Domain Name Service of country, and managing the .tr domain.

**Bilkent University.** Bilkent University, which is located in Ankara, has been prominent in the planning, implementation, and promotion of the Internet in Turkey., Mustafa Akgül who is one of the principal champions of the Internet in Turkey, is affiliated with Bilkent and is the organizer of the annual INET-TR conference, which focuses on Turkish Internet issues.

**Ege University.** Ege University, which is located in Izmir, was particularly instrumental in establishing Turkey's first wide area network with links to the international community. From this university, the Turkish BITNET (TUVAKA) had its international connection to EARN.

**Istanbul Technical University.** Istanbul Technical University played a leading role in connecting Turkish universities to the Turkish BITNET. Later, as TCP/IP emerged as a leading protocol, individuals at ITU worked on converting the Turkish BITNET over to TCP/IP protocol suite, experimenting with TCP/IP over IBM's Systems Network Architecture (SNA).

#### 4) Other

**Internet Executive Council.** The Internet Executive Council is a body that was organized by the Undersecretary of the Ministry of Transport and Telecommunications, H. Tahir Dengiz. It was formed in 1997, and had its first meeting in January, 1998. The council consists of representatives from key government, commercial, and academic organizations. The council meets every month and conducts and sponsors every aspect of the Internet in Turkey. After detailed discussions, the reports are prepared. On a regular basis it makes recommendations regarding such matters as pricing, backbone architecture, cyber law, and so forth. In general, it provides a forum where all voices can be heard. The quasi-public nature of the forum makes organizations like the ministries and Türk Telekom more accountable to the public.

### **Statistics**

#### List of countries by number of internet users

List by World Internet Stats (2010 est.) <sup>[1]</sup>				
Rank M	Country	Users (thousands) M		
-	World	1,971,000 <sup>[2]</sup>		
1	People's Republic of China	450,000 <sup>[3]</sup>		
-	European Union	337,779		
2	United States	239,233		
3	India	100,001 <sup>[4]</sup>		
4	• Japan	99,144		
5	Brazil	75,944		
6	Germany	65,124		
7	Russia	59,700		
8	Stand Kingdom	51,442		
9	France	44,625		
10	■ ■ <u>Nigeria</u>	43,982		
11	South Korea	39,440		
12	C <u>Turkey</u>	35,000		
13		33,200		
14	Mexico	30,600		
15	Italy	30,026		

According to Wikipedia result, 1,971,000 thousand people use the internet over the world. There are over 150 countries which use the Internet over the world. Turkey is the 12. country between them with the 35,000,000 Internet users.

### Let's analyze the other statistic:

Internet Usage Statistics: 35,000,000 Internet users as of June/10, 45.0% of the population, according to the ITU.
Latest Population Estimate:
77,804,122 population for 2010, according to U.S Census Bureau.
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Gross Domestic Product:
GDP per capita is US\$ 9,950 according to <u>I.M.F</u> .
Country Size (Area): Turkey has 773,473 sq km - Population density is 100 persons per sq km.

## As of 2010, the top Turkish Internet properties according to comScore were:

- Dogan Online (portal and entertainment)
- Milliyet Group (news)
- Mynet (portal)
- Blogcu.com (blog platform)
- Hurriyet Internet Group (news)
- Nokta Internet Technologies (entertainment)
- sahibinden.com (classifieds)

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