A. Varuyeu, V. Kulinchenko, A. Kucherov
Gomel, F. Skorina GSU
А. В. Воруев, В. Н. Кулинченко, А. И. Кучеров
г. Гомель, ГГУ имени Ф. Скорины

TRAINING HARDWARE AND SOFTWARE OF NETWORK ON THE CURRENT STAGE OF DEVELOPMENT

ОБУЧЕНИЕ АППАРАТНОМУ И ПРОГРАММНОМУ ОБЕСПЕЧЕНИЮ СЕТЕЙ В СОВРЕМЕННЫХ УСЛОВИЯХ

В статье «Обучение аппаратному и программному обеспечению сетей в современных условиях» рассматриваются требования к организации передачи данных в условиях интенсивного роста требований современного оконечного оборудования и сетевых сервисов. Делается акцент на изменении состава участников цифрового информационного обмена. Сформулирован вывод о необходимости изменений в подходах к подготовке молодых специалистов.

For the first time, computer networks appeared almost simultaneously with the computers themselves. This was due to the fact that the resource of computer time was extremely expensive and it was important to share its cost among several users. Users got the opportunity to prepare their data in parallel, which could then be processed sequentially or in parallel (in the form of packets) by the blocks of the computing system.

This is how the principles of resource sharing and terminal systems emerged. These systems were widely used until the 80s of the 20th century, and some samples – almost until the beginning of the 21st century.

The rebirth of computer networks was caused by the practical need for data sharing by users of personal computing systems.

From this point of view, the following definition is suitable for computer networks: a network is a system of independent computers connected to each other for the purpose of sharing data, peripherals and other network resources.

Globally, the total number of digital network users is projected to grow from 3.9 billion in 2018 to 5.3 billion by 2023 at a CAGR of 6 percent. In terms of population, this represents 51 percent of the global population in 2018 and 66 percent of global population penetration by 2023 (Figure 1).
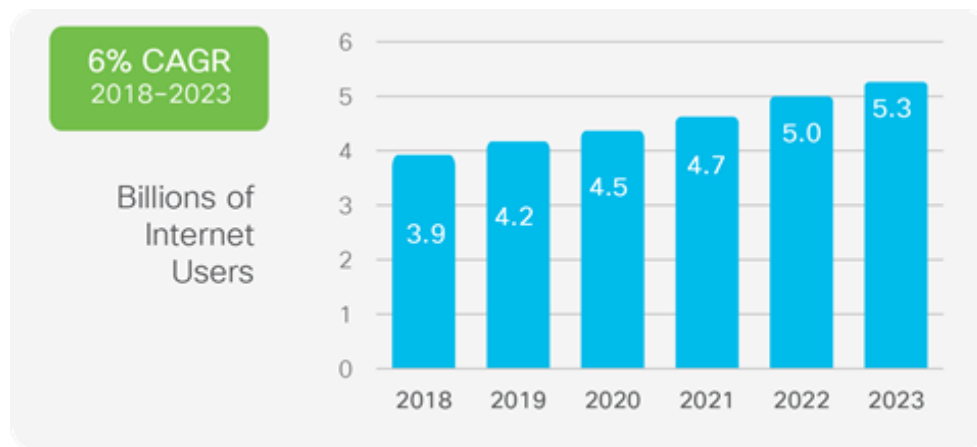

Figure 1 – Global Internet user growth

Initially, all networks could be divided into two classes:
– data exchange networks or information networks;
– data processing networks or computer networks.

Information networks included systems for transmitting signals, messages, data and other types of information. Distributed and unified computing systems belonged to the data processing networks. But, since distributed processing requires the use of information exchange mechanisms, this line has gradually been erased and at the moment all computer networks are both information and computational. Therefore, the more general term "*digital networks*" is often used.

Digital networks can be viewed from different perspectives:
– for a running program, a network is a complex system of routes for transmitting data and resources for processing them;
– for the user, a computer network is a tool for accessing network resources;
– for the manager, the network is a means of managing production processes;
– for a network designer, it is a set of standards and requirements that must be observed during project implementation.

A modern digital network has the following properties:
– an excellent combination of "performance – usability – cost" of computing resources;
– sharing of data and devices;
– online access to extensive corporate information;

– use of external data;

– integration of information systems.

However, there are also problems associated with the implementation of networks. For example, complex programming for distributed systems, ensuring software compatibility, ensuring the reliability of information transfer, ensuring security. The area of using computer networks today is constantly expanding, it includes science, education, business, entertainment.

The performance of a network is often measured by the rate of communication that can be realized in its environment. This approach is based on the fact that different types of network services have different requirements for network bandwidth (Figure 2).

The combination of several types of services within a single network structure imposes additional requirements on the equipment used and the supporting software systems.

Thus, modern networks are complex hardware and software systems.
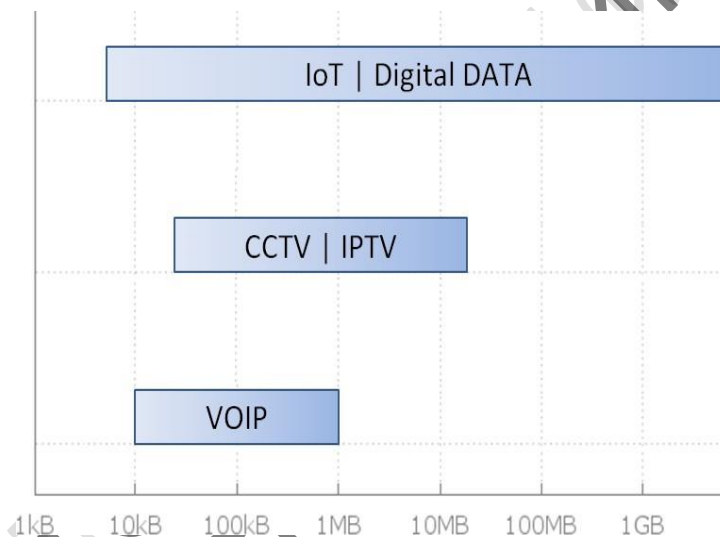

Figure 2 – The level of network services requirements for network bandwidth

Globally, devices and connections are growing faster (10 percent CAGR) than both the population (1.0 percent CAGR) and the Internet users (6 percent CAGR). This trend is accelerating the increase in the average number of devices and connections per household and per capita. A growing number of D2D applications, such as smart meters, video surveillance, healthcare monitoring, transportation, and package or asset tracking, are contributing in a major way to the growth of devices and connections. By 2023, D2D connections will be half or 50 percent of the total devices and connections.

D2D connections will be the fastest-growing device and connections category, growing nearly 2.4-fold during the forecast period (19 percent CAGR) to 14.7 billion connections by 2023. Smartphones will grow the second

fastest, at a 7 percent CAGR (increasing by a factor of 1.4). Connected TVs (which include flat-panel TVs, set-top boxes, digital media adapters [DMAs], Blu-ray disc players, and gaming consoles) will grow next fastest (at a little less than a 6 percent CAGR), to 3.2 billion by 2023. PCs will continue to decline (a

2.3 percent decline) over the forecast period. However, there will more PCs than tablets throughout the forecast period and by the end of 2023 (1.2 billion PCs vs. 840 million tablets).

By 2023, the consumer share of the total devices, including both fixed and mobile devices, will be 74 percent, with business claiming the remaining 26 percent. Consumer share will grow at a slightly slower rate, at a 9.1 percent CAGR relative to the business segment, which will grow at a 12.0 percent CAGR (Figure 3).
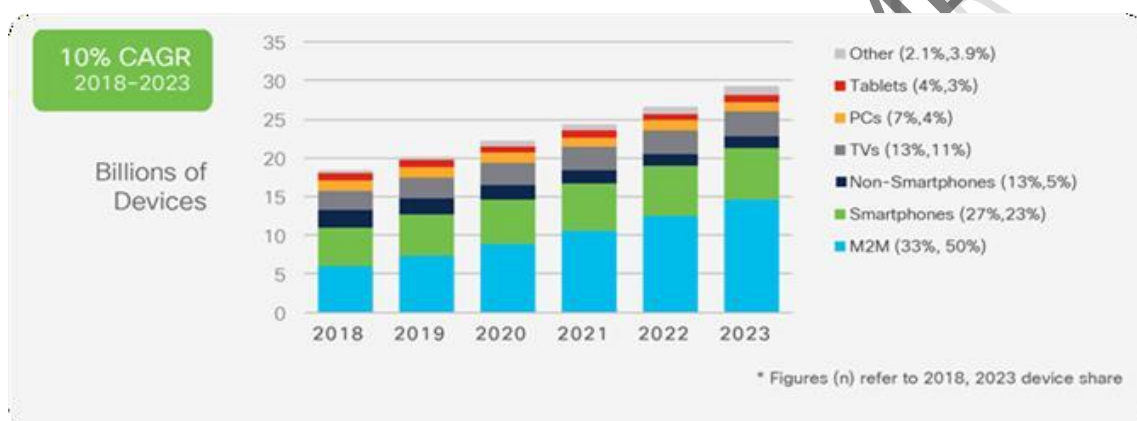

Figure 3 – Global device and connection growth

The demand for the quality of training of young specialists, taking into account the necessary experience in mastering network technologies, is growing at a similar pace.