Optimization of telecommunication infrastructure to support information resources of the higher education establishments

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Abstract. The elements of the research activity in the higher educational establishments were analysed; the methods for increasing of computing and telecommunication resources effectiveness to support information systems of higher educational establishments were studied; the peculiarities of the high-frequency cabling systems operation while using in the video-/audio- and multimedia information in educational process were taken into account; the recommendations concerning the research and providing of the interference immunity of the multiservice cabling systems were give.
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Introduction

In order to increase the effectiveness of the Russian and foreign higher educational establishments and develop their co-operation it is necesary to form and develop information, computing and telecommunication resources. The remote access to the Russian and foreign resources give more opportunities for the scientific teams of institutes, academies and universities independent of their region; it allows to increase the effectiveness of the remote education.

Today there must have been developed the requirements, which refer not only to the provision of a higher educational establishment with the information resources, such as the minimum content of the electronic education-methodological complex (EEMC), quantity to the main and additional bibliographic sources, number of electronic sources for every subject. There should be determined the requirements to the content of the specifications of the hardware for information resources storage [1-3] and conducting of the scientific researches by a higher educational establishment.

Task setting

Determine the minimum content of the hardware and documentation provision for EEMC support:

1. General specifications.
2. Means for service-oriented infrastructure means.
3. Means for the virtual telecommunication network.
4. Software for the information resources integration technology.
5. Hardware complex for general system information storage.
6. Hardware complex for resources and services monitoring.

Investigation results

While organising the scientific-methodological works on creation and modernisation of the information resources of higher educational establishments using the open information systems technologies, a special attention was paid to the optimisation of telecommunication infrastructure to support information resources and decrease of its operation costs [4, 5]. In order to make higher educational establishment investigations effective, one needs not only the information systems and data bases, but also the testing, instrumental and application software for telecommunication systems [6-11].

In order to increase the effectiveness of telecommunication systems functioning, it is reasonable to design them on the basis of structural cabling systems (SCS), integrate the interactive access systems into SCS and use virtual mode of work [12]. The average overhead of the servers operating in higher educational establishments is approximately 10...15%. Physical servers' consolidation using the virtualization means allows to transfer approximately 10 physical servers into the virtual machines (VM) which are started on one physical server and increase its overheads up to 50...60%. The total amount of the networking ports and routers necessary for the servers can be decreased in direct ratio and, the effective area of the ports will be decreased respectively. In some cases in order to decrease the number of servers additional

ports can be necessary. This necessity is defined on the stage of solution architecture planning and developing. The statistical researches showed [12] that TCO (total cost of ownership) for IT-infrastructure decreases for 60...80%, as it is shown on Fig. 1.]

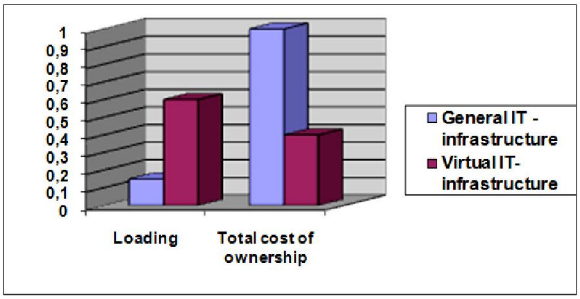

Figure 1. The statistical evaluation of the total cost of ownership at different overheads of the computing facilities

Virtualization of the computing means allows not only to decrease energy costs for the equipment operation, but also to decrease the number of ports for switchboards, since the quantity of the equipment (its ports) is also decreased.

While transmitting large amount of information through the cable networks of the educational laboratories, using one resource by many users, using of big amount of memory capacity during the computing operations often lead to the malfunctions and errors of equipment, and the work can be delayed for ten or more minutes. This is a significant time loss for the educational process.

The influence of the draft failure of the computing equipment caused by the affect of such factors as instability of the power supply, heat, humidity, change in pressure, dustiness and aggressive environments, should be compensated by the design methods while creating devices and use of the special protective devices (stabilizers, thermostats, protective screens). Hard failures and soft failures (short-time self-clearing failures) are marked among the random failures. Soft failures prevail over the hard ones in the computing equipment operation. Hard failures can be conditioned first of all by the non-fulfilment of the electromagnetic capability requirements for the network equipment.

Today video-/audio- and multimedia information is actively used for the education process organization. Cabling networks are functioning as multiservice cable networks (MCN). As a rule the educational establishments use twisted-pair electric cables. While transmitting video-/audio- and multimedia information, installation of information cable lines near the power electric cables it is necessary to provide an uninterrupted signal input under the conditions of outer electromagnetic interference influence within the necessary frequency range and necessary protection between the circuits inside the electric cable [9, 11]. The increase of the operation frequency of MCN up to 500MHz leads both to the increase of the level of cable canals emission and to their greater susceptibility to the outer electromagnetic impacts.

While operating the electric cable lines for the application transmission with the speed of 10 Gbit/s on the higher transmission frequencies (250...500 MHz and more) there appears the necessity to meet stricter specifications for the electrical parameters [12].

Conclusion

Thus, in order to increase the effectiveness of the education process it is necessary to foster the efforts of the higher educational establishments to the development of computing ad telecommunication resources; clear interpretation of the requirements to the hardware for information resources storage and conducting the investigations by the higher educational establishments; modernisation of the cabling infrastructure and decrease of its operation costs.

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References

1. Semenov, A. B., 2005. Evolution and development of the SCS interactive management system. Network messenger, 10: 37-43.
2. Semenov, A. B., 2006. The brand new SCS. Network messenger, 6: 42-48.
3. Semenov, A. B., 2006. Is it necessary to make SCS universal? Network messenger, 10: 37-41.
4. Artuschenko, V.M. and B.A. Kucherov. 2013. Analysis of information exchange in the process of dis-tribution of control facilities for spacecrafts with resource restrictions. European Science and Technology. Materials of the VI international research and practice conference, pp: 243-246.
5. Artyushenko, V. M. and V. I., Volovach, 2013. Statistical Characteristics of Envelope Outliers Duration of non-Gaussian Information Processes. Proceedings of IEEE East-West

Design & Test Symposium (EWDTS'2013). Rostov-on-Don, pp: 137-140.
6. Abbasova, T. S., E. M., Abbasov and G. N, Isaeva, 2014. Conductivity testing communication lines for research pomehozashchishchennyh multiservice cable systems. European Science and Technology. Materials of the VII international research and practice conference, pp: 390 – 393.
7. Artuschenko, V. M. and B. A. Kucherov, 2014. Optimization of parameters of ground station of satellite communication system. European Science and Technology. Materials of the VII international research and practice conference, pp: 397 – 400.
8. Artjushenko, V.M. and B.A. Kucherov, 2014. Analysis of the use of technology in the distribution of the controls of the ship. Italian Science Review, 3(12): 50-53.
9. Artyushenko, V.M. and B.A. Kucherov, 2014. Adaptive control signal parameters satellite ground station. Materials of the X International scientific-practical conference «Science and technology: a step into the future - 2014», pp: 19-24.
10. Abbasova, T. S. and O. F. Umudumov, 2008. Technical means for the maintenance of the high-speed electrical tracts of SCS. Messenger of the Assiciation of Higher educational establishments for tourism and service. 1: 77 – 85.
11. Artyushenko, V. M., 2012. Evaluation of the electromagnetic blasts in the screened information cable lines. Information Technologies. Radioelectronics. Telecommunications (ITRT-2012): collected works of the 2-nd international scientific and technical teleconference, pp: 16 – 71.
12. Artyushenko, V. M. and T., S., Abbasova, 2011. Projecting of the multimedia systems under the conditions of outer electromagnetic interference influence. FGOUVPO RGUTiS. Moscow, pp: 110.

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