

TRANSMISSION OF LARGE VOLUME OF ASTRONOMICAL DATA

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ABSTRACT. This article shows an overview of the world's major astronomical research programs, for work requiring high-speed data, in particular, examples of major domestic (PRAM ASC LPI) and foreign projects (ALMA, VLA, SDSS, LSST, HESS, MWA, ACT). At the moment the local network to cope with data obtained from experiments load, but for future projects and the development and modernization of operating projects to the emergence of new technological solutions, due to the increased flow experimental data.

Keywords: radioastronomy, high-speed data transfer.

At the time in astronomy and astrophysics has been a rapid growth of information obtained in the course of scientific experiments. The resulting massive amounts of data must to be transmitted over local networks or to the place of storage to the point of filtering. For example, consider some of the largest domestic and foreign projects, estimate the volume of streaming data that is generated as a result of the observations and the presence of solutions that allow transfer large amounts of data obtained. One of the largest domestic astronomical projects is the Pushino Radio Astronomy Observatory. It's LAN has a bandwidth of 1 Gb/s to 10 Gb/s. This capacity is sufficient for the removal and processing of radio astronomy facilities PRAO. After that consider examples of major foreign research projects, which generate much more information, and for which the relevant high-speed data. In March 13, 2013, the official opening ceremony of the Observatory The Atacama Large Millimeter/submillimeter Array (ALMA). This project provides the following observations: detection of new galaxies and planetary systems, including at the stage of their formation; detailed study of the star formation process; study a wide range of phenomena on the Sun. The projected peak flow data from each antenna of the telescope in the future may be reach then 120 Gb/s. Another foreign project that can generate a large amount of data, it's Extended Very Large Array. This project made key contributions to the observations of black holes and protoplanetary disks around young stars. He is also used for atmospheric research, research weather, satellite tracking, and other scientific fields. After upgrading to the 2012 volume of the data obtained from the complex can be up to 350 Gb/s.

One of the most famous optical foreign project- Sloan Digital Sky Survey (SDSS) – large-scale research project of images and spectra of stars and galaxies. Researches with it began in 2000. Each night the telescope receive

200 GB of data. For work of this project is enough to have a network with a capacity of up to 1 Gb/s.

Most global optical astronomical project that is currently under development, is a project Large Synoptic Survey Telescope (LSST), which is scheduled to launch in 2020. LSST- a new kind of telescope that will use a digital camera with a resolution of 3,200 megapixels. It will take more than 800 panoramic images every night, and also this project will solve the problem of discovering new comets and asteroids. At the moment, it is planned that the flow of data from the telescope will be up to 10 Gb/s.

Next, consider the observatory HIGH Energy Stereoscopic System (HESS), which explores the cosmic gamma radiation. The project was officially launched on September, 28 2004. Stream of data from this telescope is 1.6 Gb/s. Another project that generates large amounts of data, is Murchison Widefield Array (MWA). This radio telescope designed to capture low-frequency radio waves from deep space, as well as for the study of solar radio emission. The generated data telescope data stream is more than 19 Gb/s.

Observatory Atacama Cosmology Telescope (ACT) serves mainly to study the cosmic microwave background radiation. After upgrading to the 2008 data stream is 230 gigabytes per day.

Despite the fact that not all networks can provide maximum transmission of the generated amount of data, research scientists can look with optimism to the future. For example, an international team of physicists, working under the guidance of experts from the California Institute of Technology, has forwarded the data at record speed – 339 gigabits per second. A huge amount of data has been sent to the channel connecting the Canadian Victoria and Salt Lake City, the researchers reported at the show Super Computing 2012. At the same time been set yet another record – the speed bi-directional communication over a single "core" has reached 187 Gb/s. Also recently, a group of scientists from the University of Southampton has created optical fiber with ultra-thin glass membrane, capable of transmitting a wide range of wavelengths with high speed. With this technology, large volumes of information can be transmitted at a rate of 99.7% of the velocity of light. British record – 73.7 terabits per second (distance was 310 meters). This is 15 000 times faster than with conventional hollow fiber.

Thus, new technologies and solutions in the near future will pass on the local network received large amounts of astronomical and astrophysical information projects that will significantly improve the efficiency of its processing.