RUNNet - Federal University Network of Russia

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Abstract

One year has passed since first announcement of RUNNet project at INET'94/JENC5. During this year the project made a path from a set of general ideas to the fully operating network connecting five scientific regions of Russia - Central, Northern-Western, Volga, Ural and Western-Siberian. On this way RUNNet faced several fundamental problems: channel infrastructure and topology, interconnecting and cooperation with other networks, and information services. Many of them have been successfully solved.

What made it possible to do this progress is stable financial support from the State Committee for Higher Education of Russian Federation and great user demand for such a network which stimulated enthusiasm of the people involved in the project.

1 RUNNet Principles

The network architecture and information services are being developed based on the general principles:

Academic nature. The network provides services for the benefit of Russian scientific and educational community.

Federal level. The network covers practically the whole territory of Russian Federation.

Connectivity for regional networks. RUNNet provides the regional networks of science and education with inter-connectivity and access to the Internet.

Accepted use policy. RUNNet accepts traffic from regional networks of science and education. Access to the Internet is regulated by corresponding agreements with foreign networks.

Information services. RUNNet creates and develops own information services according to three main schemes: Order, Project and Climbing. The schemes determine methods of development, access and announcement of different groups of information services.

2 RUNNet Architecture

RUNNet Federal Nodes interconnected by high speed links constitute so-called backbone topology of the network. Operating Federal Nodes are located now in Moscow, St.Petersburg, Ekaterinburg, Novosibirsk, Petrozavodsk, Saratov and Ulianovsk. The following stages will bring RUNNet connectivity to Krasnoyarsk, Irkutsk, Khabarovsk, Nyzhni Novgorod, Tambov, Rostov-na-Donu, Vladivostok.

Federal Nodes act as RUNNet points of presence providing regional networks of science and education with network and information services. Also Federal Nodes play an important role in RUNNet cooperation program, an optional Internet Exchange network may be organized at Federal Node for peering with other service providers in a region.

The majority of backbone channels are based on satellite technology as the most suitable one for high speed links covering Russia extent [1]. Fiber optics is used where possible, e.g. RUNNet (St.Petersburg FN) - NORDUnet (Helsinki) and St.Petersburg - Moscow (planned). In future plans there is transfer of the backbone channels to terrestrial high speed links with preserving satellite media for back-up needs.

3 RUNNet Services

Less than four months have passed since RUNNet became an operational network. All efforts of its creators were concentrated on providing generic services. Information services are provided by universities connected to RUNNet. These services constitute the main bulk of network information resources and are the basis for experiments and development in this field [2]. But so far they do not produce the desired continuous information space. In order to achieve this goal basic principles of access, distribution, interfaces and development should exist [3].

Such approach includes the definition of RUNNet General, Registered and Local services [2]. All existing and developing information services of RUNNet could be divided into these three groups according to their importance, accessibility and, in case of distributed services, area of distribution.

4 RUNNet Development

Three main directions of the network development are being elaborated now:

4.1 Construction of new Federal Nodes thus bringing Internet connectivity to as much universities as possible

One approach to the solution of this task is to extend the existing network topology to other regions. The new backbone segments are built using available high speed channels. This approach is free from internetworking problems and just extends the administrative domain of the network.

The networking situation in Russia now shows that "user domains" of many national service providers (Relcom, RELARN, FREEnet, RUNNet) often overlap. In conjunction with poor channel infrastructure and extremely high costs for required bandwidth it is desirable in such cases to cooperate with other service providers and use their facilities to bring connectivity to RUNNet users. This approach is less expensive than the first one but it arises several cooperation problems.

4.2 Development of regional network infrastructure

The backbone does not provide network services to the end-users. The main principle here is to get as much user connectivity per one federal node link as possible. Thus the Federal Nodes act as backbone points of presence providing network services to regional segments. The regional segments are responsible for interconnecting educational institutions in their area and for providing the main bulk of information services to the whole RUNNet community.

4.3 Creating development network segments to study and implement new communication technology

Though the use of high-bandwidth channels is limited now those providers who have such links could not fully utilize the capacity. Most of the terrestrial high speed channels (fiber optics and microwave) are located in Moscow and St.Petersburg, and networks outside these areas are limited by their own links to the two cities. Poor deployment of new communication technologies makes it difficult to share the total bandwidth by building over the same physical media different logical connections or virtual channels used by multiple service providers.

For the efficient use and deployment of new communication technologies it is essential to elaborate main aspects of its application, study and debug possible failures in order to avoid problems while operational use. The purpose of the development segments is to allow isolated use and study of new technology in order to provide recommendations for the network development.

Another driving force behind this work is the strong demand for "tender" integration of various networks and network projects for science and education [4]. The backbone of such integrated network should provide scalable bandwidth and predictable quality of service for the connected networks still allowing them to determine their routing policy, architecture, etc.

References

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Author Information

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