

Networking facilities at Budker INP, Novosibirsk

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ABSTRACT

Due to numerous reasons either of technological and historical origin networking facilities of BINP, Novosibirsk, play substantial role for the whole Novosibirsk Scientific Center, known also as Akademgorodok, as well for the whole Russian HEP community. Global connectivity for BINP network was achieved via satellite link Novosibirsk-Hamburg in the framework of INTAS programme in 1995, and currently this channel is serving about hundred networks of scientific, educational and cultural institutions spread around the whole Novosibirsk - the largest Russian city beyond the Ural Mountains. Recently introduced terrestrial link BINP-Moscow delivers for BINP users easy access to almost all HEP institutions in the European part of Russia, mostly in Moscow region. Another international link BINP-KEK, established about two years ago, provides efficient access over terrestrial line either for Moscow and BINP teams to KEK and to some US institutions, thus actually wrapping around the globe the World Wide HEPNet. Operating network enterprise of such scale, vital for large community beyond the Institute imposes specific requirements for network control and traffic monitoring. Additionally, some security considerations are discussed.

KEYWORDS: networking connectivity, international channels

1 Introduction

Due to numerous reasons either of technological and historical origin networking facilities of BINP, Novosibirsk, play substantial role for the whole Novosibirsk Scientific Center (NSC), known also as Akademgorodok, as well for the whole Russian HEP community. Several projects pretending to become "final solution" for complete fulfillment of any potential demand were initiated from time to time during last two decades at NSC but usually were terminated without any noticeable result. Technological background of these projects was spread from X.25 to exotic proprietary systems.

Real success was achieved only in 1994 with installing around the NSC several Cisco routers obtained in the framework of early NSF-supported networking projects. The network built that times was based on existing communication copper lines set up about 20 years ago, which were untroubled buried in the ground for more than a decade.

2 External Connectivity: Initial Stage

If not count of early connections based on dial-up SLIP links BINP - ITEP and BINP - Space Research Institute (both in Moscow dated to 1993), the real global connectivity for BINP network was achieved via satellite link BINP-DESY in the framework of INTAS programme in 1995. It was agreed that established channel could be used for not only our Institute exclusively, but for the whole scientific community of NSC. Therefore all other institutes of NSC got external connectivity and thus BINP serves as ISP for the rest of

Akademgorodok. The capacity available on the channel for the whole network during last years was increased from tiny 64 Kbps to about a megabit.

With time user population was significantly expanded and currently this channel is serving about a hundred networks of scientific, educational and cultural institutions spread around the whole Novosibirsk - the largest Russian city beyond the Ural Mountains, not only Novosibirsk Scientific Center. According to the statistics of integrated external traffic only about 10 percents of the traffic is generated by about 600 particular internal BINP hosts, while total number of connected to the satellite terminal computers around NSC and Novosibirsk exceeds 4500.

Having even not really huge data flows travelling through the Institutes' network in addition to purely internal traffic required the carefully designed topology of the internal network to prevent an introducing any bottleneck for this transit traffic. This was achieved with splitting internal network to several segments interconnected with each other either via ethernet switches and/or repeaters and bridges. Thus the segment carrying an external traffic is almost free of BINP-to-BINP addressed packets. The only hosts still sitting there are these performing monitoring functions.

3 External Connectivity: The Modern Terrestrial Channels

Recently introduced (May 1999) terrestrial link BINP-Moscow delivers for BINP users easy access to almost all HEP institutions in the European part of Russia, mostly in Moscow region. Currently this link has capacity of 1 Mbps and is planned for upgrade upto 1.5 Mbps soon. Because significant part of Russian Internet is located to the West of Ural, BINP network has an excellent connectivity with almost all National centers. At the same time E1 links built for connecting NSC to the rest of Novosibirsk even earlier (about 1997) provide equally effective connectivity with numerous regional networks of the West Siberia (Tomsk, Kemerovo etc).

Another terrestrial link BINP-KEK, established about two years ago, provides an efficient access over terrestrial line either for Moscow and BINP teams to KEK and to some US institutions, thus actually wrapping around the Globe the World Wide HEPNet. While it's current capacity is sufficient only for interactive access to remote centers and prevents from large data exchange (its' current bandwidth is just 128 Kbps), it is planned to upgrade it upto 0.5 Mbps already in coming months.

4 General Operating Issues: Monitoring and Security

Operating network enterprise of such scale, vital for large communities beyond the Institute imposes specific requirements for network control and traffic monitoring. In order to achieve this goals some specific packages were adapted to be suitable to our specific needs. The most useful one is the package "trafstat"¹ based on BPF API, which allows us to gather and save every hour statistics on a selected component of the whole traffic (traffic directed to/from BINP-DESY gateway, traffic directed to/from Institutes' hosts etc) with details sufficient for the most tasks of retrospective analysis.

These tasks may include (but not restricted with) computing cumulative statistics on per-institution base (Institute of Mathematics consumed 5.3 percents of the whole traffic during the given period), the facts of exchanges between particular sets of hosts/ports (if there were telnet sessions between somehost.nsc.ru and hackerzone.badguys.net with our side performing as a server) etc. While such statistic has significant volume (few megabytes daily) we keep it on offline storage from the very beginning.

This information turned to be invaluable in cases when some security incidents are being investigated. Taking into account additional risk due to close proximity of Novosibirsk State University and other Universities and Colleges of Novosibirsk, full of too curious students/aspirants, networking team of BINP must carefully watch upon their activity. Thus we're forced to introduce some serious restrictive facilities into mentioned above too effective networking infrastructure surrounding BINP. Some ports were unconditionally blocked on border routers (Samba, ICQ and other such stuff). Telnet access is restricted in general and allowed only for two hosts, and users of them were urged to use such services as one-time passwords and Secure Shell. Several modern security related packages like NFR² are being evaluated currently.

Another thing worth to implement on a network sitting almost on the border between Russia and the rest of the world is introducing some kind of global connectivity monitoring facility. In order to achieve this our site was joined to IEPM Project³ collecting statistics on global connectivity. Preliminary data obtained so far (few last months) indicated that BINP is a good place for installation of numerous mirror servers due to sufficiently good connectivity with either foreign as well as with national HEP sites.

References

1 See <http://soft.risp.ru/trafshow/index.html/>

2 Network Flight Recorder, <http://www.nfr.net/>

3 Internet End-to-end Performance Monitoring Project <http://www-iepm.slac.stanford.edu/>