

LABORATORY 17

Laboratory of Information Transmission Networks

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The leading researchers of the laboratory include:

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DIRECTIONS OF ACTIVITY

Basic directions of the laboratory activity are development of theoretical foundation for analysis and synthesis of distributed information transmission networks, and practical implementation of large-scale projects concerning with distributed computer communication networks.

The theoretical researches are carried in the following directions:

- Development of methods and algorithms for dynamic routing in ATM networks.
- Extension of product-form stochastic network theory in part of methods and algorithms for G-networks study.
- Development of methods for analysis and synthesis of wireless local and distributed information transmission networks controlled by the IEEE 802.11 protocol.
- Development of methods and algorithms for topology synthesis and optimal routing choice in information transmission networks.
- Research and development of wireless networks on the base of infrared and laser modems.
- Development and study of methods based on extended Petri network for analysis of intellectual telecommunication networks.

MAIN RESULTS

In 2002, the Laboratory continued the fundamental researches related to extreme graph theory, queuing networks theory, and reliability theory. Moreover, the field experiments with various physical media (fiber-optical, radio, satellite communications), operational environments and various network architecture were carried on simultaneously.

The Laboratory has obtained the following fundamental results:

- Routing methods and algorithms in packet switching networks have been systematized and studied, in particular, dynamic routing algorithms for ATM networks have been surveyed.
- Models of G-networks with negative requests have been developed to describe adequately computer network operation in the presence of noises and viruses.

– Mathematical models have been developed for analysis and synthesis of topological structure of regional wireless computer networks (specifically, for optimal allocation of base stations and connection of radio subscribers in this class networks).

– Verification model based on extended Petri network has been developed for a protocol of intellectual telecommunication networks.

Theoretical results related to analysis and synthesis of distributed information transmission networks have been adopted as a foundation for practical implementation of large-scale projects concerning with this class of networks. *Results of scientific researches have been implemented with the following projects:*

– Topological development of the cellular radio-modem network Radionet to provide Moscow scientific, cultural and educational institutions with access to Internet.

– Development of an atmospheric optical line prototype adopting infra-red modems and its passing to the Plant of Zverev's name for pilot batch production.

– Development of a typical project for scientific city computer network (using Obninsk scientific city as an example).

– Development of a unified terminal for air and railway ticket reservation on domestic and international trips.

– Development of protocols for interaction of wireless 802.11 networks and cellular GPRS networks, which has provided an opportunity to implement corporate wireless networks in almost any region of Russian Federation and to extend the geography of access to Internet for state and commercial subscribers.

– Development and extension of information transmission networks of Russian Ministry of Transport, Presidium of RAS, and Russian Road Agency.

– Development of automated docflow system for large managerial institutions.

GRANTS FROM:

- **Purpose Programme of RAS:** "Telecommunications and Integration Systems".
- **Ministry of Industry, Science and Technologies of RF (State contract No. 37.053.11.0063):** "Methods for Design of Computer Networks".
- **International Russian-Italian project. Ministry of Industry, Science and Technologies of RF:** "Optimal Design of Mobile Wireless Information Transmission Networks, Using Stochastic Models" ("Wireless Communication Networks" project).
- **NATO Science Programme in the Collaborative Linkage Grant PST.CLG.977405 (program "Partnership with NATO"):** "Wireless access in INTERNET on base technology IEEE 802.11".

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