

# Cell biology as a key to computer networking

Falko Dressler<sup>1</sup>, Bettina Krüger<sup>2</sup>

<sup>1</sup> University of Erlangen, Dept. of Computer Science 7, [dressler@informatik.uni-erlangen.de](mailto:dressler@informatik.uni-erlangen.de)

<sup>2</sup> University of Erlangen, Nephrology, [bettina.krueger@fd42.de](mailto:bettina.krueger@fd42.de)

Besides to classical research area of bioinformatics, the turn to nature for solutions to technological questions has brought us many unforeseen great concepts. This encouraging course seems to hold on for many aspects in technology. Many efforts were made in the area of computer technology employing mechanisms known from biological systems. The most known examples are evolutionary algorithms and the artificial immune system. One application is in network security, e.g. for the search for viruses and worms, where the immune system was used as an inspiration.

In contrast, the focus of our group lays on trying to map the cellular and molecular biology to networking architectures. Recently, it was shown that the known approaches to study effects in computer networking, especially methods to analyze the behavior of large scale networks suffer from many presumptions. We try to study this behavior by analyzing the internal functioning of network components as well as there interactions in comparison with cellular systems and the associated intra and extra cellular signaling pathways.

The main focus of this work is to show the similarities of computer networks and cellular systems. Based on the knowledge about cellular metabolism, new concepts for the behavior patterns of routers, monitor systems, and firewalls can be deduced and the efficiency of individual sub-systems can be increased. Focusing on examples of hot topics in the computer society, i.e. network security, potential solutions motivated by cellular behavior are currently studied and, hopefully, will soon bring new results in these areas.

Independently from these examinations, we try to show the power of our novel approach by introducing the basic mechanisms and interactions as well as a self-evident application. Doing this, we must keep in mind that the deeper the parallels between biology and technology, the more important it is to map the corresponding elements correctly.