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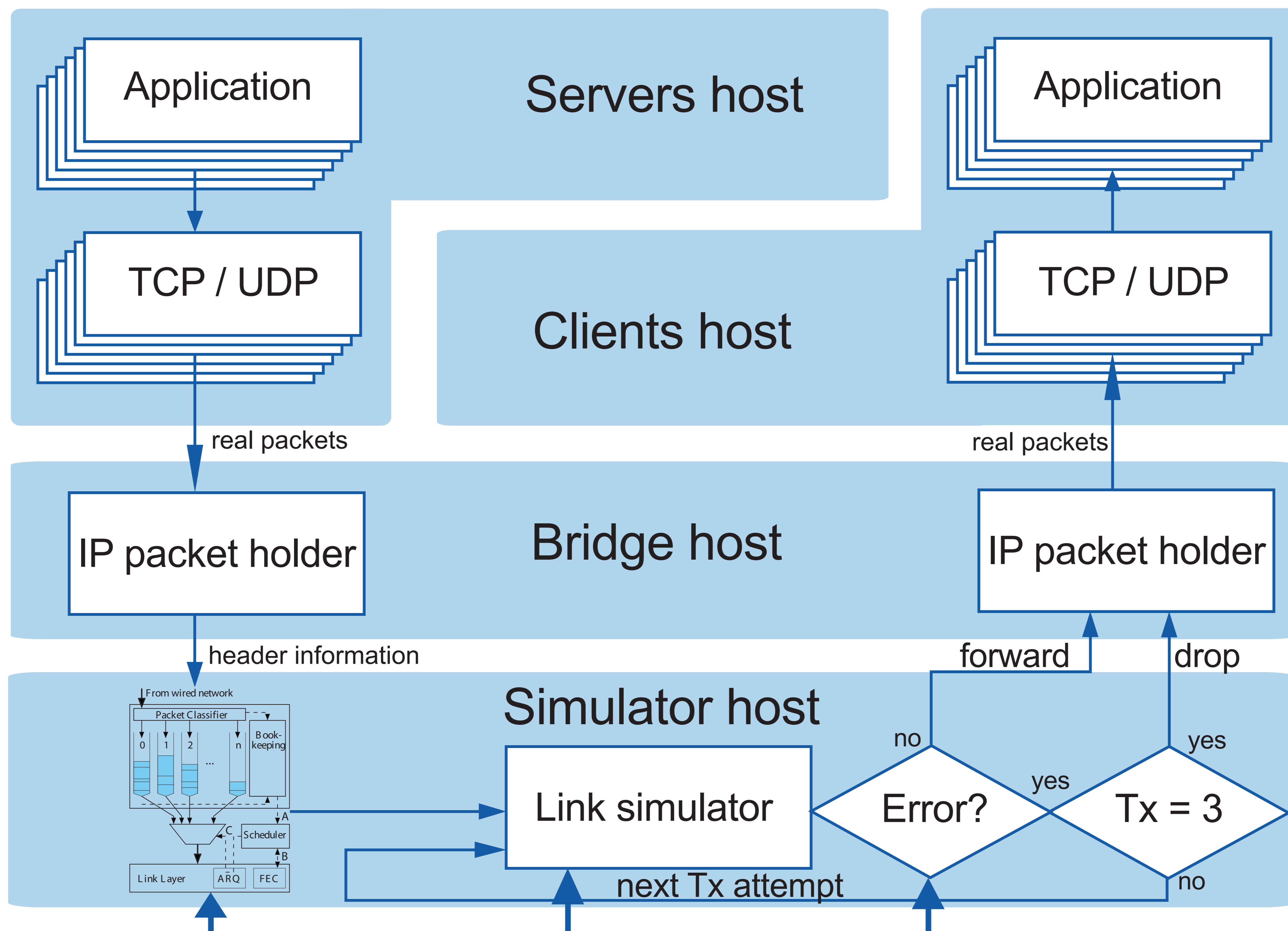
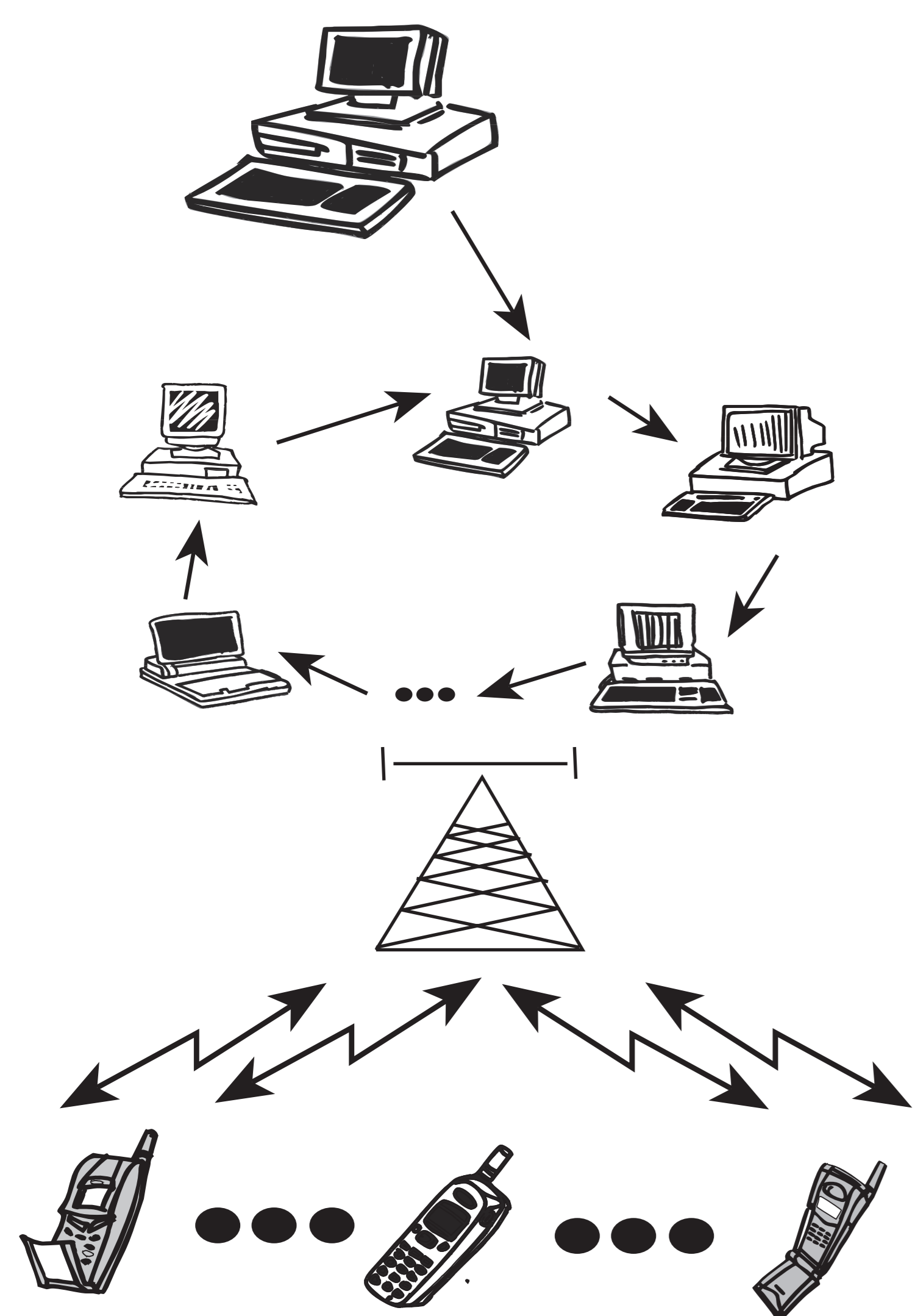
# A TOOL FOR REAL TIME SIMULATIONS OF TCP/IP OVER WIRELESS FADING CHANNELS



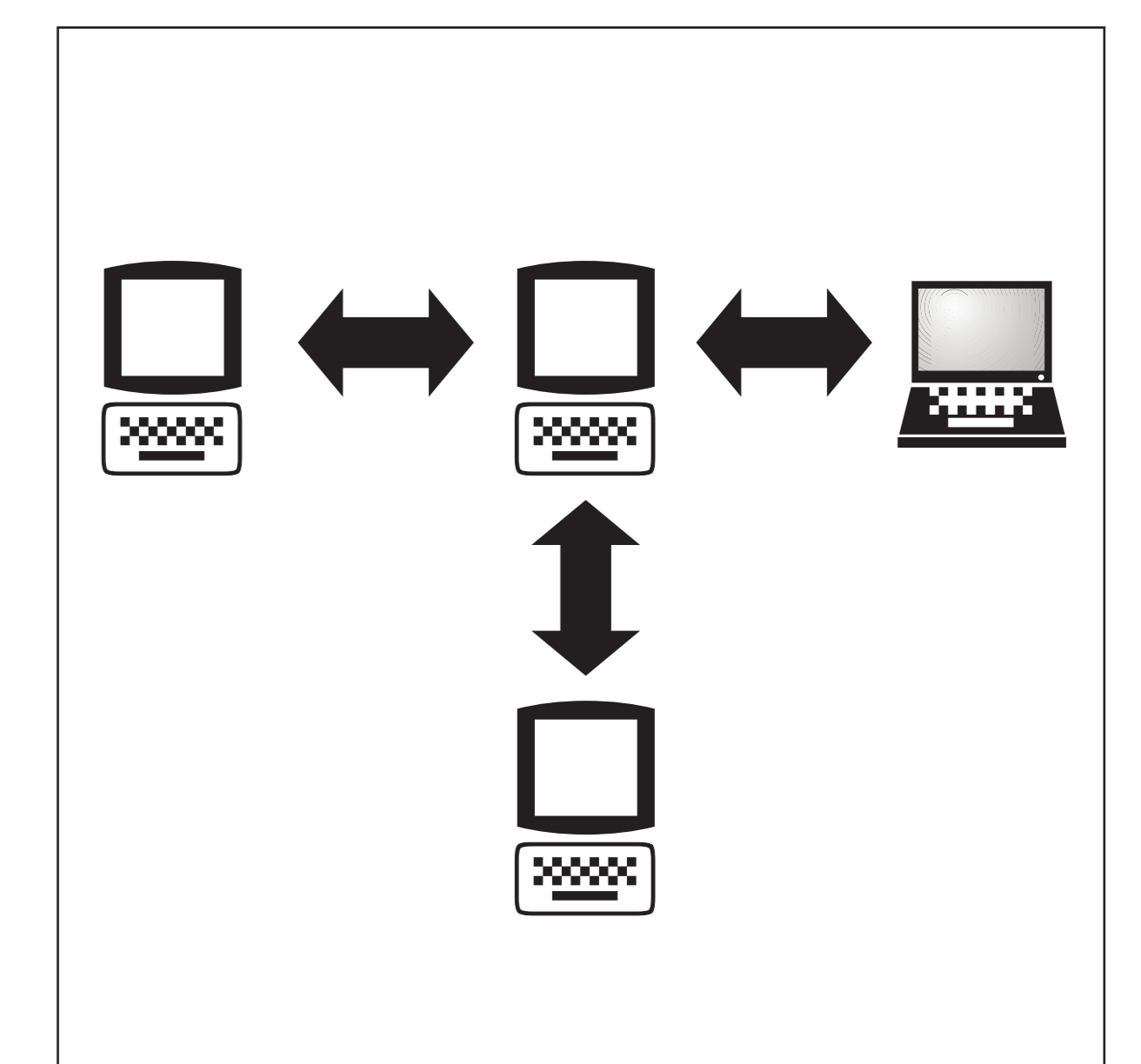
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## Overall real time simulation

The purpose of the simulation tool is to evaluate how different approaches to communication protocols on different layers affect the experienced service level. Primarily we focus on different flavors of TCP, clever media access scheduling, and link layer error detection and correction schemes.

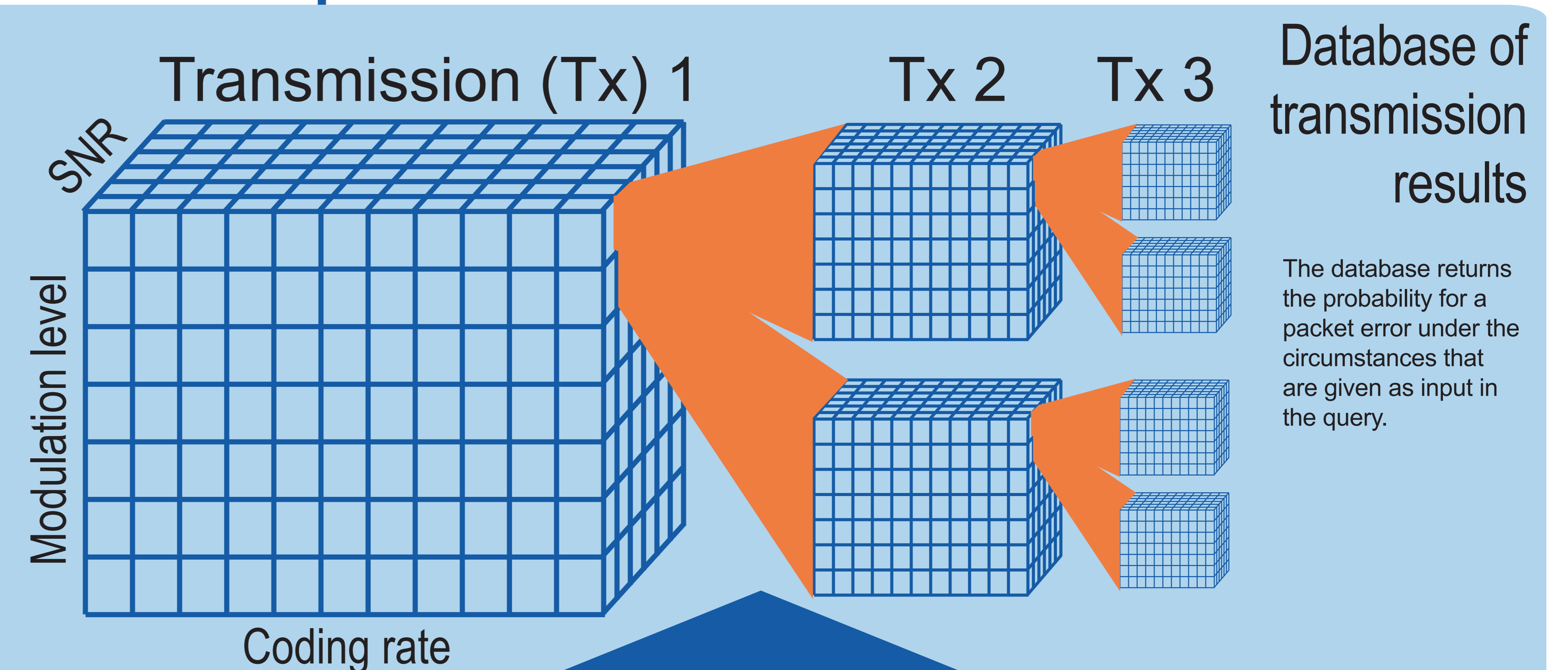
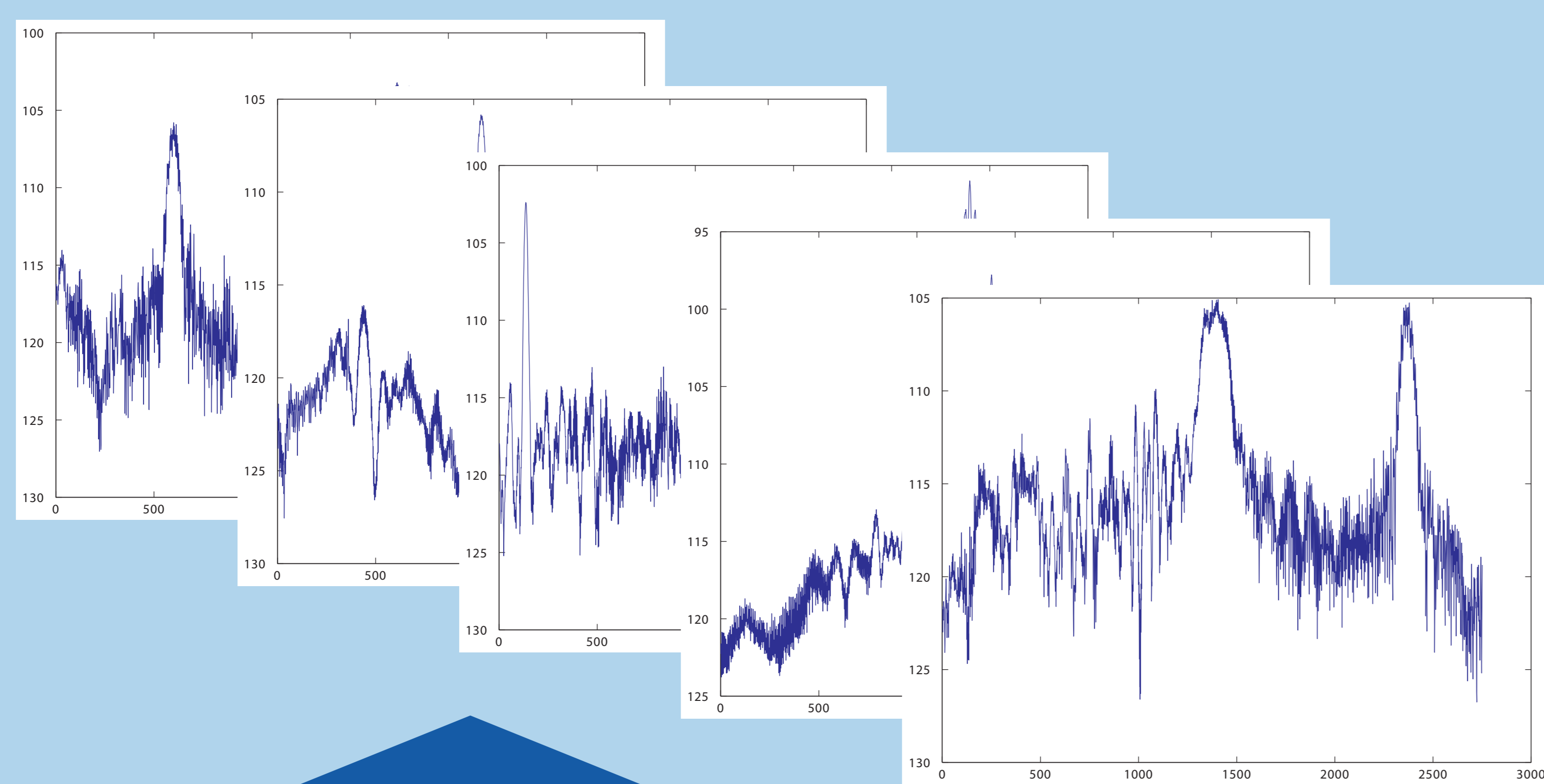


The setup of the simulation environment includes four computers that communicate over an Ethernet. They all run the Linux operating system, and the simulator code is written in C++. The Servers host run different server applications, such as http, ftp, and media streaming. The Clients host run the corresponding client applications. On the Bridge host, the packets are held and their header information is sent to the Simulator host. On the Simulator host, the link layer simulation is carried out, and the outcome results in a drop/forward signal back to the Bridge host.

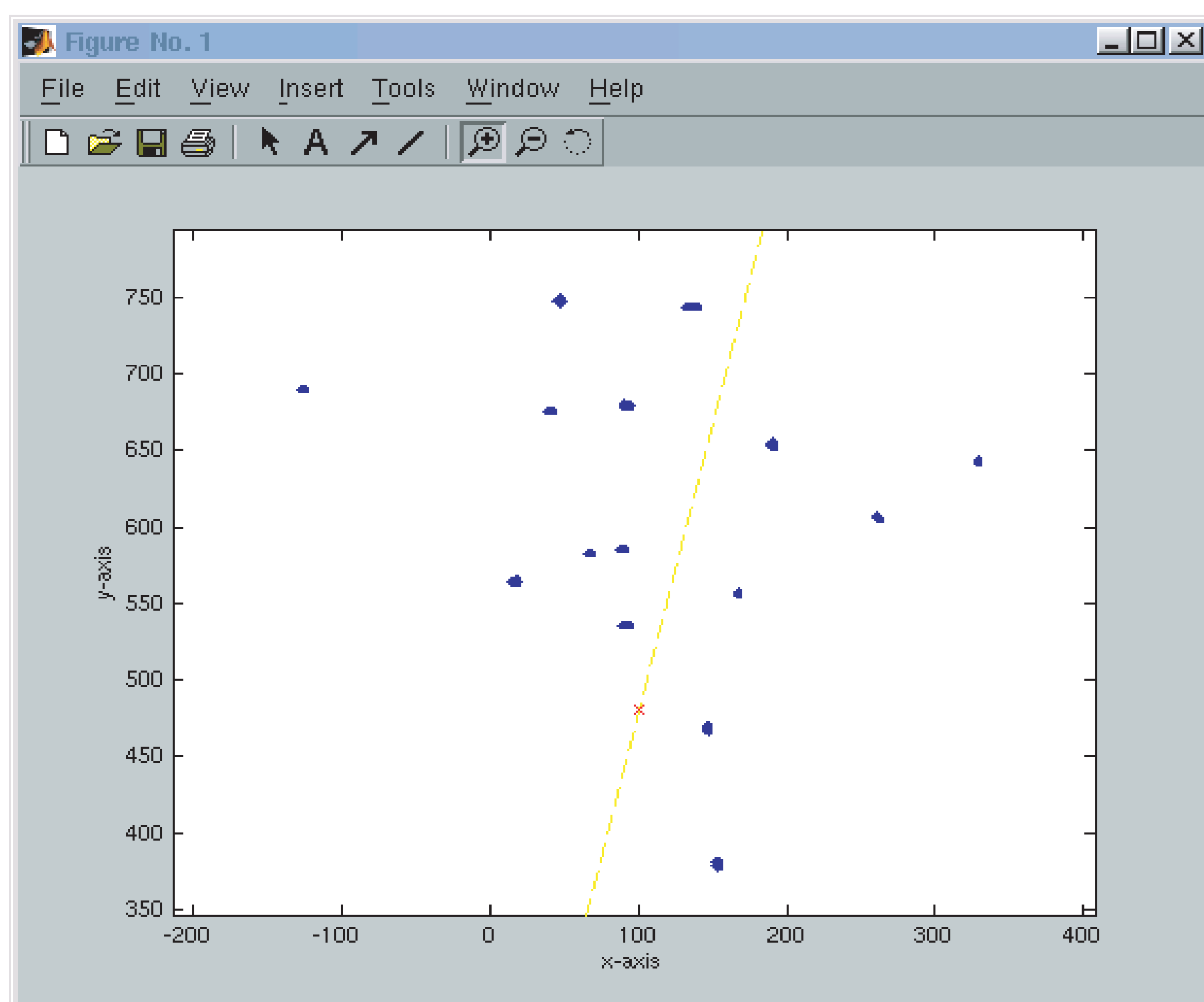


### Database of channel SNRs

The database returns the channel SNR for a mobile at a specific time slot. Different mobiles use different channels, so one separate channel is used for each mobile.



## Simulation of mobility of terminals in a scattering environment



The mobile moves at constant speed along the yellow path. It is surrounded by radio wave scattering objects that create multipath propagation of the received radio signals. Through ray-tracing simulations of the transmitted signal from a base-station, situated in origo, we collect channel impulse-responses at the mobile terminal.

## Simulation of transmission results under various conditions

Through Monte-Carlo simulations of transmission of link layer data packets under the varying conditions that are produced by the channel, the coding rate, and the modulation level, we obtain tables of probabilities for an erroneous reception of the data. By also applying our Hybrid ARQ link protocol, following transmission attempts become dependent of the previous ones. This leads to a huge database for all possible combinations of channel SNR, coding rate, modulation level, and transmission attempt.

