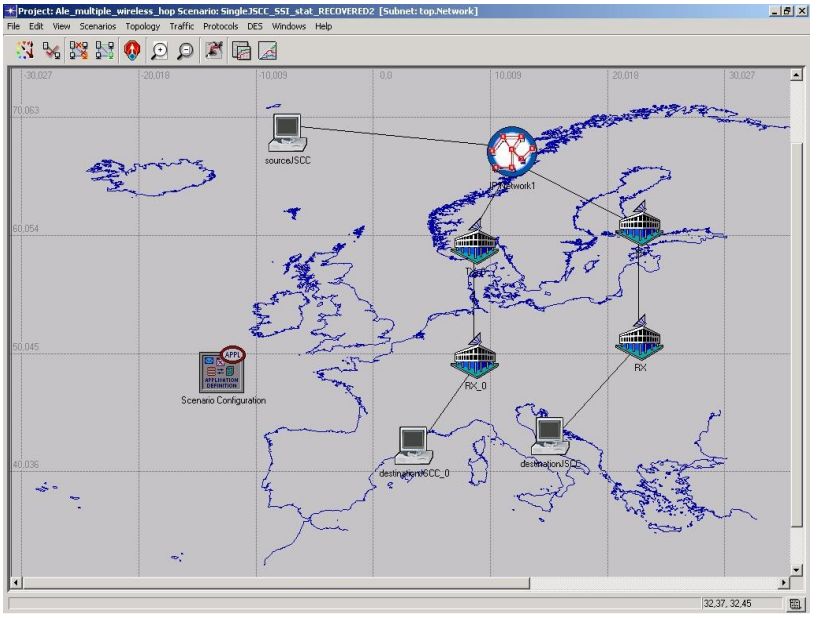
Chapter 7: CONCLUSIONS AND FURTHER MODIFICATIONS

7.1.- Expected results and their exploitation

Research effort in the domain of end-to-end optimisation for multimedia transmission over wireless systems is expected to produce significant benefits for the whole community. From the industry point of view, efficient joint optimisation approaches allow to propose general and powerful solution for all type of networks that require bandwidth and QoS simultaneous optimisation strategies over heterogeneous networks and transmission schemes, hence providing improvement for any future wireless systems, and representing a first step for the 4G long-term target.
For the user, the proposed research activity should result in greatly enhanced quality for multimedia communication, potentially allowing the development of currently too complex and time consuming video over wireless systems.
Preliminary results for prototype systems implementing some basic joint optimisation techniques [1][2] led indeed hope for **peak video quality gains about 3dB in PSNR for equivalent bandwidth occupation.** Better results could also be envisaged. Work in progress shows that gains up to 8dB in PSNR could be expected in bad channel conditions respect to conventional schemes. Finally, the questions raised to achieve this joint end-to-end optimisation are highly relevant in the context of new scientific and technological issues, whether on the flexibility aspects, the integration of different system modules for achieving high-quality transmission on the move, or the hope for seamless multimedia communication across heterogeneous networks and solving these issues or part of them would contribute to teach and mentor a large number of experts for European companies and Universities.
We must say that two different scenarios are foreseen. The first one is a single-link WLAN scenario, where both source and channel coding/modulation are (jointly)adapted to propagation conditions and QoS requirements. Such a scenario will consider the transmission of heterogeneous multimedia data and the evaluation of the gain introduced by the optimisation process. The second scenario includes more users in the same WLAN environment but it is not totally performed yet. In this case, the focus will bw put on the optimisation of the whole network performance with respect to the interference and radio resource allocation. Also it must be said that UEP and RHOC techniques are being implemented now in OPNET, so in this project I have not made any probe with these techniques.
SAI information is not yet implemented over OPNET, because it is being studied if the impact of the overhead is considerable or not. SO on further implementation there must be exist this information that goes from the destination node to the source node

The appearance of a multiple hops wireless would be the following



Regarding PHYSICAL LAYER CONTROLLER we must say that its task is to optimize the channel coding, interleaver and modulator parameters according to the information collected from the system. Only control of channel coding through convolutional channel codes was considered in the basic simulation chain. New options have been developed in the current version of the simulation chain in order to also control channel coding with different classes of codes and modulation parameters. In particular, specific modules for controlling channel coding through LDPC codes and to provide multi-carrier modulation adaptation (adaptive loading) are under development.

7.2.- CONCLUSIONS

The PHOENIX project main goal is effectively exploit the available bandwidth on wireless links (WLANs,...)that is dynamic by nature, providing optimized solution for multimedia transmission over IP-based wireless networks. In this aspect, it is complementary to the QoS mechanisms proposed by IETF (e.g. Differentiated services [3] architecture), which do not focalize on efficient use of network resources eventhough they intend to guarantee and end-to-end QoS. In the same way, the PHOENIX project allows for optimization of the available bandwidth utilization on the wireless channel in a dynamic way, supporting fine granularity up to application flow. This way, already deployed systems, such as the GSM or UMTS, could also be improved thanks to PHOENIX concept, by modifying the board driver to support configuration by other entities (the PHYSICAL level controller).