AN INTELLIGENT RESEARCH ENVIRONMENT FOR SPORTS APPLICATIONS
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INTRODUCTION
The advent of new powerful platforms and the development of modern wireless technologies have introduced a possibility to carry out real-time mobile measurements of sporting equipment and sporting performances (Korhonen et al. in print). A wireless measuring system capable of locating and tracking users in outdoor sports was developed. The idea of this system is to offer a base for research in sports, sports device development and athlete’s physiology measurements. Infrastructure for this purpose includes wireless technology platforms in Vuokatti area, ski tunnel, jumping hill, ice hall and sports hall. In this paper the main focus is on the ski tunnel infrastructure.

METHODS
The measuring infrastructure in ski tunnel consists of 36 access points and a positioning server connected via switched Ethernet network, and tags worn by users. The access points are placed in staggered formation in the first 1/3 part of tunnel so that there is continuous coverage of four access points and in the rest of the tunnel in center of ceiling further apart. A tag collects heart rate and possibly other sensor data and sends it to access points within range. All data is packed using nanoUDP. Access points receive packets and send them over UDP/IP to the Linux positioning server. The system is synchronized by beacons sent by access points. The server calculates tag positions based on Received Signal Strength Indicator (RSSI) and the known positions of access points in tunnel coordinate system.

RESULTS
A wireless positioning and measurement system was developed to be used in the ski tunnel. The system is still under construction. However, some functionality tests for the system have been done already. Some research with similar wireless methods has been done in ski tunnel previously (e.g. Turunen et al. in print) and in jumping hill (e.g. Mikkonen et al. in print).

DISCUSSION
Ski tunnel wireless infrastructure offers possibilities in real time monitoring of for example positioning, velocity and heart rate of athlete in real sport environment. In near future it could also be possible to transmit most valuable data to athlete interface thus extending training possibilities. An http interface for coaches is available over WLAN or Internet. Ski tunnel infrastructure offers diverse but controlled environment for sporting, sport device development ant testing, and athlete physiology measurement. Applications beyond sports are possible as well.

REFERENCES
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