Communication scenario airship - base station

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The communication link between the PRT autonomous airship (blimp, UAV) [1] and ground control station is realized redundantly over three communication channels in different frequency ranges. The intended communication channels consists of a WLAN connection following the IEEE 811.2h standard in the 5 GHz band, a serial connection within the 800 MHz band and a GPRS/UMTS broadband connection in 1,9 to 2.1 GHz band. Apart from the redundancy (connecting security, reliability) this structure offers Internet connection with the advantage to access external maps, GIS data (geographic information systems) and Web services. Furthermore a simple interoperability can be realized to external services of the project partners. An extremely flexibly user interface can be integrated in such a way. Each notebook with WLAN or GPRT/UMTS Internet access or small devices like PDAs or smartphones can be used for ground control. In order to ensure real redundancy, advanced routing and load balancing techniques are used to realize traffic shaping and traffic control (quality of service) over a VPN (virtual private network). This approach allows the usage of the full bundled communication bandwidth. It realizes a safe and stable data link secured over VPN. The mobile phone providers in Germany have reached a nearly complete network coverage today. Even in case UMTS and EDGE coverage is not available GPRS connections with up to 58,6 kBit/s can be used country wide. This bandwidth is sufficient for transmission of highly compressed MPEG4 video streams, sensor and command data. It can be expected that in short time full UMTS coverage with bandwidths of 384 kBit/s up to 7.2 MBbit/s will be available. UMTS uses frequency ranges from 1.9 GHz to 2,1 GHz (Germany). The related communication hardware is very inexpensive. Very low power consumption and very low weight are further advantages of this approach. However communication latency is much higher (GPRS up to 2 seconds, UMTS $\leq$ 1 sec.) than with other proposed channels. Two mobile communication contracts are necessary for the implementation. However appropriate inexpensive flat fees are available. The coverage of this communication approach substantially reduces the risk of a loss of the blimp. The selected components are integrated at present and tested in an embedded PC system. Range and throughput measurements are still to be carried out. A Web-based user interface is currently under development.

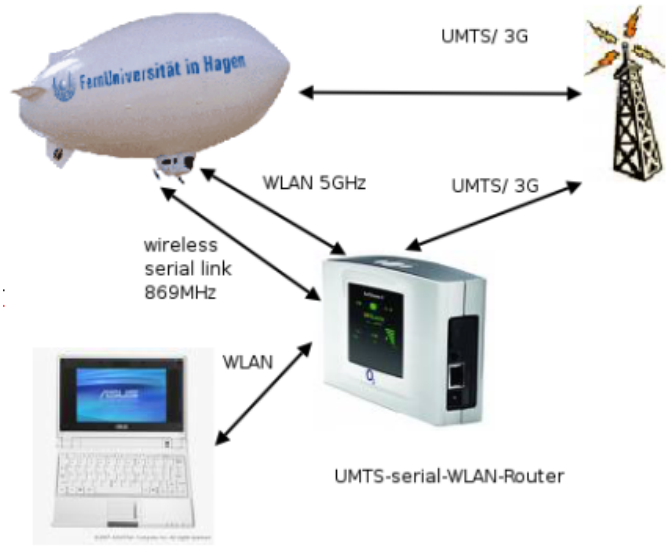

Figure 1: Communication structure

[1] http://prt.fernuni-hagen.de/pro/blimp/en/index.html

[2] http://www.t-mobile.de/funkversorgung/inland