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Hannover, 06/14/01
KOE

Subject: Höft & Wessel AG
FCC ID: PGMHW901960001
731 Confirmation No.: EA100061
Correspondence Reference No.: 19277
Request for Tech. Info: 05/16/01

Dear Sir:

Transmitted herewith is an amendment to the subject application provided in response to the request for technical information dated May 16, 2001.

1. Please find attached the RF Safety Calculations and Applicants Declaration.

2. Please find below a detailed description of the distribution of frequencies in special cases

A system consists in a basestation and one or multiple endpoints (see [1], section 10.3 for details). All communication occurs between endpoint and basestation or vice-versa and is connection-based (see [1], section 10.5). There is no communication between endpoints.

Two cases must be distinguished: (i) the spectral power distribution during an ongoing connection and (ii) during connection setup.

ad (i):

While a connection is active, data is transmitted in a TDMA frame (see [1], section 10.5.1). We use the term bearer to indicate that the same time slot of the TDMA is used over a continuous sequence of frames. A connection is built by one ore multiple bearers. On the air interface a bearer appears as a sequence of 416,7 µs transmission bursts every 10 ms.

The system uses 48 frequency channels (see [1], section 10.4.1). The frequency is changed in every frame according to the rules defined by a generic frequency hopping pattern (see [1], section 10.5.3). After 48 frames (i.e. 480 ms) all frequency channels have been used. The generic hopping pattern is programmed into the basestation at production. Therefore all connections within the system use the same generic hopping pattern.

As the lifetime of a connection is long compared to 480 ms, the transmission power is uniformly spread over all 48 frequency channels. The typical connection time in the system is in the range of several minutes. So above condition is fulfilled in practical circumstances.

ad (ii)

During connection establishment a bearer is set up. The first transmission on a new bearer may happen at any frequency channel with the same probability.

Frames are numbered in the order of transmission. The frequency channel to be used by a bearer in frame n depends on: the frame number n, the generic hopping pattern, the hopping channel I. As explained above the generic hopping pattern is a system constant, so the frequency channel is a function of n and I.

The parameter I is used for modifying the generic hopping pattern. Let f = f(i)[n] denote the mapping of frame numbers n on frequency channels f caused by the generic hopping pattern f(i), i being constant. Then h(i,I)[n] denotes the mapping for hopping channel I, i.e. the hopping pattern modified by the parameter I. Strictly speaking the parameter I does not define a different hopping sequence but only shifts the generic hopping pattern in time (see [1], section 10.5.4)

The frame number n is incremented on every frame, even when there are no data to be transmitted. As long as the connection active the basestation sends out a dummy bearer. By monitoring the dummy bearer the endpoint (among other things) synchronizes its own frame counter to that of the basestation. (see [1], section 10.6.1).

The frequency channel that is used for the first transmission on a new bearer depends on the frame number n0 of this first transmission and the hopping channel I. There is no timely correlation between the event of setting up a connection and the frame counter. Therefore any value of n0 has the same probability. Moreover the endpoint that sets up the new bearer may do that on any of the 12 hopping channels I, the selection of which is statistically independent from n0. This proves that all frequency channels have the same probability for being used on the first transmission of a new bearer.

Therefore even in the unlikely event of connection lifetimes shorter than 480 ms, each frequency is used equally on the average by each transmitter.

3. Please find below a detailed description of procedure regarding sharing / coordinating free channels.

A system consists in a basestation and one or multiple endpoints (see [1], section 10.3 for details). All communication occurs between endpoint and basestation or vice-versa and is connection-based (see [1], section 10.5). There is no communication between endpoints.

All connections within the system use the same generic hopping pattern, which is programmed into the basestation at production time and does not change during the lifetime of the product. Endpoints may adapt their hopsets only by selecting the parameter I, which causes a time shift of the generic hopping pattern (see [1], section 10.5.4)

We assume that the question mainly refers to section 10.7.1 of document [1], in particular to the sentence "Due to the fact that the basestation broadcasts a list of free channels and each endpoint performs RSSI measurements, the only potential interference situation is a collision of two endpoints during connection setup."

We like to clarify that the "list of free channels" which is broadcast by the basestation only reports the occupied time slots in the TDMA frame and those time slots which cannot be used by an endpoint due to internal processing constraints at the basestation. It does not provide information about the occupancy of hopping frequencies by other transmitters.

Such information is only detected locally at the endpoint and at the basestation by monitoring the environment through the RSSI scan (see [1], section 10.7.1) and is taken into account for the selection of a suitable parameter I when setting-up a new bearer. So each transmitter uses locally derived information only for detecting other users and adapting its hopset. This complies to FCC part 15, section 15.247(h).

We trust this information is sufficient to issue the grant ASAP. If you have any further questions please do not hesitate to contact us.

Sebastian Köhler
technical project manager

References

[1] Höft & Wessel: User Manual for HW 90196/US, HW 90195/US, HW 8660/US, Version 1.00, 02/02/2000