

**Source:** Simon Pike (convenor of AH 03)  
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### **Objective of the Ad Hoc Group**

The purpose of the AH03 correspondence group was to investigate the UE output power tolerance. The UE maximum output power is defined in draft specification S4.01A (TSGR4-(99) 087) in section 6.2.1. The current value for all UE power classes is: [+1dB/-3dB] (in square brackets)  
The ad hoc group should aim to confirm these values or agree different ones by the next meeting of WG4.

### **Working assumptions**

To focus the work of the correspondence group, I proposed the following as starting assumptions for the discussion:

- 1) The discussion should focus on the range of powers (currently 4dB) rather than how this is centred on the nominal values.
- 2) This range applies over all operating conditions of the terminal (ie extreme conditions).
- 3) When closed loop power control is effective, this will determine UE output power. Therefore the discussion should concentrate on periods when closed loop power control is not effective.
- 4) The most urgent power class to reach a conclusion is +21dBm.

### **Summary of the discussion**

The discussion in the group can be divided into a number of themes:

#### **1) Size of the window of power tolerance**

The initial correspondence continued the discussion in the last WG4 meeting. Some operators wanted a tight window, whereas the manufacturers felt that any window smaller than 4dB would have substantial impact on implementation of terminals.

It seems that the group has reached a consensus on a window of 4dB for both normal and extreme conditions.

There seemed to be two reasons behind some operators seeking a narrow window:

- random variation of terminals over a wide range of powers
- the possibility of the majority of terminals having powers at the lower end of the window.

In the following section I make some proposals on the way to specify UMTS requirements which could make the second point less likely to occur.

#### **1) Position of Window relative to nominal power value**

It was pointed out that, under Japanese Radio Law, the maximum power must be no more than +1dB relative to nominal power. However, some European operators (based on experience with GSM) requested a window centred above the nominal value, to ensure that the nominal value could be used for planning purposes.

As the upper limit is a mandatory requirement in Japan, I can see no alternative to using this for the specification of the terminal. In the section below, I make a proposal which may meet the needs of the European operators.

#### **2) Differing requirements for normal and extreme conditions**

Early on, there were proposals for different windows for normal and extreme conditions. However, these proposals were not developed as the discussions progressed.

### **3) Radiated antenna power**

Some European operators requested a definition of the radiated power, as well as the power from the antenna connector.

### **4) Value for nominal power**

Although it was not directly raised by any of the contributors to the group, the differing views on the position of the window relative to the nominal power may reflect differing expectations of the typical power available from a terminal.

## **The way forward**

### **Decide the size and position of the window of power tolerance**

The most recent e-mail in the group (Friday 19 March, from Mr Maeda of NTT DoCoMo) supported a window of +1dB/-3dB, for both normal and extreme conditions.

As there have been no e-mails in response to this during the last week, I tentatively propose that the ad hoc group can accept this window.

### **Personal Observations**

The views of European operators over output power tolerance was largely based on experience of GSM. Based on the discussion in the correspondence group, I make a number of proposals:

#### **1) Define separate power for RF planning**

GSM specifications did not give separate power values for equipment and for operator to use for planning purposes. It would assist operators if WG4 defines recommended powers for planning purposes as well as specifications for terminals.

#### **2) Define measurement technique for talk time**

The way that talk time was measured for GSM terminals gave an incentive for terminal manufacturers to produce terminals with output power at the low end of the window (because talk time was measured at maximum power). For W-CDMA, the mean transmit power in normal operation will be lower than for GSM. Therefore, if WG4 defines an appropriate set of conditions to measure talk time, this will remove this incentive for manufacturers to produce terminals with power at the low end of the window.

#### **3) Consider specification of ACLR**

One aspect of the W-CDMA specification which may encourage terminal manufacturers to design terminals with low maximum power output is the ACLR requirement. If this is specified at the maximum output power for the terminal, it might encourage manufacturers to design terminals with output power at the low end of the window. One way to overcome this is to specify ACLR at an absolute power; I would propose to use the power recommended for planning (which could be the nearest power step, the nearest power step below, or the nearest power step above). If this value was used it could be justified as the value to be used for calculations of guard bands with other services, because the power of the terminal should not normally rise above the value used for planning purposes.