

**Title:** 3G UE Transmit power classes and changes to S4.01A

**Source:** Vodafone, T-Mobil

**Purpose:** Action

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## Introduction

At this initial stage of UMTS development, it is crucial from a network planning point of view to understand what types of terminals will be available. From the RF point of view it is highly desirable to limit the number of power classes defined, which is a lesson learnt well from GSM operational experience. The presence of multitude of classes at this early stage will only serve to blur the planning stage and could lead to undesirable consequences.

There are currently 6 classes of UE defined for FDD. The only agreed class is class 4 terminals, which has a maximum power capability of +21 dBm. This figure was arrived after extensive discussions prompted by a contribution [1] that addressed various aspects related to output power of UE.

In contrast, the remaining classes were defined without clear reasoning behind the need for such classes. This approach is not reasonable and it is our feeling that sufficient argument, services and applications must be presented for the definition of newer classes.

We, therefore, propose the deletion of all the classes bar class 4. It is important to emphasise that extra classes can be defined in the future as deemed necessary. Therefore, the signalling should allow for the inclusion of new classes in the future and a LS to this effect should be sent to 3GPP TSG RAN WG2.

The paper also presents some further reasoning behind the deletion of the lower and higher power classes and introduces issues that have to be considered when proposing further power classes.

## Low power classes

It has been mentioned that classes 5 and 6 (10 and 0 dBm respectively) will be targeted for licence exempt applications. In our view and with the current trend in spectrum allocation, license exempt application in FDD should be avoided and discouraged.

Special applications such as telemetry using the FDD bands must rely on the coverage provided by the PLMN. Note that the network would be planned for the working

assumption of 21 dBm. Terminals with lower power would, therefore, not get the required coverage and this should be avoided in the early days of UMTS.

## High power classes

It has been mentioned that these terminals can be used for specific applications such as on trains or buses. However, more consideration will need to go into defining such classes than just purely stating the value.

Currently, we do not foresee the need for this class of to be included in the first release of the specifications. Sufficient hooks can be added to ensure that such terminals, if needed, can be added in the future.

## Changes to S4.01A

The changes are basically the deletion of all the classes bar class 4. There are some editorial modifications as well. Note that it is not appropriate to include a note on the possibility of introducing other classes since the text does not explicitly, nor implicitly prohibit them. Future classes of UE maximum output powers must remain an option and this should be made clear in the meeting and to RAN and TSG T.

## References

1. Vodafone, Tdoc SMG2 UMTS-L1 178/98," UMTS Mobile Station Transmit Power", SMG2 UMTS L1 #5, Gatwick, UK, July 1998.

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## 6 Transmitter characteristics

### 6.1 General

Unless detailed the transmitter characteristic are specified at the antenna connector of the UE. For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

### 6.2 Transmit power

#### 6.2.1 UE maximum output power

~~The following class of UE maximum output power has been defined~~ ~~The following Power Classes define the maximum output power;~~

**Table 1:UE Power Classes**

Power Class	Maximum output power	Tolerance
1	{+33} dBm	{+1dB / -3dB}
2	{+27} dBm	{+1dB / -3dB}
3	{+24} dBm	{+1dB / -3dB}
4 [1]	+21 dBm	{+1dB / -3dB}
5	{+10} dBm	{+1dB / -3dB}
6	{0} dBm	{+1dB / -3dB}

Note

1. The maximum output power refers to the measure of power when averaged over the transmit timeslot at the maximum power control setting.
2. The tolerance of the maximum output power is below the prescribed value even for the multi-code transmission mode
- ~~3. The need for power classes 5 and 6 is for further study.~~
3. For UE using directive antennas for transmission, a class dependent limit will be placed on the maximum Equivalent Effective Isotropic Radiated Power (EIRP).