B. Rallinder

133/87
26 FEV. 1987

CEPT/CCH/GSM

GSM doc 41/87

Madeira 16 - 20 Feb. 87

Status: Internal Output Document

Source: GSM

The package of NBTDMA working assumptions unanimously approved by GSM at its Madeira meering 16-20 Feb. 87.

1. Equalization

The system is required to equalise delay profiles of up to least 7 µs. It was recognised that in mountaineous ares this could be too small a value. Therefore a working assumptions of 20 µs has been set. However the working assumption should be reviewed at the GSM June meeting. Towards this end:

- Results of measurements at 900 MHz shall be provided by COST 207, including the amplitude and the delay of the delayed path, as well as the percentage of locations where this situation occurs and a description of the measurement locations.
- As part of the optimistions the impact on the cost and the complexity of the MS of equalising different delayas over the range starting from 7 us shall be studied together with the cost of alternative solutions to deal with the problem (antenna arrangement, ...).

The aim shall be to see which minimum value would lead to a satisfactory performance over a fair percentage of truly representative locations (say 90%) in the regions concerned by this effect taking into account the need to achieve the most economic solution to the systems as a whole.

2. Frequency hopping

Network operators will have the freedom to implement or not frequency hopping in all or certain of the Base Stations. Consequently:

- Frequency hopping procedure will be described in the air interface specification.
- The frequency hopping capability will be a mandatory feature for Mobile Stations and an optional feature for Base Stations.

In addition it is agreed that the system, while supporting frequency hopping, will be optimised with the assumption that neither frequency hopping nor space diversity in the mobile equipment is used.

3. TCH gross bit rate

A gross bit rate of 16 kbit/s/TCH is adopted as a working assumption. During the optimisation phase the error coding scheme for the speech codec and the channel coding will be optimised together to increase the range of bit error rates.

4. Data transmission

- DTMF signalling in both directions will be supported by the GSM system, optional to be implemented by the Network operator. The DTMF information is transmitted as a signalling message over the Dm channel. The appropriate DTMF tone is injected into the audio part at the receive end.

- Data services will be supported by the GSM system, optional to be implemented by the Network operator. The terminal equipment is connected to the mobile station via a terminal adaptor and the transmission is fully digital. Terminal adaptors for V-series are to be specified.

5. Multiple access scenario

- The system is based on the TDMA technique, comprising 8 full-rate TCHs per carrier frequency as a working assumption. If there is a strong impact on the performance or implementation of handover, this figure will be reconsidered.

- The system will support half-rate TCHs to cater for future half-rate speech codecs.

- The system shall be optimised for the full rate TCH and the only constraints on optimisation arising from the requirement to support future half-rate speech codes shall be that the delay of the speech codec and multiple access system shall not exceed 130 ms when half rate codecs shall have been implemented.

- The maximum allowed delay for the multiple access system including channel coding and interleaving shall be 65 ms.

- A single bit-rate scheme is a working assumption.

6. Decoding duty cycle

The demoludation process implemented in the MS will have a maximum duty cycle of 50%; i.e. the mobile station must be able to "listen" to another frequency during one burst duration inbetween two sucessive burst of the full rate TCH assigned to the MS.

7. Modulation scheme

As a working assumption DPM (nRC) modulation is adopted.

8. Spectrum efficiency

- The C/I_c performance of the system is required to be better than 10-12 dB.

- The carrier spacing is to be in the 200 to 300 kHz range as a working assumption.

It is required that the spectrum efficiency of the existing analog network will be at least maintained during the transition to the GSM system. This requirement defines the relation between C/I_c performance and the carrier spacing. When the GSM system is established it will allow for higher spectrum efficiency than the analog system.

- RF-power control in the mobile station is adopted as a working assumption. RF power control in the BS is to be studied by WP2.

9. HP accomodation

- A maximum RF peak power of 5 Watts is adopted as a working assumption.

- Sleep-mode is supported by the GSM system as a working assumption.

10. Interleaving

The implementation of an interleaving scheme is adopted as a working assumption.

11. Speech coding

- An improved version of the RPE-LPC algorithm is adopted as a working assumption, During the optimisation phase, the addition of long term prediction to this algorithm will be evaluated. By May 1st, one of the following alternatives will be chosen:
  - improved RPE-LPC proposal;
  - original RPE-LPC.

- As a working assumption the speech coding time frame is 20 ms.

- The net bit rate of the speech codec will be fixed well in time to enable optimisation of a combined channel coding - error protection scheme. For the moment a gross bit rate of 16 kbps is a working assumption.

- The delay of the speech codec for 16 kbit/sec/TCH shall not exceed 35 ms as a working assumption.

- Optimisation shall be aimed at improvement of error robustness while keeping the same level of quality in errorfree environment.

- The SCEG will implement speech activity detection in the codec, and optimise the codec for a minimum effect on speech quality.