

Terrestrial Trunked Radio (TETRA); TETRA mobiles moving at high velocity

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Terrestrial Trunked Radio (TETRA).

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1 Scope

The present document describes the setup and results of operational tests with TETRA terminals at high velocity. In September 2004 tests were performed with a mobile radio temporarily built into a fixed wing airplane. In March 2006 tests were performed using a portable radio in a high speed train.

2 References

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Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

GPS	Global Positioning System
MER	Message Erasure Rate
MS	Mobile Station
RSSI	Received Signal Strength Indication

4 Air to ground field test

4.1 Configuration and test area

The test at high speed was part of a general Air to Ground field test held in September 2004 in the Netherlands. For the Air to Ground test a fixed wing airplane was used with a mobile TETRA radio. See figures 1 and 2.



Figure 1: Airplane used during the test



Figure 2: Mobile radio built into a cradle

The test was performed in the north west part of the Netherlands at the coast of the IJsselmeer. See figure 3.



Figure 3: Test area Air to Ground high speed

The MS behaviour and the position, speed and altitude of the airplane were recorded with a laptop PC running logging software. For this the laptop PC was connected to the mobile and a GPS receiver.

4.2 Results

The normal air speed of the airplane used for the test is around 200 km/h. Due to a strong tail wind and descent of the airplane a ground speed just above 300 km/h was reached during the test.

Figure 4 shows the recorded ground speed versus time.

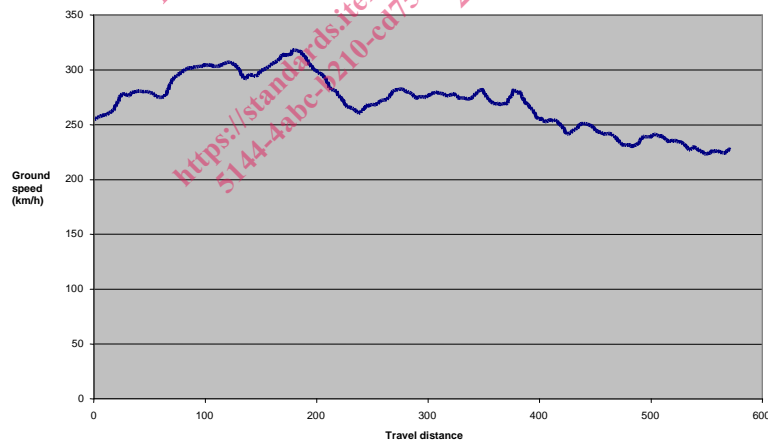


Figure 4: Ground speed during the trip

In figure 5 the Received Signal Strength Indication (RSSI) during the flight is shown. In the area with speeds above 300 km/h (between travel distance 80 km to 180 km) the RSSI is between -80 and -75 dBm. The max value of the RSSI in the test stretch is -50 dBm, when the airplane is very close to the Air to Ground base station.

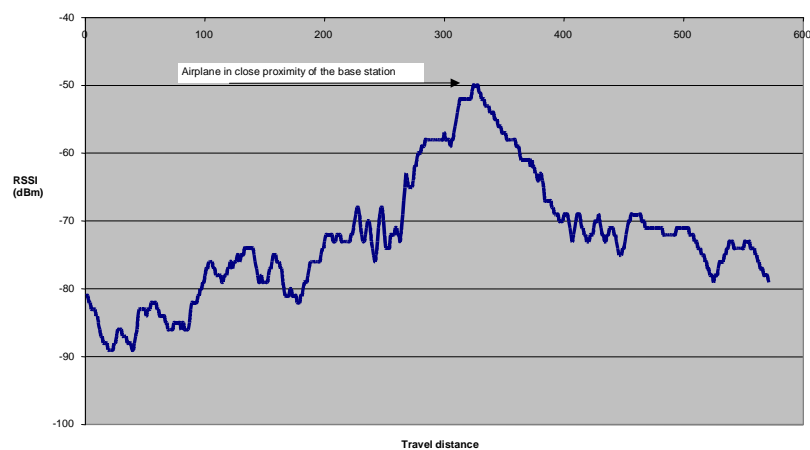


Figure 5: RSSI during the flight.

Figure 6 shows the Message Erasure Rate (MER) during the flight. At speeds > 300 km/h the MER remains zero.

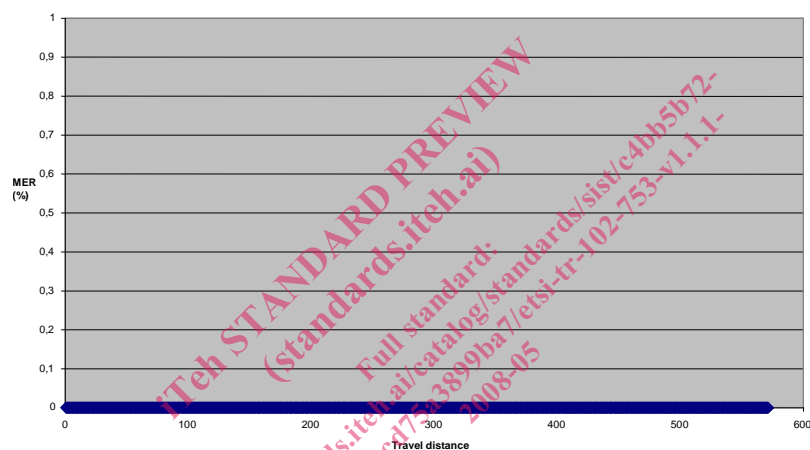


Figure 6: Message Erasure Rate (MER) during the flight

5 Performance test in High speed train

5.1 Configuration and test area

The test at high speed was part of a general performance test held in March 2006 in the Netherlands. For the coverage test a portable TETRA radio was used in the High speed train. See figures 7 and 8.



Figure 7: The High speed train

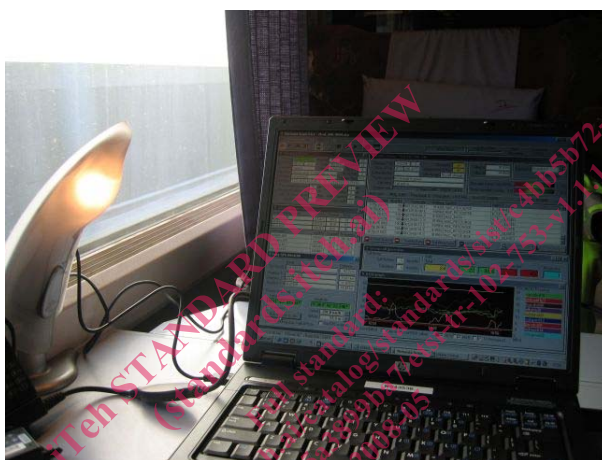


Figure 8: Test setup (portable radio on the far left)

The radio was positioned close to the window. The MS behaviour and position and speed of the train were recorded with a laptop PC running logging software. For this the laptop PC was connected to the MS and a GPS receiver.

The test was performed in the south-western part of the Netherlands travelling from Rotterdam towards the Belgian border. See figure 9.



Figure 9: Test area High speed train