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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
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Contents

Foreword

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1 Scope

The present document specifies the standards allowed to implement layer 1 on the Iuant interface for UTRA, E-UTRA and NR.

The specification of transmission delay requirements and O&M requirements are not in the scope of the present document.

The modem option of Iuant layer 1 specification in clause 4.3 applies to UTRA, E-UTRA BS and NR BS type 1-C.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
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[1] 3GPP TS 37.462: "UTRAN Iuant interface: Signalling transport".

[2] ISO/IEC 8482 (1993-12): "Information technology - Telecommunications and information exchange between systems - Twisted pair multipoint interconnections".

[3] TIA/EIA TSB89: "Application guidelines for TIA/EIA-485-A".

[4] 3GPP TS 25.101: "Technical Specification Group Radio Access Network; User Equipment (UE) radio transmission and reception (FDD)"

[5] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception"

[6] 3GPP TS 38.101: "NR; User Equipment (UE) radio transmission and reception (FDD)"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

On-Off-Keying: A modulation system in which a carrier is switched between two states, ON and OFF.

Common feeder cable: Feeder cable where some antenna line devices (e.g. RET, TMA) are connected via the same feeder cable.

3.2 Abbreviations

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

BS Base Station
DC Direct Current

DL	Downlink
FDD	Frequency Division Duplex
ISB	Idle-State Biasing
OOK	On-Off-Keying
RET	Remote Electrical Tilting
RF	Radio Frequency
TMA	Tower Mounted Amplifier
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access

4 Iuant layer 1

4.1 General

There are two layer 1 options:

- RS485 option: A screened multicore cable, which supports a conventional RS485 serial multi-drop bus.
- Modem option: A connection to a RET and/or a TMA control unit by way of a coaxial cable which is shared with DC supply and RF signals.

Both layer 1 options support the connection of two-way serial data and DC power to the RET and/or TMA antenna device.

At least one of these two layer 1 options shall be supported.

The default data rate for both layer 1 options shall be 9.6 kbps. Higher data rates of 38.4 kbps for both layer 1 options and 115.2 kbps only for the RS485 layer 1 option may optionally be supported. Each unit communicates on one of the three data rates, but different units on the same interface may use different data rates.

After a reset, a secondary device shall alternate between supported data rates. When alternating between data rates, the data rate shall be held constant for 300 ms. After every correctly received device scan command (see TS 37.462 [1]) independent of whether it matches or not, at one of the supported data rates, that data rate shall be held constant for 1.5 seconds. After successful reception of an address assignment frame, the secondary device shall use that data rate until it is reset.

Data rates:

- 9.6 kbps ± 3 %
- 38.4 kbps ± 3 %
- 115.2 kbps ± 3 %

The format of the data octet shall be as shown in figure 4.1.1:

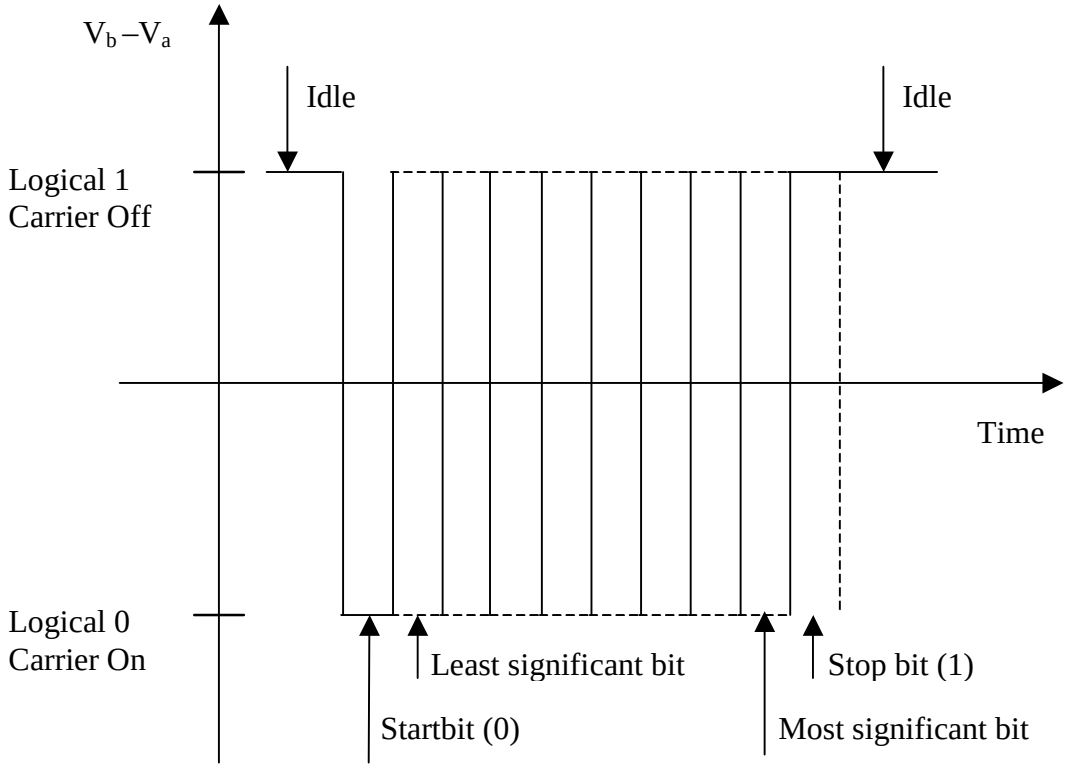

Figure 4.1.1: Format and order of transmitted data

4.2 RS485 option

This option is constituted by a two wire bi-directional multi-drop configuration conforming to ISO/IEC 8482 [2]. The mapping of mark/space to logical one and zero as referred to in ISO/IEC 8482 [2] shall be according to figure 4.1.1.

The use of ISB, also called idle-line failsafe in TIA/EIA TSB89 [3], is mandatory. The bias voltages shall be applied only by the primary device to any separate RS485 bus. The polarity of the idle-state bias is defined as a transmitted 1.

The RS485 transmitter shall be set to drive the bus before the first start bit is sent and held active until the last stop bit is sent. The RS485 transmitter shall stop driving the bus within 20 bit-times after the last stop bit is sent.

If an antenna modem is used ISB shall be implemented by the antenna modem.

4.3 Modem option

The connection to a RET and/or a TMA control unit by way of a coaxial cable which is shared with DC supply and RF signals is provided by two modems, a BS modem and an antenna modem. The BS modem shall be either connected to the antenna connector of the BS or integrated in the BS. It provides signal transmission to the antenna modem and signal reception from the antenna modem over the antenna feeder cable. The antenna modem is located between the antenna feeder cable and the antenna. Modem configurations and reference points for modem characteristics are specified in figure 4.3.1 and figure 4.3.2. Unless otherwise stated, requirements in this section apply to both BS modem and antenna modem.

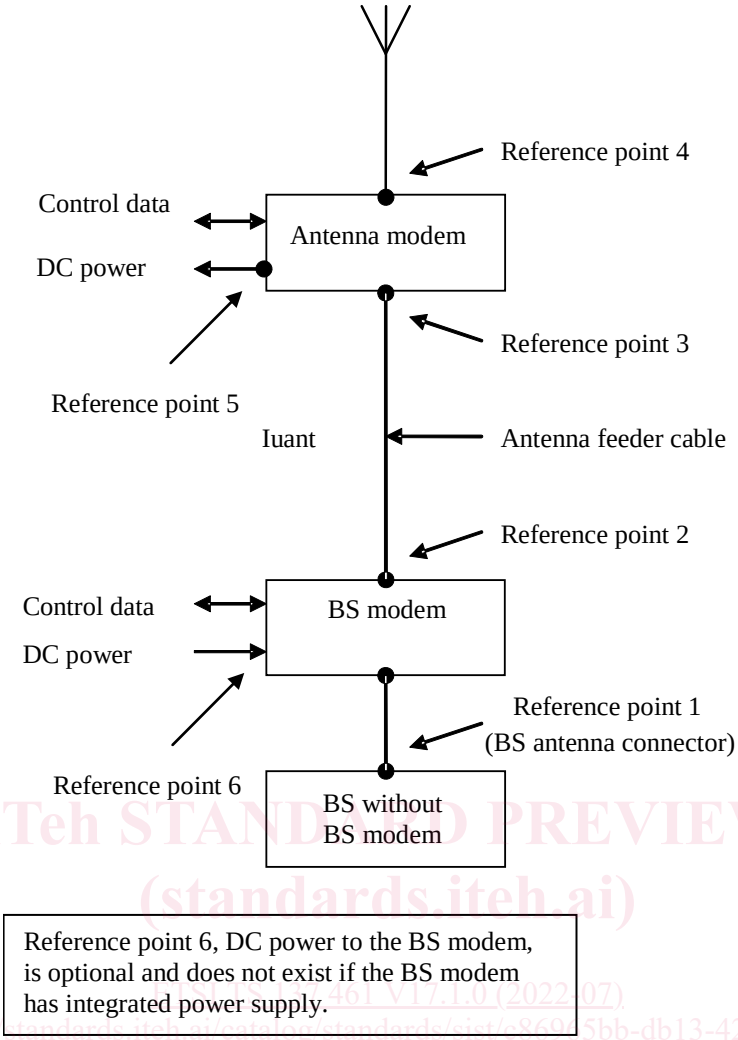

Figure 4.3.1: Modem configuration and modem reference points for a BS without BS modem

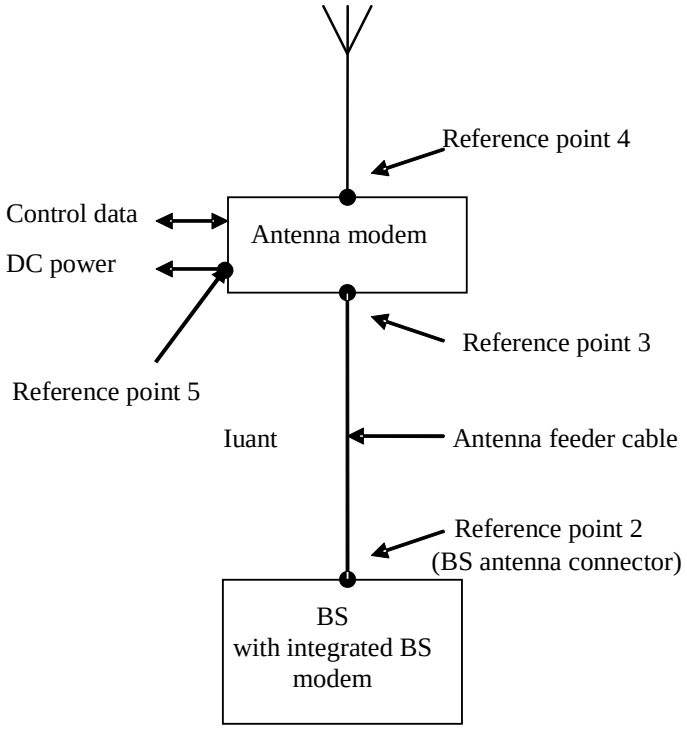

Figure 4.3.2: Modem configuration and modem reference points for a BS with integrated BS modem

4.3.1 Interference with existing systems

The modem circuit shall be capable of managing its transmitting characteristic according to subclause 4.3.5.

4.3.1.1 Carrier frequency and frequency stability

The following carrier frequency shall be used for this application:

2.176 MHz ± 100 ppm

4.3.1.2 Modem isolation and modem emissions

The external BS modem shall provide minimum attenuation according to figure 4.3.1.2.1 between reference point 2 and reference point 1 to protect the BS from emissions of the antenna modem.

External BS modem emissions at reference point 1 shall be attenuated at least according to the modem attenuation in figure 4.3.1.2.1 below the levels specified for the modem spectrum emission mask in subclause 4.3.4.2 to protect the BS from emissions of the BS modem.

The antenna modem shall provide minimum attenuation according to figure 4.3.1.2.1 between reference point 3 and reference point 4 to protect other radio systems from emission of the BS modem.

Antenna modem emissions at reference point 4 shall be attenuated at least according to the modem attenuation in figure 4.3.1.2.1 below the levels specified for the modem spectrum emission mask in subclause 4.3.4.2 to protect other radio systems from emission of the antenna modem.