WAVECOM ELEKTRONIK AG
Hammerstrasse 8
CH-8180 Buelach
Switzerland
www. WAVECOM.ch

BINARY INTERCHANGE OF INFORMATION AND SIGNALING (BIIS)

A new, digital signaling system for mobile radio systems, Binary Interchange of Information and Signaling (BIIS) has been defined.

Introduction

BIIS seeks to offer more functionality for Land Mobile Radio systems than has been the case until recently. The background for the new signaling system is the increasing demands for new functionality and also the need for telecommunication systems which can be used for trans-border communication inside the European Union.

Architecture

BIIS has been standardized by ETSI. The standard only describes the air interface, i.e. the physical layer, the data link layer and a call control layer. However, the standard also describes possible interconnectivity scenarios. These scenarios include data network connectivity, e.g. IP networks or voice patching to the PSTN either or to a PABX.

BIIS functionality includes selective calling, various other call features, short text messaging, predefined status messages and data transmission.

Protocol stack

BIIS uses 1200 bps subcarrier FFSK modulation with a center frequency of 1500 Hz and a shift of 600 Hz. The frequency deviation of the main carrier can be adjusted to accommodate channel spacings of 12.5, 20 and 25 kHz.

The basic transmission format of BIIS is an address codeword followed by none or more concatenated address, control or data codeword's, see fig. 1.

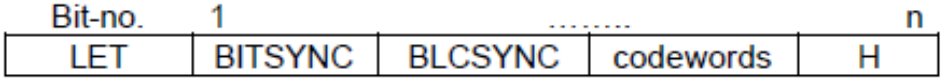

Fig. 1 Transmission format

Transmission is preceded by a Link Establishment Time (LET) consisting of an unmodulated carrier the length of which is system defined. This is followed by fields for bit synchronization (BITSYNC), block synchronization (BLCSYNC) and code words. Finally a Hang-Over bit (H) is appended. If BITSYNC and BLCSYNC are inverted then a FEC option is enabled. The option applies a (8, 4) convolutional code over the entire codeword length resulting in a 128 bit codeword.

Code words are 64 bits long and are comprised of 48 bits of information and 16 redundancy bits. 15 of the redundancy bits are generated by a cyclic (63, 48) code, the last bit is used for overall even block parity, see fig. 2.

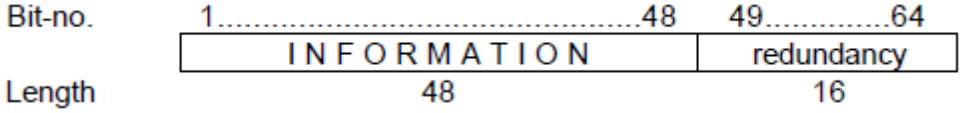

Fig. 2 Structure of a codeword

BIIS offers addresses for selective calls for individual, group and broadcast calls at three priority levels. Other services offered are emergency reset, repeater access, PABX and PSTN access and sending short, predefined status messages. Commands can be sent to force a station to another channel or to enable or disable mobile stations.

WAVECOM ELEKTRONIK AG
Hammerstrasse 8
CH-8180 Buelach
Switzerland
www. WAVECOM.ch

Three types of blocks are defined: Address, control and data blocks. The general address block is shown in fig. 3. The block contains fields for message definition (Operating Mode Characteristic) and Regional Code (country code). The common address field (COM) contains common information for the individual transmitter and receiver addresses – its content is nationally defined.

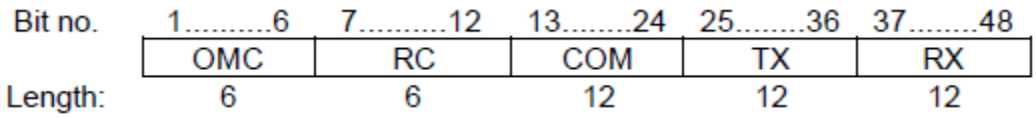

Fig. 3 Address block structure

BIIS has two addressing modes, a normal mode and an external address mode. In normal mode a maximum of 4096 addresses are available. The external mode is used for an accurate definition of the complete receiver and transmitter address and takes two address code words.

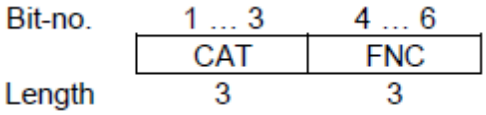

Fig. 4 OMC field structure

The OMC field is divided into two fields, a category code (CAT) and a function code (FNC) yielding 64 different messages, see fig. 4.

BIIS data transmission can take place either as 16 predefined status messages in the OMC field of an address codeword, as short data messages or as longer data messages.

The short data transfer consists of an address codeword with the OMC = 011 001 and one or more data code words. A data codeword counter is inserted at the beginning of the first data block, see fig. 5.

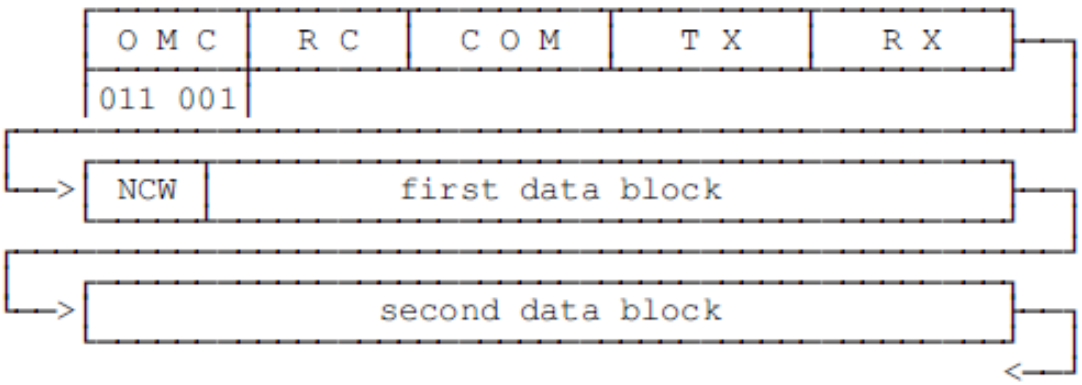

Fig. 5 Short data transfer structure

Longer transmissions – or data dialogues – will use a protocol and procedures closely resembling HDLC, except that no flags are transmitted. Three modes are supported, Asynchronous Balanced

WAVECOM ELEKTRONIK AG
Hammerstrasse 8
CH-8180 Buelach
Switzerland
www. WAVECOM.ch

Mode, Group Mode and Asynchronous Disconnect Mode.

The general dialogue data transmission format consists of an initial address block followed by a control block (control packet transmissions carry an additional control block) and one or more data blocks, up to a maximum of 64 data blocks, see fig.6.

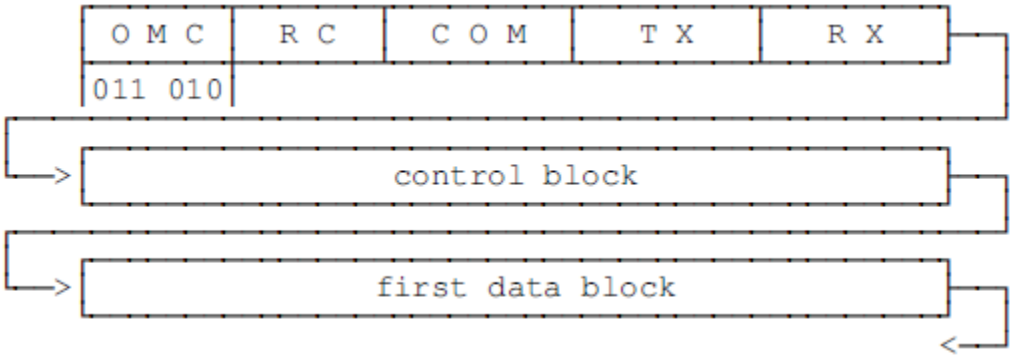

Fig. 6 Dialogue data transfer structure

The control block contains a data terminal sub-address (ADR) for peripheral devices connected to the radio, a command-response field (C/R) identifying the frame contents, a control field (CONT) containing I-, S- or U-frames and finally a parameter field is included. This field includes information on number of data words, number of last bits and if compression is enabled, see fig. 7.

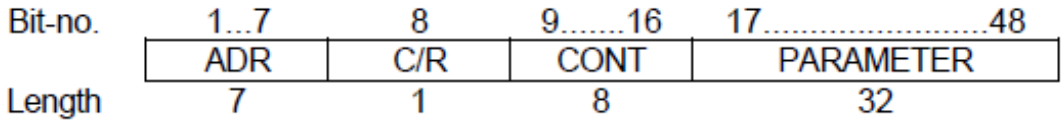

Fig. 7 Control block structure

I-frames are used for numbered information transfer, S-frames are used for the control and supervision of the data transmission, e.g. acknowledgements, and U-frames for general control functions. The maximum number of bits, which can be transferred in an I-frame is 3072.

If compression is enabled it will use the Radix-40 method.

For external device connectivity stations can use an ITU V.24/V.28 25/pin interface or a 9-pin subminiature D interface with reduced V.24 functionality. V.24 is the standard for the physical lines and their functionality and V.28 is the signal level standard. Both asynchronous and synchronous interfaces are available. The synchronous interface must follow the V.25bis signaling standards.

Implementation

The WAVECOM BIIS decoding module will decode call information as well as short and long data transmissions.

Data is displayed in binary, hexadecimal or text format.

For HDLC formatted data both control information and payload data is decoded.

WAVECOM ELEKTRONIK AG
Hammerstrasse 8
CH-8180 Buelach
Switzerland
www. WAVECOM.ch

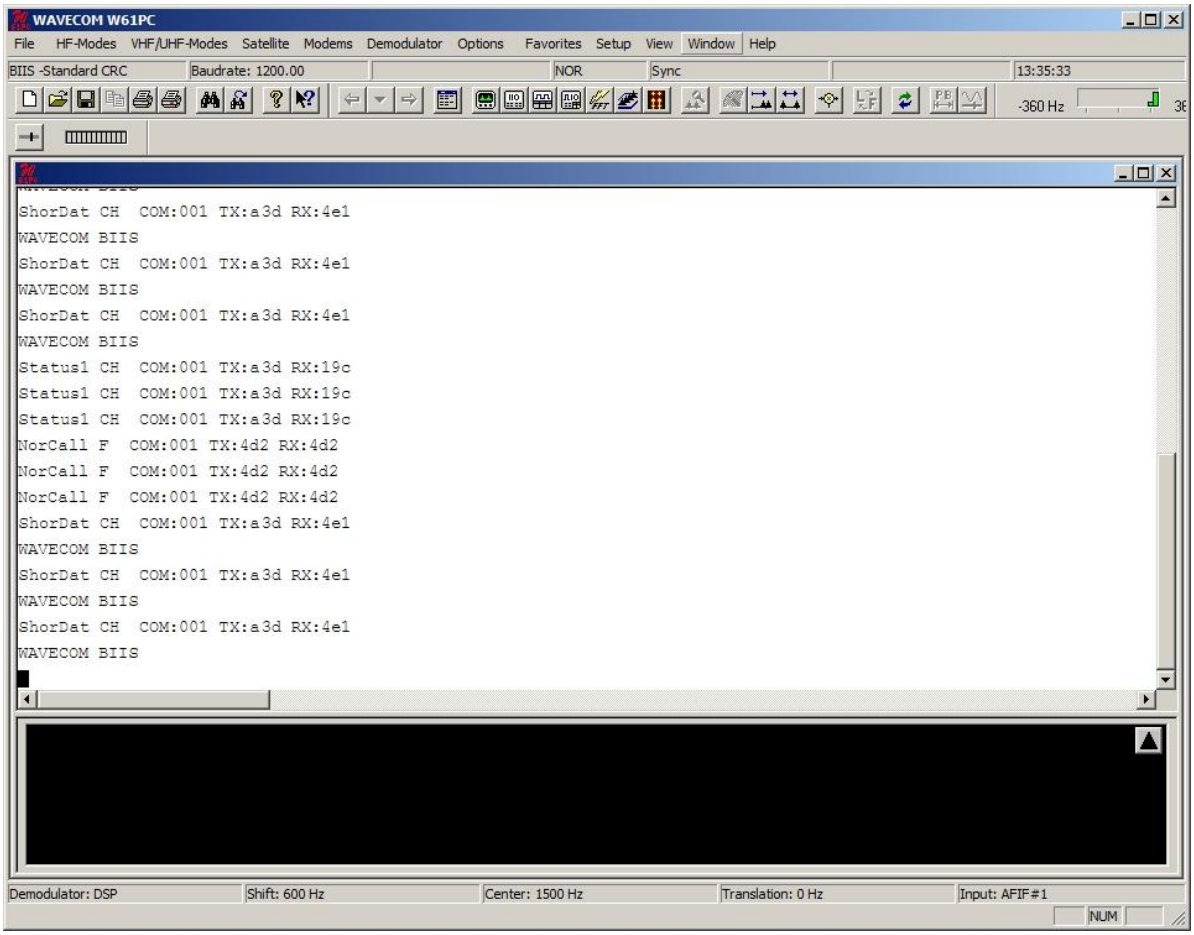

Fig. 8 WAVECOM BIIS decoder screenshot

References:

Structure diagrams have been borrowed from ETSI TS 300-230, which is the standard governing BIIS.