W-Sat-email-Decoder V2.4.0

by WAVECOM ELEKTRONIK AG

WAVECOM®

NACHRICHTENTECHNIK

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Contents

General Information

Welcome

Thank you for choosing a WAVECOM decoder. The product that you have purchased includes the latest technology in data decoding, together with the latest software release available at the time of shipment.

Please check our website at http://www.wavecom.ch for software updates.

Before you install the product, please also check the latest documentation on the installation CD/DVD or on our website.

WAVECOM ELEKTRONIK AG develops and sells products for wireless (HF/VHF/VHF/SHF) data monitoring independent of frequency range.

Two decoder families are currently available:

- W-CODE is a stand-alone application, which works with native host hardware.

- W61PC/W61LAN consists of hardware (e.g. W61PC, W61LAN) and corresponding, integral software (no additional order of the software required).

Revisions

Version	Date	Changes
2.0.00	11-Aug-2011	Changed: Name "W-Sat-email-Decoder" New: Auto-Mode New: Meta-Data output New: PPP Decoder for PPP (Wireshark) New: Dualog Decoder New: SAT-B-HSD support
2.0.01	9-Sept-2011	New: Input data format New: Metadata output format
2.1.00	27-Apr-2012	Several new features.
2.1.01	11-Dec-2012	Bug fix.
2.2.00	20-Sep-2013	New: ZModem New: UUCP New: UUPlus New: se@COMM (partial) New: Xdatos (partial)
2.2.1	10-Dec-2013	Bug fix in UUPlus.
2.2.2	23-Apr-2014	Bug fix in Amos and SkyFile.
2.3.0	12-Aug-2014	Prescan of input files to make the decoder robust.
2.4.0	02-Dec-2016	Add filename tag for AMOS decoder. General improvements and bug fix.

Recommended WAVECOM Products and Services

W-BV BitView Tool

The highly sophisticated BitView Tool is an external off-line, stand-alone .NET application for analysis of unknown signals.

BitView has a number of features:

- ➢ Bit manipulation tools
- ➢ Bit display tools (text, graphics)
- ➢ Simultaneous processing of multiple analysis sessions
- ➢ Auto-update functionality
- ➢ Report generator (parameters, data, ASCII, XML)
- ➢ Drag and drop of functions
- ➢ Re-arrangement of functions in a tree view
- ➢ Nested docking
- ➢ Auto hide
- ➢ Drag and drop of windows
- ➢ Application and modification of alphabets
- ➢ Persistent-to-XML file (screen layout is restored at start-up time)
- ➢ .NET technology
- ➢ No installation required, just run the executable
- ➢ Data stream and data file import from W61PC/LAN and W-CODE
- ➢ MatLab and C# user defined functions

Installation

Before the installation of a software update, the old version must be uninstalled, see "Software Uninstall" below.

Go to the medium which contains the W-Sat-email-Decoder installation file, and click the installation file name. The welcome screen is displayed.

Follow the instructions as they appear on the installation screens. You can use the **Cancel** button throughout the installation process to cancel the process.
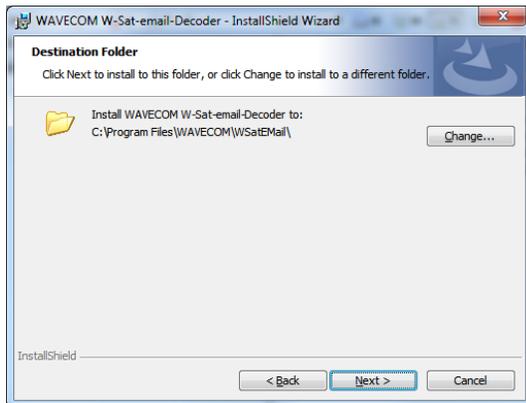
Click **Next** to continue the installation. Use **Change** to select another installation folder as the installation folder.
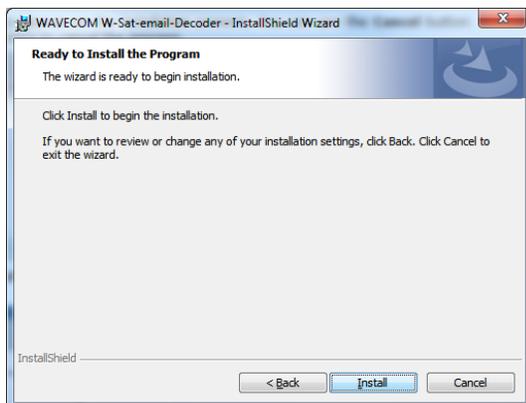
Click **Install** to begin the installation.
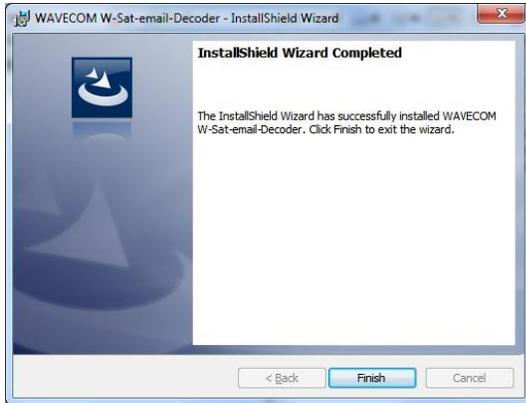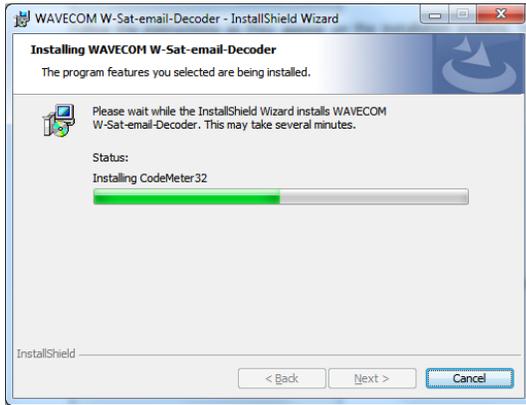
If the installation was successful, click the **Finish** button to complete the installation.

Note: After installation, you can run the application if you are a member of the Administrators, Power Users or Users group.

Software Uninstall

In certain situations e.g. a software update, it is necessary to uninstall the software. Use the following commands:

VISTA, Windows 7	XP
- Click on **Start,** go to the **Control Panel** menu and click **Programs and Features** - Select **WAVECOM W-Sat-email-Decoder** from the list - Click **Uninstall**	- Click on **Start,** go to the **Settings** menu and open **Control Panel** - Select the **Add/Remove Programs** icon - Select **Install/Uninstall** - Choose **WAVECOM W-Sat-email-Decoder** from the list - Click **Add/Remove**

The application has now been removed from the PC - it is however possible, that the icons may have to be manually removed.

Licensing

A valid W-Sat-email-Decoder license is required to run the software.

How the Sat-email-Decoder Works

The W-Sat-email-Decoder takes as its input a session file and the corresponding text files, as produced by a WAVECOM decoder, or any text file from an external source containing emails. Before beginning decoding, it prescans the file to make sure that the input data is not corrupt. After prescan it does protocol decoding and possible decompression, the email(s) and possible attachment(s) are output as files (see the message flow below).
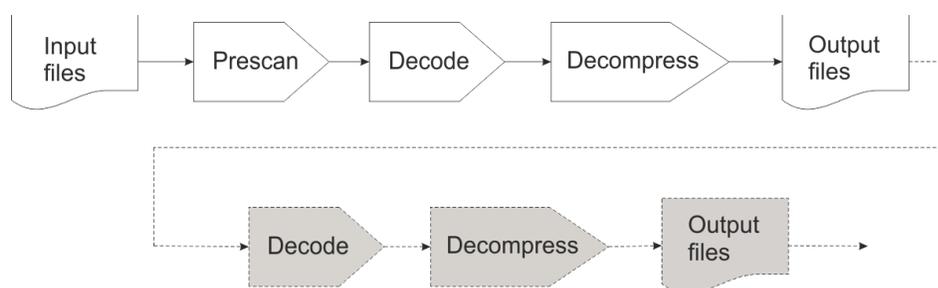
The output files may themselves be encoded or compressed. In this case external applications must be used to decode and/or decompress the files. This procedure is shown in the path diagram above in dashed lines and grayed-out boxes. External processing may have to be repeated until legible output is produced.

The user should be aware that messages may be encoded using methods such as UUEncode, Base64 and TNEF. Such messages must also be decoded by an external application.

The W-Sat-email-Decoder will decode the main message protocols encountered on satellite and other communication links. These protocols reside on Layer 2, the data link layer.

User Interface

The W-Sat-email-Decoder consists of a menu bar a window with three panes,

> ➢ Input File List

> ➢ File Viewer

> ➢ Decoded File List

The **Input File List** displays a record of information for each of the files(s) loaded using the **File Menu.**

File View displays a hex and text dump of the file selected in the **Input File List**.

The **Decoded File List** contains a list of decoded files.

Menu bar

The main menu bar contains four menus.
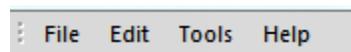
File Menu
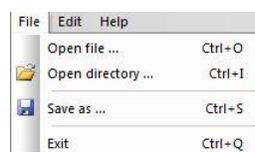
Click **Open file...** to load a single file into the **Input File List**.

Click **Open directory...** to load a complete directory containing an optional session file produced by a WAVECOM decoder.

Click **Save as ...** to save one or more files.

Click **Exit** to exit the W-Sat-email-Decoder. When attempting to close the ED, the user is asked
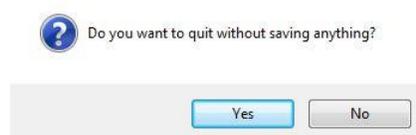
If saving the decoded data is not required press "No".

If saving the decoded data is required press "Yes", then select one, more or all files in the **Input File List** and from the **File Menu** select **Save as ...** to open a directory browser. In the browser select an existing folder or create a new folder where the decoded data should be stored.
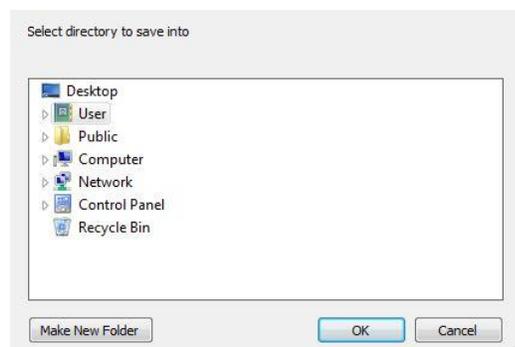
Edit Menu
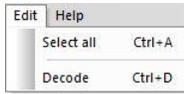
Click **Select All** to select all files in the **Input File List**.

Click **Decode** to decode all selected files.

Tools Menu
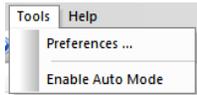
Click **Preferences...** to select all files in the **Input File List**.

Click **Enable Auto Mode** to start the automatic decoding of files placed into the input decode all selected files.

Preferences
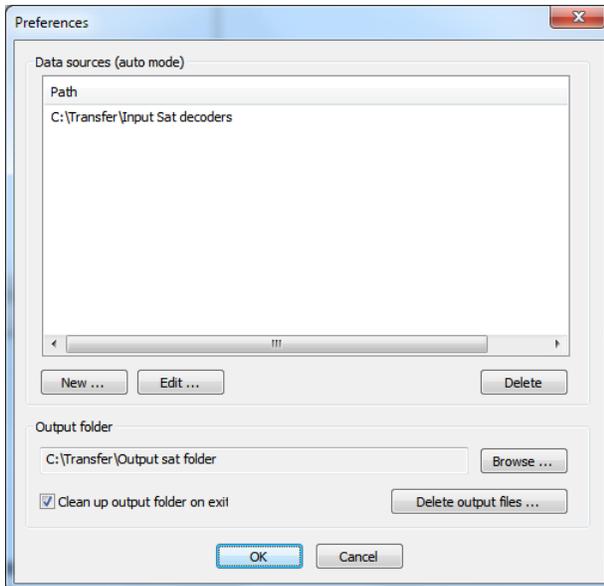
Data sources (auto mode) define folders which will be used as a data source for automatic decoding if **Auto Mode** is enabled.

Output folder decoded data are placed in this folder.

Clean up output folder on exit. The defined output folder is cleaned up on program exit.

Help Menu
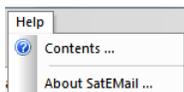
Through the help menu a help file and information on W-Sat-email-Decoder is accessible.

Input File List

The **Input File List** is the entry point into the W-Sat-email-Decoder and displays a record of information for each of the files(s) loaded using the **File Menu**. Double-clicking a record will start an attempt to determine the mail system and decode the file (the "Mail System" column will be set to "Unknown" before this attempt). The columns labeled "Termination", "Mail System" and "Status" displays the results of the operations (see end of section for a detailed list). At the same time the raw input file is loaded into the

File Viewer and finally, if decoding was successful, a list of decoded output files is displayed in the **Decoded File List**.

In the example below, a mail file captured from a decoder with serial number 606029620 has been determined as using the GlobeWireless mail system and successfully decoded. The compressed file contained an email message (*Mail_1.txt*) and an attachment (*4th Quarter CORINTH Stores.zip*).
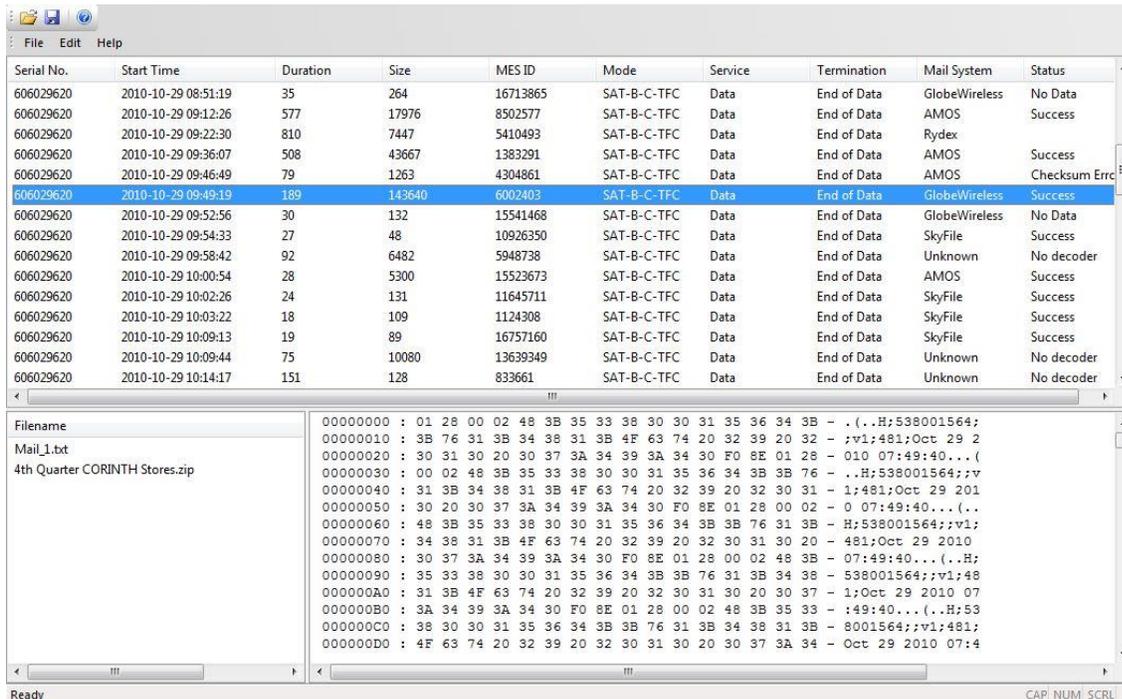
If an input file is selected clicking **Save as…** in the **File Menu** opens a file browser, allowing the user to save the selected files under another name and path.

Right-clicking one or more selected files displays an option **Open output folder…** Left-clicking this item, allows the user to open the directory where the decoded and decompressed output files for the selected input file are saved. In the example below the file described earlier, has been decompressed and its components separated into individual files:

- A decoded and decompressed mail message file (*Mail_1.txt*)

- A decoded and decompressed attachment (4th *Quarter CORINTH Stores.zip*)

- A text file containing all mail messages (*0000001800000018_Pass1.txt*)

- A binary file containing the captured, 7z-compressed file without protocol and packet overhead (headers, CRC etc.) (*0000001800000018_Pass1.7z*)

- A MetaData.xml file containing various additional information.
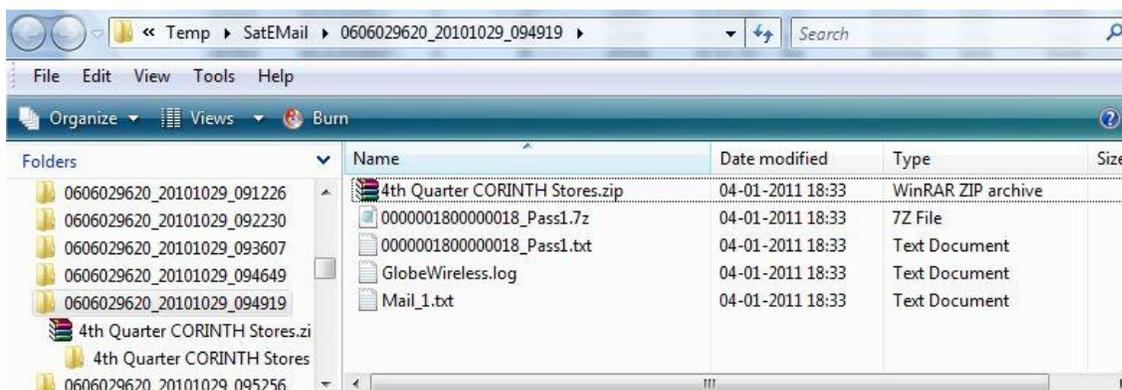
WARNING: Depending on your anti-virus application, during decoding of an input file a warning message like this may be displayed by your anti-virus and malware protection application.

You are strongly advised to follow the instructions given.

Output files are saved in sub-folders in the selected data folder. The sub-folder names are constructed as *<decoder_serial_number>_<yyyymmdd>_<hhmmss>.*

The decoded files are saved in a number of ways depending on the email system:

> If the decoded mail system transmits messages and attachments as individual messages, the output files are saved under their original names with a preceding number, e.g. *01_255996071.txt* starting with 01 for the first decoded file

> If the decoded mail system transmits messages and attachments consolidated into one file, the application will attempt to decompress the file and to save the individual messages and attachments under their original file names, otherwise a generic name, *Mail_<number>.txt* is used

The **Input File List** is divided into a number of columns,

Serial No.	Start Time	Duration	Size	MES ID	Mode	Service	Termination	Mail System	Status

Serial No.   The serial number of the decoder

Start Time   Time when session was started

Duration   Duration of session

Size   Size of input file

MES ID   The Inmarsat MES ID used on the link

Mode   Inmarsat source system (mode)

Service   Type of service (Data)

Termination   A description of cause for the termination of the session (see below "Status Messages", "Cause for "Termination"").

Mail System   The mail system determined for this input file (see below "Status Messages", "Mail System").

Status   Decoder status (see below "Status Messages", "Status").

File Viewer

The **File Viewer** will display a selected input or output file in a hexadecimal file viewer. The leftmost column is a hexadecimal byte counter, the center column displays the file in hexadecimal notation, and the rightmost column displays the file contents in printable ASCII. The viewer does not allow the user to edit the file.

Decoded File List

The **Decoded File List** displays the output file(s) if decoding was successful. Left-clicking on a file name will display the file in the **File Viewer**. Left-clicking the file name will load the file into the **File Viewer** and display this message,
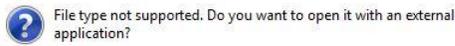
Press "Yes" if you wish the decoder to attempt to open the file with an external application, e.g. MS Office or WinRAR.

Right-clicking a file name loads the file into **File Viewer** and displays a menu.
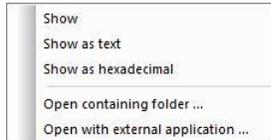
Clicking **Show** will display the file in **File Viewer** and if the file type is unsupported by the decoder an attempt to open the file with a corresponding application will be undertaken.

Clicking **Show as text** will display the file in text format in **File Viewer**.

Clicking **Show as hexadecimal** will display the file in hexadecimal format in **File Viewer**.

Clicking **Open containing folder …** will open the file browser in the folder containing the selected file.

Clicking **Open with external application …** will attempt to open the file with the appropriate external application.

Clicking **Open with an external application…** allows the user to apply an external decoder or decompressor. When attempting to open a file a warning may be displayed.
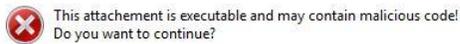
If a file shown in the list is not present on the disk, the entry is marked in red color.

Implemented Decoders

Email application	Additional transmission system
AMOS	
Dualog	
GlobeWireless	
GTMail	
PPP	
Rydex	
se@COMM	IRIDIUM
SkyFile	THURAYA
UUCP	
UUPlus	IRIDIUM
Xdatos	IRIDIUM
ZModem	

Reference

Input data format

The Decoders now support two formats:
- Data stream extracted from INMARSA-B, INMARSA-M or INMARSAT-mM frames
- Raw data from Inmarsat-B-HSD (ISDN)

INMARSAT-B, INMARSAT-M or INMARSAT-mM

Use this format for INMARSAT-B, INMARSAT-M or INMARSAT-mM low speed data. The expected format is the data extracted from the HDLC I-Frames in the correct order and without duplicates. In other words, the same data stream a user of the satellite services sends and receives.

INMARSAT-B-HSD

Use this for ISDN data (SAT-B-HSD). The format consists of the raw contents of the data frames, without signaling units.

Metadata output format

The metadata output is not yet fixed. The following format description is based on the XML output by the GUI. For now, not all decoders are able to write metadata.

The XML files created by the GUI are structured as follows:

```
<MetaData>
<Transmission>
<!-- This part is filled by the GUI. Decoders do not use it. -->
</Transmission>
<Mail>
<!-- Generic mail information by the decoder. There may be several mails in one file. -->
<Attachment>
<!-- Attachment data. There may be several attachments in one mail. -->
</Attachment>
</Mail>
</MetaData>
```

Transmission section

The "Transmission" part is only written by the GUI. It is omitted when the DLL is used directly.

Tag name (key)	Value
MES_ID	MES ID of the sender
Mode	Transmission mode

Mail section
This part contains information about mails.

Tag name (key)	Value
Serial	Serial number of the mail
Time	Timestamp in the UNIX format (time_t)
DateTime	Timestamp in YYYYMMDDhhmm format (Globe Wireless)
Subject	Subject
From	Sender
To	Receiver
Cc	Cc
Bcc	Bcc
Account	Account information
Priority	Priority
Charset	Character set
Filename	Name of the file saved by the decoder (AMOS and GTMail)

Attachment section

This part contains information about attachments. It always is embedded into a mail section.

Tag name (key)	Value
Name	Filename
Size	Size of the file
Time	UNIX timestamp
Filename	Name of the saved file (if it differs from "Name")

External Applications

If the output file is itself a compressed or encoded file, the user must launch an external application as described above to decode or uncompress the file. The user may wish to use the information below as a guide on how to further process such files.

Encoding

Many Uuencode, Base64 and similar decoding tools may be found on the Internet. WinZip will decode most encodings, as well as performing decompression.

TNF files (Transport Neutral Encapsulation Format) may be read using freeware such as *Winmail Opener, Winmail Reader* or *tnef2win*. Be aware that the TNEF format in addition to the publicly known and described Microsoft tags allows private tags, which are used by certain email systems and which the freeware readers will not decode.

Compression

A number of freeware decompressors are available from the Internet, i.e. WinRAR, 7zip, etc. Furthermore, source code for most methods is available in case you wish to roll your own de-compressor.

Status Messages

Cause for "Termination"

These messages are produced by the WAVECOM decoder

Message	Description
EOD	Normal end of data
ChannelRelease	Normal channel release
NewSession	Transmission stopped unexpectedly
StopMode	Bit stream interrupted
SyncLost	Excessive number of synchronization attempts
TONoScrVect	Bad scrambling vector
TONoSynch	Synchronization or re-synchronization time-out
TooManyBadCRCs	Excessive number of failed checksum calculations
UserCancel	User cancellation

Mail System

The names given are not necessarily the proper system names. Some systems are not decoded in the current version of W-Sat-email-Decoder and are marked as such.

Mail systems which are recognized,

Message	Description	Decoded
AMOS		Yes
Blast		No
Dualog		Yes
GlobeWireless		Yes
GTMail		Yes
MS-RAS	PPP, TCP/IP	Partially
Rydex		Yes
se@COMM		Partially
SkyFile		Yes
UUCP	File transfer	Yes
UUPlus		Yes
Xdatos		Partially
ZModem	File transfer	Yes
Unknown	The mail system was not recognized (also shown before decoding is attempted)	

Status

These messages are produced by the W-Sat-email-Decoder software

Message	Description
CRC Error/Checksum Error	A CRC or check sum error occurred.
Corrupt Data	The data structure is corrupted. This could be caused by a transmission error or an unknown format was encountered.
No Data	The input file does not contain user messages.
No Decoder	A decoder for this format was not found.
Packet Lost	Data was lost in transmission.
Success	Everything seems to be OK.
[Name] not implemented yet.	The system can be recognized, but there is no decoder available.

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Glossary of Terms

active window

The window on the screen where the next action will take place. The active window is indicated by a colored title bar and border.

AF-IN

The AF input has a range of 0 – 16.000 Hz. This input should be used when the source is an AF output (line or speaker) or a 12.0 or 12.5 kHz IF output used in professional digital recorders.

alert

A warning or notice of an error in the form of a message, a sound from the computer's speaker, or both.

AMBE

Advanced Multi-Band Excitation speech coding.

ANSI

An acronym for the American National Standards Institute, an organization that sets standards for a variety of programming languages and systems.

AOR

Atlantic Ocean Region.

APC

Adaptive Predictive Coding.

ARQ

Automatic repeat request (ARQ) (or automatic repeat-query) is an error-control method for data transmission which uses acknowledgements and requests to achieve reliable data transmission over an unreliable service. An acknowledgement is a message sent by the receiver to the transmitter to indicate that it has correctly received a data frame or packet. A request is a message sent by the receiver to the transmitter to indicate that the sender has to re-transmit the frame/packet; if the sender does not receive an acknowledgement before a timeout, it usually re-transmits the frame/packet until it receives an acknowledgement or exceeds a predefined number of re-transmissions.

ASCII

An acronym for American Standard Code for Information Interchange, pronounced "ASK-ee." It is a code in which the numbers from 0 to 127 stand for letters, numbers, punctuation marks and other characters. ASCII code is standardized to facilitate transmitting text between computers or between a computer and a peripheral device.

Baud Rate

The speed in a 2FSK transmission. The duration of a bit is 1/Baud. At 50 Baud a bit is 20ms long.

The speed is given as the channel speed in Bauds. For two level modulation types this equals the raw user bit rate, for four level s the bit rate is doubled, for eight levels it is tripled etc.

Broadcast

Public or private radio station transmitting music, news...

Buffer

A temporary holding area in the computer's memory where information can be stored. In editing, it is an area in memory where cut or copied data is held, sometimes called the clipboard. See also: clipboard and type-ahead buffer.

Clipboard

The holding place for what you last cut or copied; a buffer area in memory. Information contained on the clipboard can be inserted (pasted) into other documents and other WINDOWS applications.

Context sensitive

Able to perceive the situation in which an event occurs. For example, context sensitive help presents information specific to the particular task you are performing, rather than presenting just a general list of commands.

Control key

A specific key, usually abbreviated as "Ctrl", that produces control characters when used in combination with character keys.

CRC

A cyclic redundancy check (CRC) is an error-detecting code designed to detect accidental changes to raw data, and is commonly used in digital data transfer and storage. A CRC-enabled protocol calculates a short, fixed-length binary sequence, known as the check value or improperly the CRC, for each block of data to be sent or stored and appends it to the data, forming a codeword. When a codeword is received or read, the device either compares its check value with one freshly calculated from the data block, or equivalently, performs a CRC on the whole codeword and compares the resulting check value with an expected residue constant. If the check values do not match, then the block contains a data error and the device may take corrective action such as requesting the block be sent again, otherwise the data is assumed to be error-free (though, with some small probability, it may contain undetected errors; this is the fundamental nature of error-checking).

CRCs are so called because the check (data verification) code is a redundancy (it adds zero information to the message) and the algorithm is based on cyclic codes. CRCs are popular because they are simple to implement in binary hardware, are easy to analyze mathematically, and are particularly good at detecting common errors caused by noise in transmission channels. As the check value has a fixed length, the function that generates it is occasionally used as a hash function.

Database management system

(DBMS) - A software system for organizing, storing, retrieving, analyzing and modifying information.

Default button

The push button with a bold border in dialogues. The default button often has a dotted-line border around the button name. The default button is chosen when you press "Enter" (or Ctrl+Enter depending on your configuration).

Default font

Used font if no other font is defined.

DIS

The DIS input (Discriminator) has a range of 0 – 20 kHz. This input is supported by a few VHF-UHF receivers and facilitates the reception of ”Direct FSK” signals like POCSAG or PACKET-9600. The advantage of this input is the easy handling. Only the gain has to be adjusted. There is no need for an adjustment of the center or the translation frequency. DIS is only released for ”Direct FSK” modes.

Disable

To make an item unavailable for use. Disabled items reflect the WINDOWS color settings for disabled commands, and generally appear dimmed and cannot be chosen.

EOD

End-Of-Data.

Error message

A message displayed to tell the user about an error or problem in the execution of a program or in the user's communication with the system. An error message is often accompanied by a beep.

EXT-DEM-IN

The EXT-DEM-IN input must be used if an external demodulator is to be connected. The minimum input level is TTL level (LO = 0 V, HI = +5 V) and the maximum is RS-232C level (LO = -12 V, HI = +12 V). Note that utilizing this facility will disable certain W51PC functions. Thus this input should be employed for special purposes only.

FDX

Full duplex.

FEC

Forward error correction (FEC) is error control methode for data transmission, whereby the sender adds redundant data to its messages, also known as an error-correction code. This allows the receiver to detect and correct errors (within some bound) without the need to ask the sender for additional data. The advantages of forward error correction are that a back-channel is not required and retransmission of data can often be avoided (at the cost of higher bandwidth requirements, on average). FEC is therefore applied in situations where retransmissions are impossible (traffic lists, broadcasts).

FFSK

Fast Frequency Shift Keying.

FFT

Fast Fourier Transform.

File type

The categories of files specified by file extensions: APP, DBF, PRG, CDX, FRX, and so on.

GFSK

Gaussian Frequency Shift Keying.

GUI

Graphical User Interface.

HDX

Half duplex.

Hot key

An underlined letter in a menu or dialogue that you can type to immediately choose an item.

IF-IN-10.7

The IF-IN-10.7 input has a range of 10.685–10.715 MHz (or 21.385 – 21.415 MHz). This IF is common for VHF-UHF receivers.

IF-IN-21.4

The IF-IN-21.4 input has a range of 21.385–21.415 MHz. This IF is common for VHF-UHF receivers.

IF-IN-VAR

The IF-IN-VAR has a range of 14 kHz–1.5 MHz. Most receiver IF's are within this range.

IMBE

Improved Multi-Band Excitation speech coding.

Insert mode

The default text-editing mode in which any character you type is inserted at the cursor position and the text to the right of the cursor is shifted to the right.

IOR

Indian Ocean Region.

IQ

In-phase Quadrature. Used to denote the complex format on which the RF data is processed and stored. The IQ demodulation is also sometimes named Base-band demodulation, Quadrature demodulation, Complex demodulation etc.

Keyboard shortcuts

The keystroke combinations that you can use to choose menu options instead of using the mouse.

LAN

Local Area Network.

LES

Land Earth Station.

LNA

Low Noise Amplifier.

Loop

A section of a program that executes repeatedly until a limit or condition is met, such as a variable reaching a specified ending value.

Mark

Application	Condition	Condition
Voltage to signal ground	Negative (-)	Positive (+)
Conventional term	MARK	SPACE
Binary digit value	1	0
Timing signal state	Off	On
FSK signal state	Lower frequency	Higher frequency

MATLAB

MATLAB® is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. This collection includes the following topics.

Menu bar

A horizontal strip that appears at the top of the screen and contains menu pads.

Menu name

A word, phrase or icon on the menu bar that designates one menu. Selecting the menu pad highlights the name and causes the menu options to appear.

Menu options

Commands, found on menus, that perform specific actions. When you choose a menu option, you are telling the program what action to take.

Menu pads

The menu names found on the menu bar.

Menu system

The combination of the menu bar, menu pads, menus and menu options.

MES

Mobile Earth Station.

MFSK

Multi Frequency Shift Keying.

Minimize

The act of causing a window to become an icon that includes the title of the window.

Modal

Describes the state of a window or dialogue when it does not allow another window or dialogue to be brought in front of it until that window or dialogue is dismissed, e.g., the Expression Builder dialogue.

MPDS

Mobile Packet Data System.

NA

Not Available.

NCSC

Network Control Station Channel.

Network

A collection of interconnected, individually controlled computers, together with the hardware and software used to connect them. A network allows users to share data and peripheral devices (such as printers and storage media), to exchange electronic mail, etc.

Non-modal

A window or dialogue that allows another window or dialogue in front of it while it is open, for example, the Command window.

On-line help

A reference guide, accessible while using the software, that provides additional information about commands, functions, and the interface.

Option

Different additional options are available from WAVECOM.

In the manual, options are marked with (Option).

OSI-Layer

OSI (Open Systems Interconnection) is a standard description or "reference model" for how messages should be transmitted between any two points in a telecommunication network.

Paste

To place the contents of the clipboard at the insertion point.

Path name

The full name by which an operating system identifies a file. A path name is a sequence of directory and file names, each preceded by a backslash, that specifies the path from device to directory to file that the operating system takes to locate that file.

PB

Passband.

PC

Personal Computer.

Phase Shift Keying

Is a digital modulation scheme that conveys data by changing, or modulating, the phase of a reference signal.

Pointer

A small solid box or arrow on the screen that follows the movement of the mouse and shows where your next action will take place.

POR

Pacific Ocean Region.

PSTN

Public Switched Telephone Network.

RHCP

Right Hand Circular Polarization.

Right-clicking

Clicking with the pointing devices right button.

Scroll

To move through the contents of a window or so that a different part becomes visible.

Scroll bars

The controls that are used to view text that extends beyond the edge of a window. A window can have vertical and/or horizontal scroll bars.

SELCAL

Selective call systems are an efficient supplement to voice traffic. One method was the so-called single-tone-mode using five different tone frequencies, another one the two-tone-modes, where the call number is transmitted as frequency combinations.

Developments led to the five-tone-sequence systems. The five digits are often divided into two groups. The first digits work as radio net flags, the last three digits are user call numbers.

The entire call number is transmitted by consecutive tones in decade sequence. When two identical digits are to be transmitted consecutively, then an eleventh frequency is used as a repetition identifier. If there more than two identical digits are to be transmitted the repetition tone is appended to the digit tone (e.g. 22222 is transmitted as f2 fw f2 fw f2, where f2 is the tone for "2" and fw is the repetition tone).

In most systems the accuracy of the single frequencies has to be within +1/-1.5% of the nominal value.

Modifications of the tone allocation and tone duration has led to numerous systems despite many standards.

Only the EURO (EuroSignal) system uses six consecutive tones. The worldwide telephone signaling standard DTMF mode transmits two simultaneous tones.

Server

See file server.

Shift

The difference between two tones in a FSK transmission.

Size control

A screen element found on WINDOWS that allows you to change the window size.

SNAC

Single Network Access Code.

SNR

Signal-to-Noise.

Space

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Spinner

A control that allows you to increment or decrement numbers either by typing the numbers or clicking the UP and DOWN arrow keys.

String

An item of information consisting of a sequence of text characters.

SW

Software.

TDM

Time Division Multiplex.

TDMA

Time Division Multiple Access.

Text editing window

A window in which text is displayed and can be scrolled.

Text editor

The part of the software that allows you to modify text files.

Text file

A file which contains information expressed in text form and whose contents are interpreted as characters encoded using the ASCII format.

Thumb

A gray box in the scroll bar that indicates the relative position in the text. If you want to move through the text rapidly you can drag the thumb up and down.

Unicode Font

The Unicode standard is intended to provide a 'unique, universal, and uniform' encoding for each character in all living languages (plus a few dead ones). One font (WAVECOM Unicode) is automatically installed on your computer. Other Unicode fonts with are available on the market.

unlock

To remove the restriction on the use of a disk or a file so that it can be changed, deleted or renamed. See also: lock.

Utility

Transmission in RTTY or FAX.

W-[XX]

Stands for a WAVECOM product code like W-PCI, W-PCIe, W-CODE, W61PC or W-51PC.

Wildcard

A character that may be used to represent a sequence of characters in a path name. A common wildcard character is the asterisk (*). As an example, if you request a listing of *.TXT files in a particular application, you would see a list of all files ending with the extension TXT.

WINDOWS

Microsoft WINDOWS™ Operating System.

Word-wrap

The automatic continuation of text from the end of one line to the beginning of the next, so that you don't have to press the Enter key at the end of each line you type. If word-wrap is set off, the text you type may extend beyond the edge of the window.

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