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MFE VIII.1 (Code 6484)
VoIP Reference Gateway with Ethernet Interfaces and SIP-VoIP Client

MFE VIII.1 front view

MFE VIII.1 rear view

Overview

MFE VIII.1 is a light-weight and compact front end equipped with Ethernet, AES/EBU and USB interface. It supports the core features according to RFC 3261 and offers an integrated SIP-VoIP client with numerous voice codecs.

MFE VIII.1 is used as reference gateway in conjunction with the communication quality analysis system ACQUA* and other HEAD acoustics front ends. Connected to a notebook or PC via USB (Plug & Play), it is configured and controlled by ACQUA.

Via MFE VIII.1, ACQUA performs automated measurements according to international, HEAD acoustics or user-defined standards. In conjunction with MFE VI.1, combined electrical/acoustical measurements are possible.

MFE VIII.1 thus serves for system optimization and development as well as quality control and benchmark testing in all areas where excellent voice quality of VoIP devices and IP-based transmission systems plays a decisive role.

* Requires ACQUA version 3.5.100 or later.

** HEAD acoustics provides an implementation of the EVS reference codec in its frontend MFE VIII.1. At present, no final license agreement has yet been provided by the licensor. We would therefore like to point out that the HEAD acoustics EVS codec implementation is subject to change without prior notice.

DESCRIPTION

Equipped with USB and Ethernet connectors, MFE VIII.1 serves as reference gateway for voice quality measurements of digital communication devices and transmission systems.

The front end is connected to the communication analysis system ACQUA via USB for status information, data acquisition and control purposes. The AES/EBU in- and outputs provide connection to the other HEAD acoustics front ends, e.g. MFE VI.1. Pulse in- and outputs with TTL levels are also available. Moreover, MFE VIII.1 allows clock adjustment to the device under test (DUT).

The front end settings can be easily controlled via the intuitive ACQUA settings manager. They can be stored and assigned to selectable measurement sequences.

Protocols:
- SIP (Session Initiation Protocol, RFC 3261) via UDP, TCP or TLS
- RTP (Realtime Transport Protocol, RFC 3550), also usable without SIP
- Media Encryption by SRTP and ZRTP
- Firewall Policies NAT, STUN or ICE
- IPv4 and IPv6

Codecs (standard delivery):
- G.711 (A-law, μ-law)
- G.722 (64 kbit/s (Mode 1))
- G.726, AAL2-G.726 (16, 24, 32, 40 kbit/s)
- L16 (16 bit linear PCM @ 8, 16, 32, 44.1, 48 kHz)
- GSM 06.10 Full Rate
- Speex @ 8, 16, 32 kHz
- iLBC
- SILK @ 8, 12, 16, 24 kHz

Codec parameters:
- Payload type can be modified
- Overload point can be modified
- Format specific parameters (fmtp) can be modified

Jitter buffer:
- Static or adaptive jitter buffer
- Initial size can be defined and current size can be reset to initial size
- Memory usage can be monitored

Packet lengths:
- 10, 20, 30, ... ms depending on selected codec

Monitoring:
- Audio signal over VoIP can be monitored by headphones
- IP traffic can be monitored via USB

OPTIONS

- **MFE VIII.1-IMP (Code 6496)**, software option network impairment for MFE VIII.1, allows reproducible measurements under impaired network conditions even with activated DTX, can currently only be enabled on primary front end and thus cannot be combined with MFE X and MFE XI.

CODECS

- **Cod-AMR (Code 6485)**, hardware codec option for licensing the following additional codecs for use with MFE VIII.1:
  - AMR NB
  - G.722.2 AMR WB
  - GSM 06.60 Enhanced Full Rate
  - G.729 Annex A and Annex B

- **Cod-OPUS (Code 6494)**, Opus (Audio, 2-Channel) software codec option for MFE VIII.1.

- **Cod-EVS (Code 6495)****, EVS (Enhanced Voice Services) software codec option for MFE VIII.1, supports all specified bandwidths and bit rates incl. AMR-WB interoperable mode, DTX/CNG, CMR, features static jitter buffer for accurate delay conditions instead of EVS´s adaptive jitter buffer. Includes MFE VIII.1-SPE (Code 6497).

APPLICATIONS

- Measurements of digital communication terminals
- Measurements of digital transmission systems
- Direct IP connection of ACQUA analysis system to external radio testers

FEATURES

- Multiple codecs (encoding, decoding)
- Future-proof: new codecs may be added by HEAD acoustics plugins
- Digital interface (AES/EBU) for audio data exchange, e.g. with MFE VI.1
- User-friendly software control via ACQUA

- Full knowledge of level, delay changes and signal processing
- Clock adjustment to DUT
- Exact synchronization between audio signal and IP packets
- RTP also usable without SIP
- Specific support of radio testers Anritsu MD8475A or Rohde & Schwarz CMW 500 (not delivered by HEAD acoustics)

SYSTEM REQUIREMENTS

- **ACQUA (Code 6810 etc.),** Advanced Communication Quality Analysis (cf. ACQUA data sheet), Version 3.5.100 or later
- **PC with USB and Ethernet Port** (as specified by ACQUA data sheet)

STANDARD DELIVERY ITEMS

- **MFE VIII.1 (Code 6484),** USB Measurement Front End, Digital, with VoIP Interface
- **PSH I.4 (Code 3718),** External power supply 100-240 V AC → 24 V DC
- **PCC I.9x (Code 997x),** Mains cable (to local specification)
- **CDM V (Code 1637),** Cable D-Sub 15-pin ↔ 2 x XLR (AES/EBU in/out) + 2 x BNC (Pulse in/out)
- **2 x Ethernet Cable,** 1 x crosslink (red), 1 x normal, 3 m
- **1 x CUSB II.1.5 (Code 5478-1.5),** USB 2.0 cable, with ferrite, 1.5 m
- **Manual**

CONFIGURATION EXAMPLES
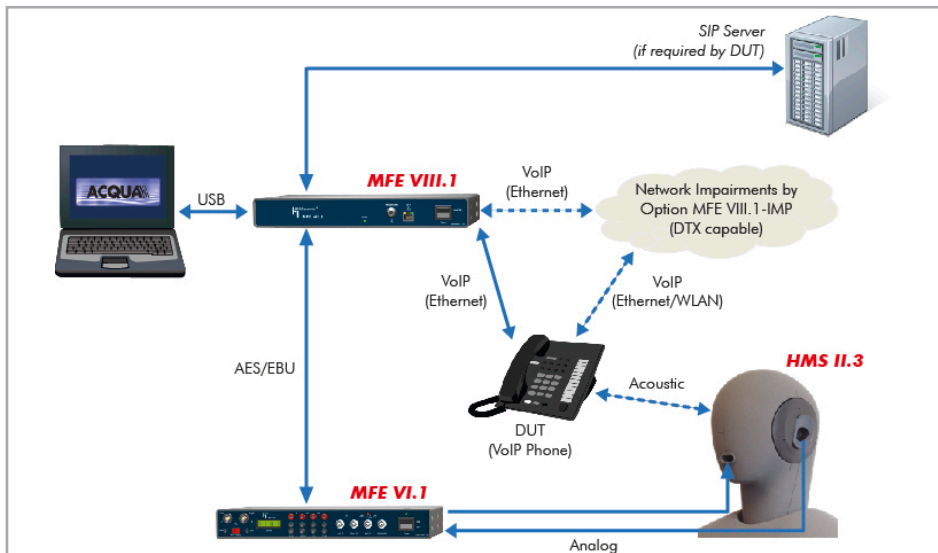
Configuration example: VoIP test setup with analysis system ACQUA, head and torso simulator HMS II.3, front ends MFE VI.1, MFE VIII.1 and optional MFE VIII.1-IMP
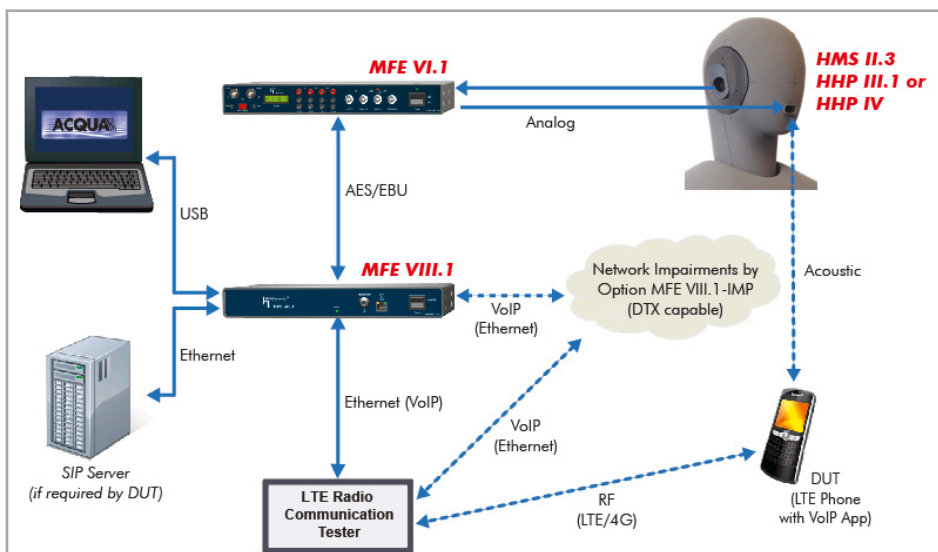
Configuration example: VoLTE test setup with analysis system ACQUA, head and torso simulator HMS II.3, front ends MFE VI.1 and MFE VIII.1 and optional MFE VIII.1-IMP

Technical data – MFE VIII.1

Measurement Unit

Operation	Remote control via ACQUA software (version 3.5.100 or later)
System Check	Automatic hardware check at switch-on
Power Supply	External power supply PSH I.4, 100 - 240 V AC ➜ 24 V DC
Clock Accuracy	Calibration accuracy: +/-0.25ppm Temperature stability: +/-1ppm for temperature range 15°C – 35°C, 59°F – 95°F Aging stability: +/-1ppm within first year after calibration, typically lower

IP Features

Protocol	• SIP (Session Initiation Protocol, RFC 3261) via UDP, TCP, TLS • RTP (Realtime Transport Protocol, RFC 3550), also usable without SIP • Media Encryption by SRTP and ZRTP • Firewall Policies NAT, STUN or ICE • IPv4 and IPv6
Codecs (standard delivery)	• G.711 (A-law, μ-law) • G.722 (64 kbit/s (Mode 1)) • G.726, AAL2-G.726 (16, 24, 32, 40 kbit/s) • L16 (16 bit linear PCM @ 8, 16, 32, 44.1, 48 kHz) • GSM 06.10 Full Rate • Speex @ 8, 16, 32 kHz • iLBC • SILK @ 8, 12, 16, 24 kHz
Codecs (optional) *** cannot be enabled on primary front end and thus cannot be combined with MFE VIII.1-IMP **** decoding of channel-aware mode does currently not utilize redundancy	• AMR NB (bandwidth-efficient and octet-aligned operating modes supported) • G.722.2 AMR WB (bandwidth-efficient and octet-aligned operating modes supported) • GSM 06.60 Enhanced Full Rate • G.729 Annex A and Annex B*** • Opus • EVS**: bandwidth NB-FB, bit rates 7.2 - 128 kbit/s, 5.9 kbit/s source-controlled VBR mode, 13.2 kbit/s channel-aware mode****, 6.6 - 23.85 kbit/s AMR-WB interoperable mode, DTX/CNG, CMR, static jitter buffer; includes MFE VIII.1-SPE (Code 6497)
Codec parameters	• Payload type can be modified • Overload point can be modified • Format specific parameters (fmtp) can be modified
Jitter Buffer	• Static or adaptive jitter buffer • Initial size can be defined, current size can be reset to initial size • Memory usage can be monitored
Packet Lengths	• 10, 20, 30, … ms depending on selected codec
Monitoring	• Audio signal over VoIP can be monitored by headphones • IP traffic can be monitored via USB
SIP Registration	• Registration with registrar supported
MFE VIII.1-IMP Network Impairments (optional)	• Jitter, delay, packet loss can be configured • Statistical and deterministic • Reproducible measurements even in the case of Discontinuous Transmission (DTX)

Interfaces & Connectors

Ethernet	1 x at front (DUT), 1 x at rear (PC), RJ45, 10 or 100 Mbit/s
Headphones	1 x at front, 6.3 mm phone jack
AES/EBU In/Out	1 x at rear, Sub-D 15 pin, digital audio input/output, 48 kHz sampling rate (for MFE VI.1), IEC II subcode adjustable; 24 bit
Pulse In/Out	1 x at rear, Sub-D 15 pin, TTL level, pulse inputs galvanically separated
USB In/Out	3 x at rear (1 x In, 2 x Host), USB 2.0, control and data exchange via ACQUA
DC In/Out	1 x at rear, Lemo, DC-In: 8 W max.

Environmental Conditions

Operating temperature range	0 °C - 50 °C; 32 °F - 122 °F
Storage temperature range	-20 °C - 70 °C; -4 °F - 158 °F
Air Humidity	35 - 70 % (non-condensatory environment)

Housing

Overall dimensions (W x H x D)	327 mm x 44 mm x 175 mm
Weight	ca. 1.8 kg

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