Air Traffic Control ATC & Radio Channel Analyzer

GFPE 2010

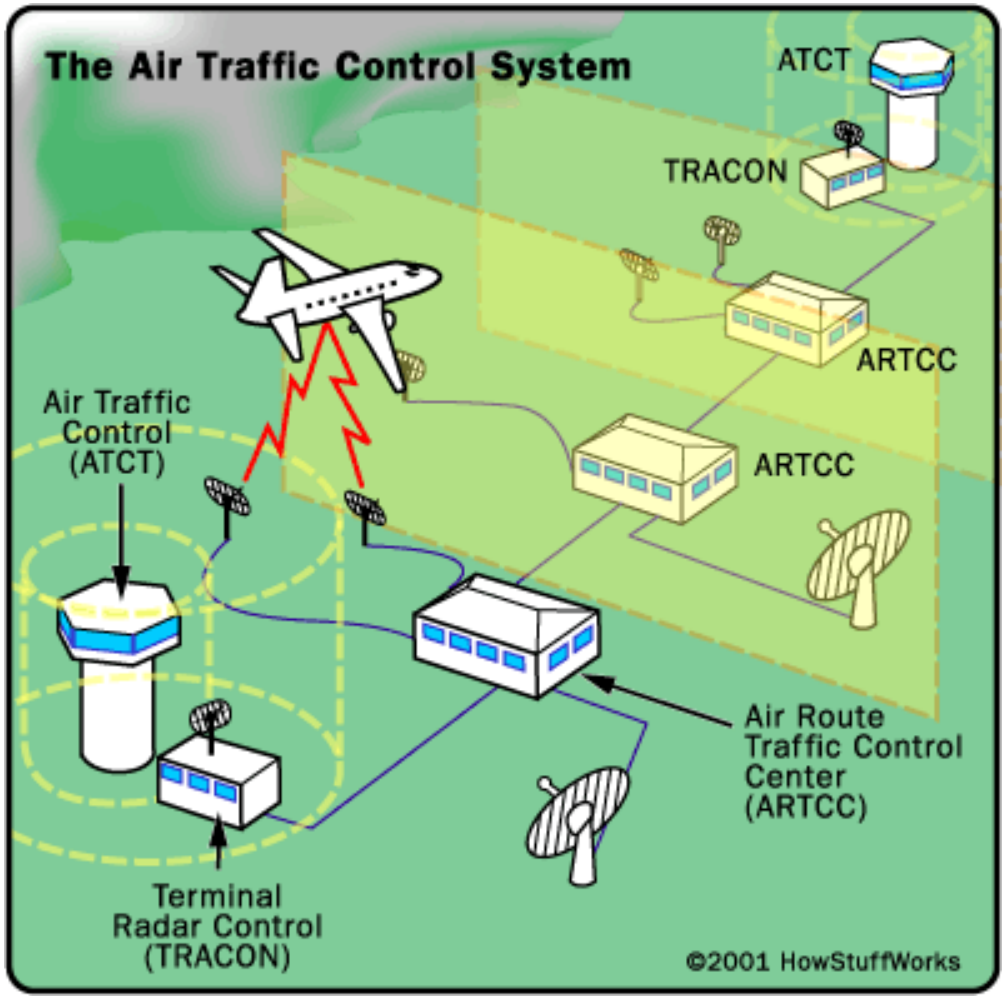
Basics

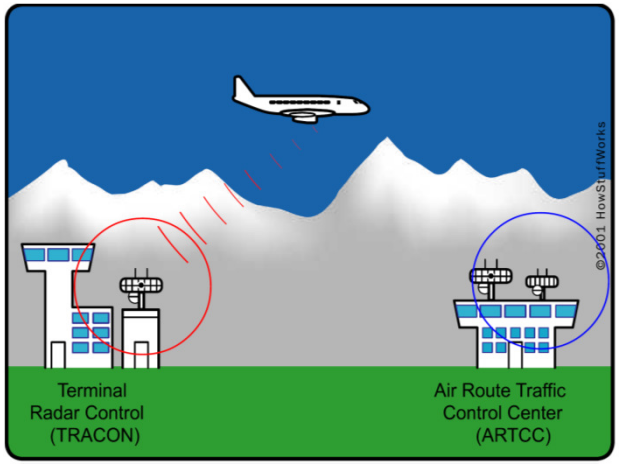
The communication between the air-traffic controller in the control tower and the pilot on board of his aircraft is operated by voice radio. This voice communication mainly transmits information on flight situation, position of the aircraft, altitude, air speed, or such like.

The most important monitoring unit besides the radar is the aircraft radio. Therefore the idea of safety is a cornerstone for the whole air-traffic control system with highest requirements regarding reliability and availability.

Air Traffic Control & Radio Channel Analyzer GFPE 2010 has been designed and developed to test and maintain existing and new communication networks for air trafic control ATC. FO, radio-relay analog and digital (E1) voice communication channels, AoIP, VoIP.

Air Traffic Control System (ATC)





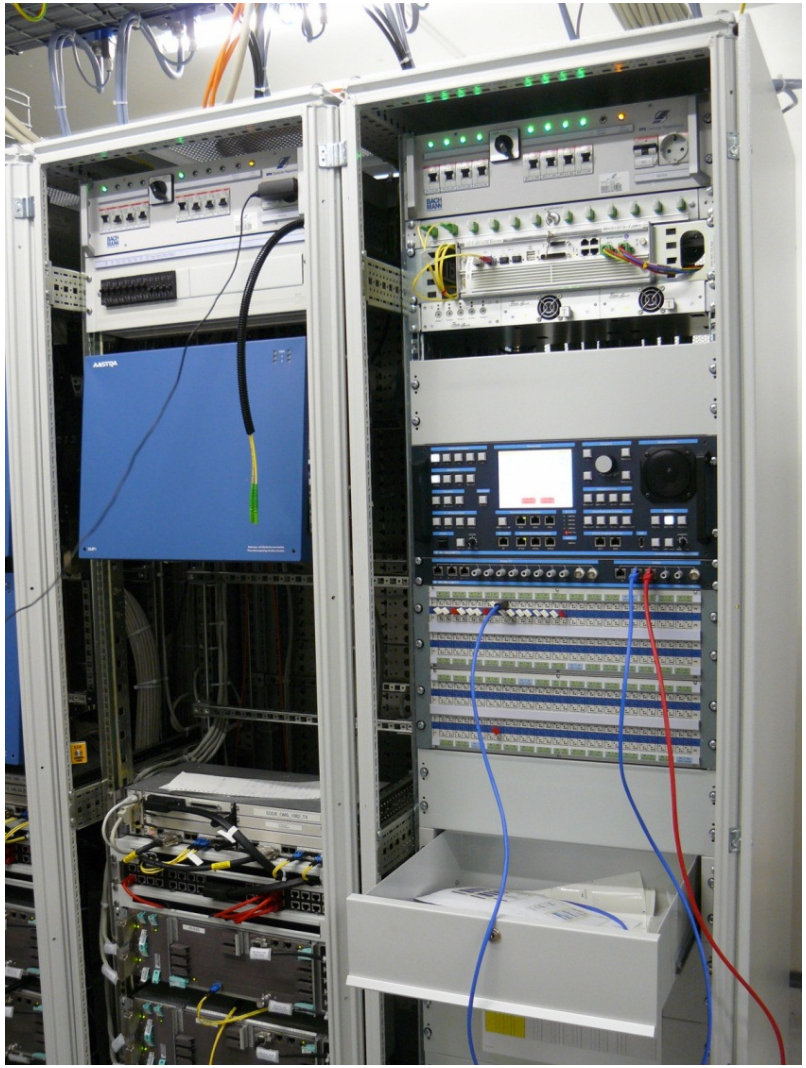
Operational Areas of the GFPE 2010

- **Monitoring**
- **Testing**
- **Maintenance**
- **Debugging**

of all transmission and reception lines in a
AirFlight radio system
as well as for all
communication lines
from an
air navigation service.

Example: AirFlight radio at airport Berlin Schönefeld, Germany

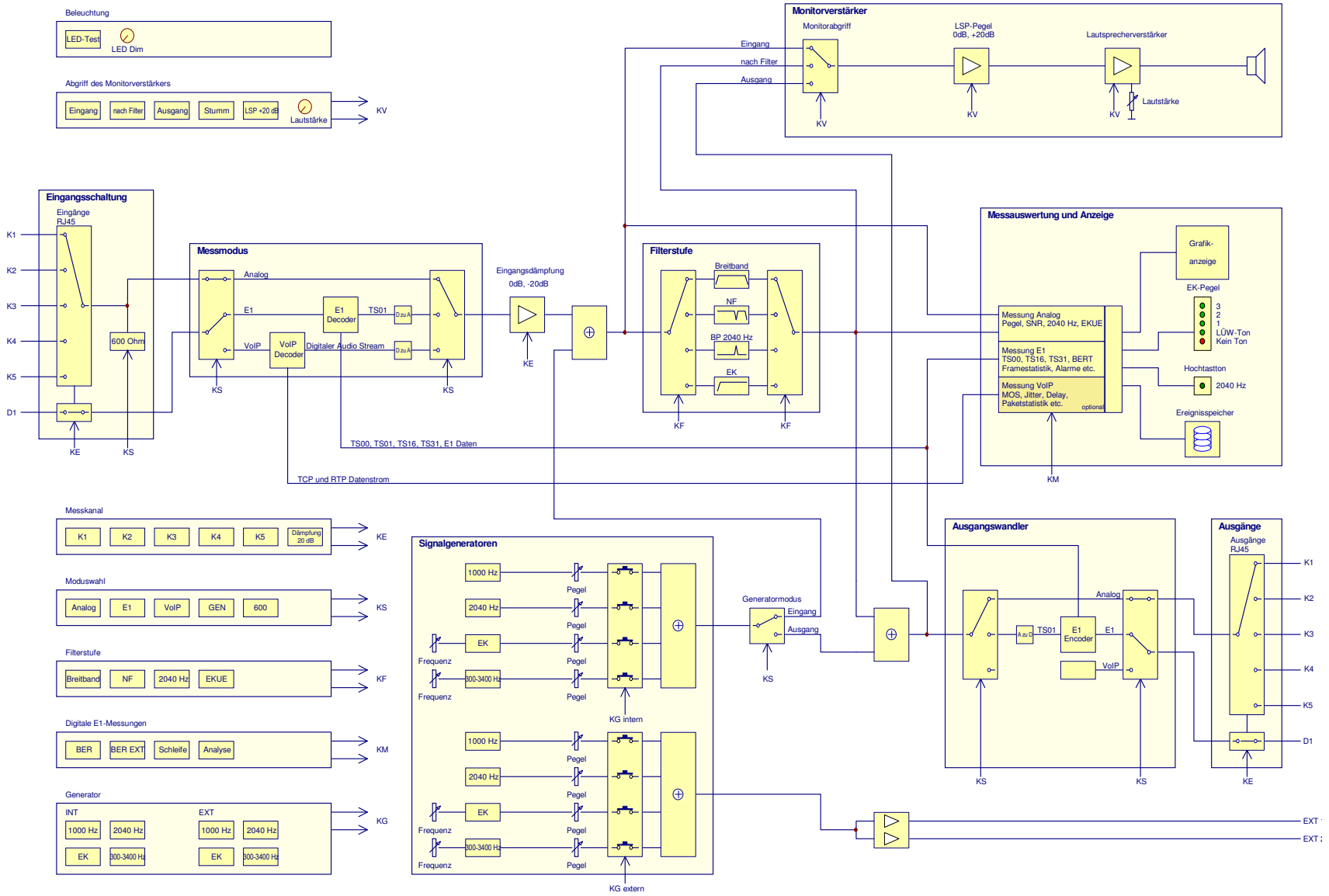
AirFlight radio at airport Berlin Schönefeld - Germany



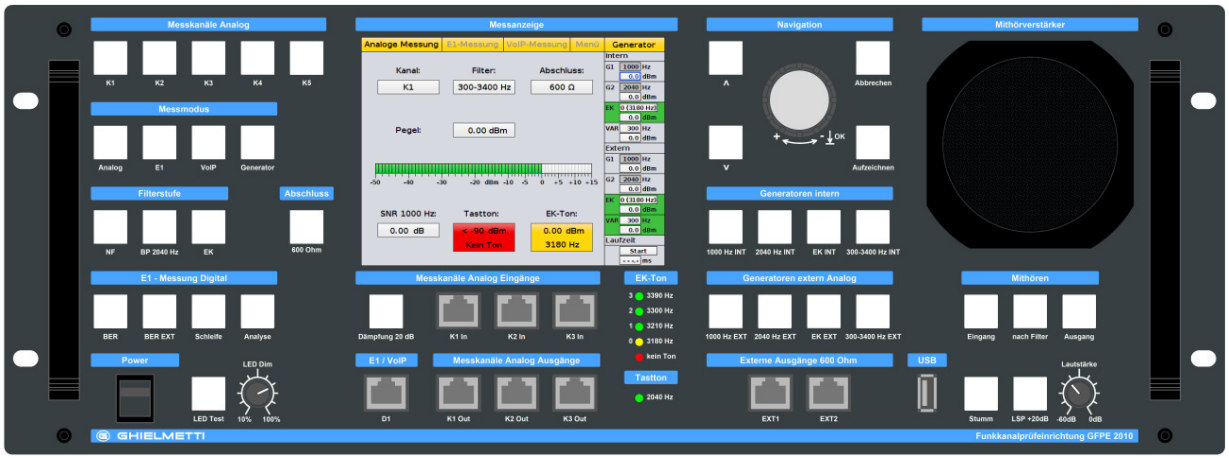
Characteristics GFPE 2010

No. of integrated measurement systems	3 (analog, digital, (VoIP in preparation)
Signal generators analog	8
Level meter analog	Display
Key sound evaluation	✓
EK-sound evaluation	4 frequences
Signal propagation time analog	✓
SNR measurements	✓
Analysis of signals in E1 networks	✓
Insert of data in E1 data streems	✓
Signal propagation time in E1 networks	✓
Analysis of VoIP connections	In preparation
Monitoring of audio signals	✓

Bloc diagram GFPE 2010



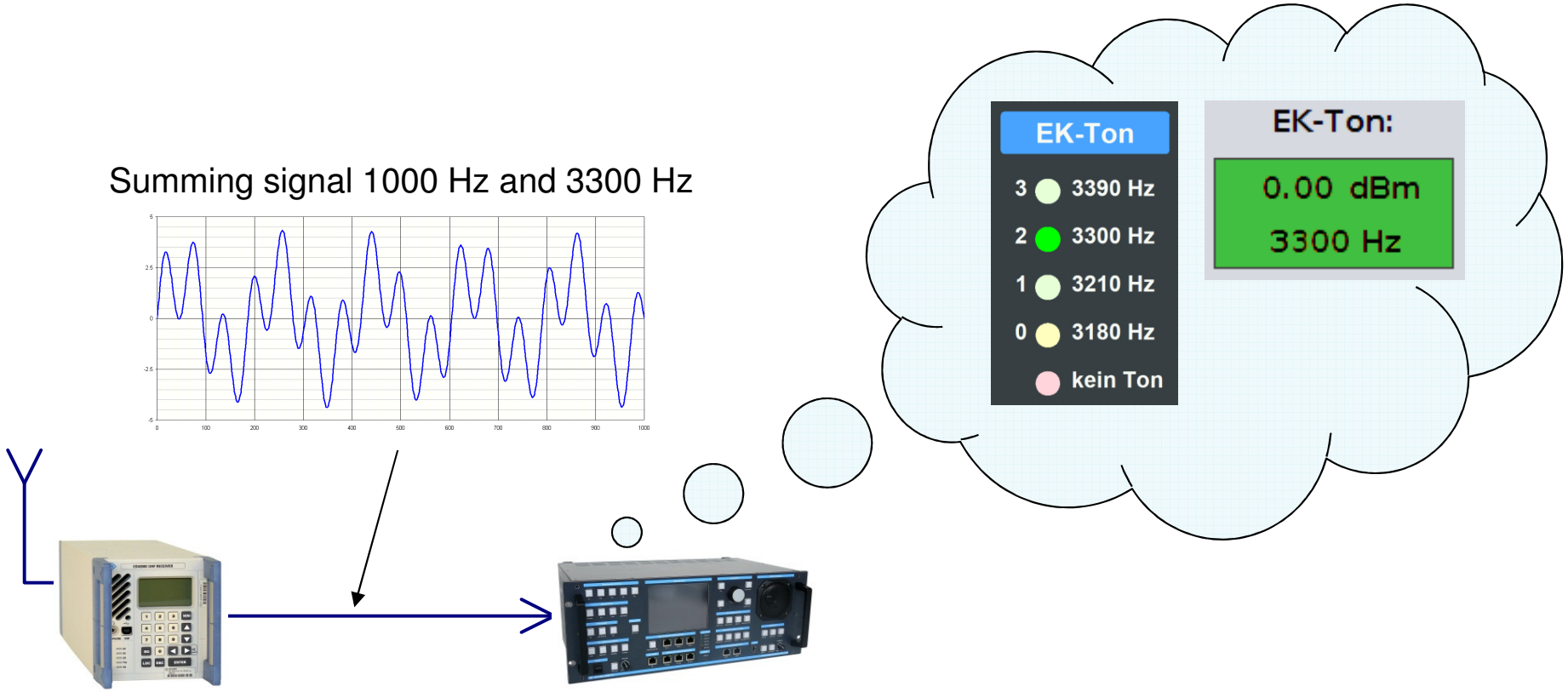
Analog measurements



- Measurement and listening of analog signals
- Signal delay measurements between send and receive signal
- Signal to noise ratio (SNR) measurements

Measurement and listening of analog signals

Measuring of audio signals with EK-sound-signals on a receiver output



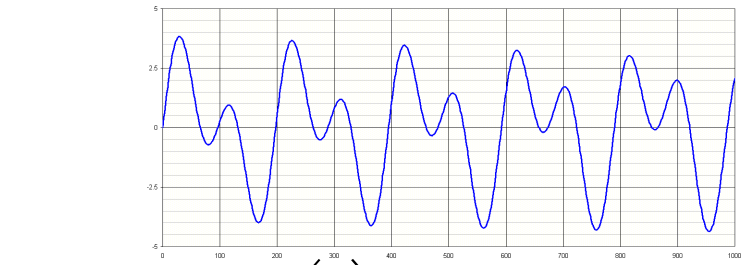
Connection to receiver output

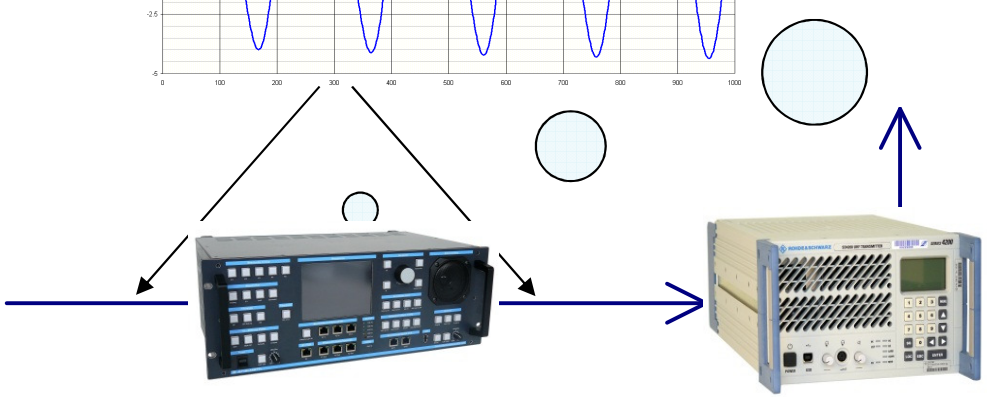
Display of signal level and EK-signal.

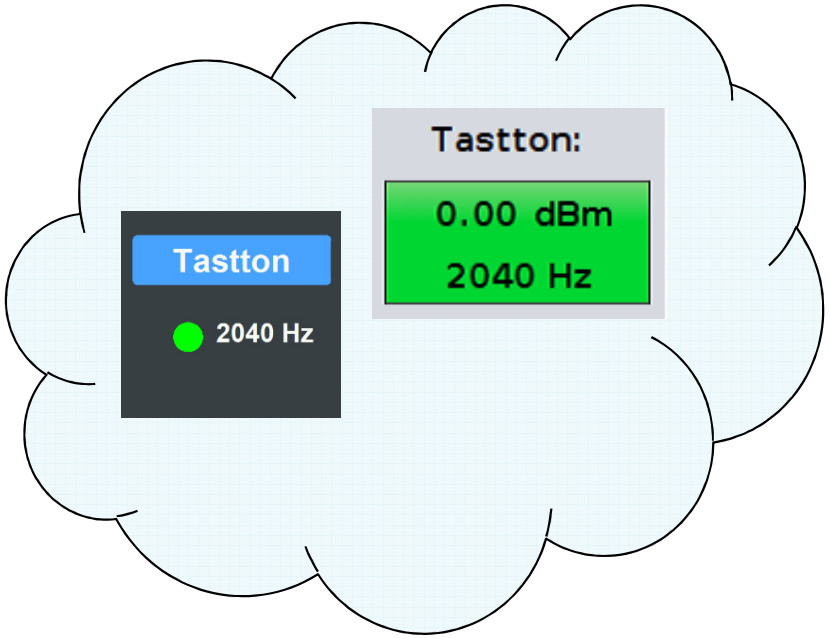
Measurement and listening of analog signals

Measuring of audio signals with key-signal on a transmitter input

Summing signal of 1000 Hz and 2040 Hz







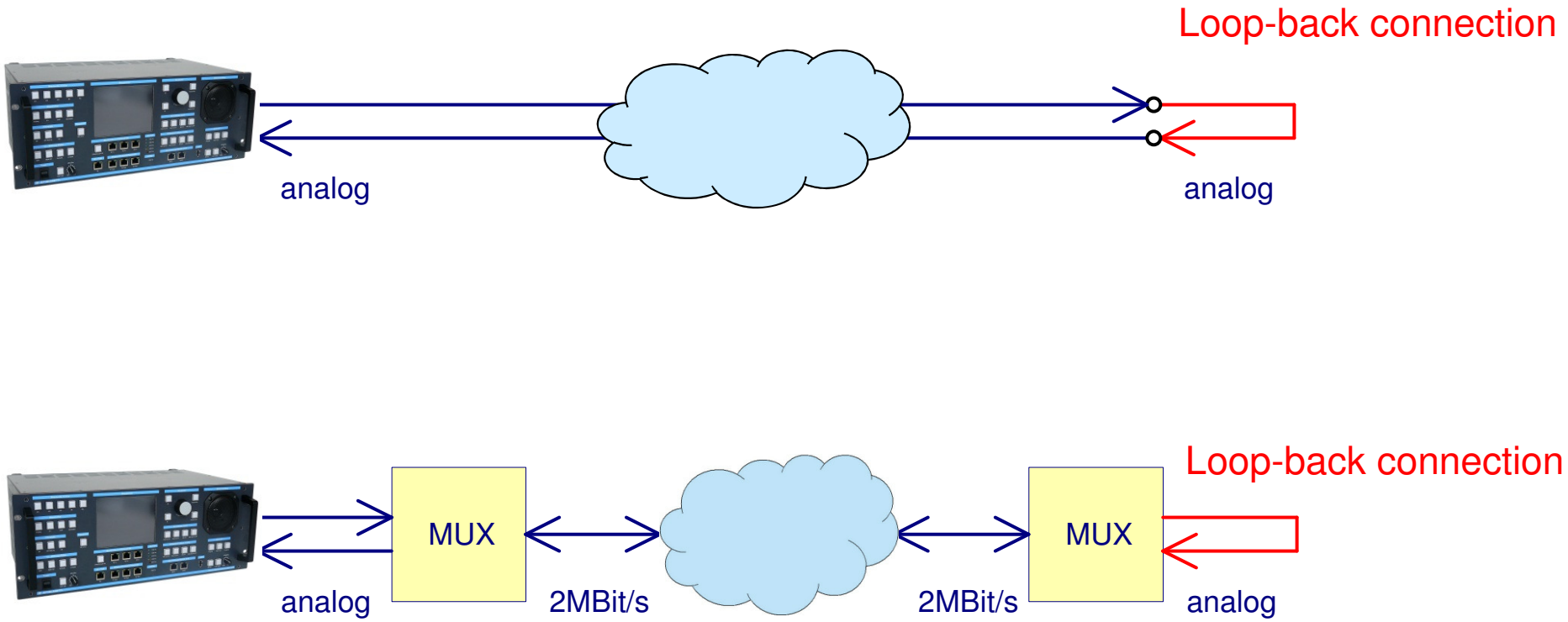
Signal to noise ratio measurement (SNR)

- Tapping of 1000 Hz signal at connector "EXT1" or "EXT2« with a interconnection to a line or a load.
- Reconnecting to an analog input.

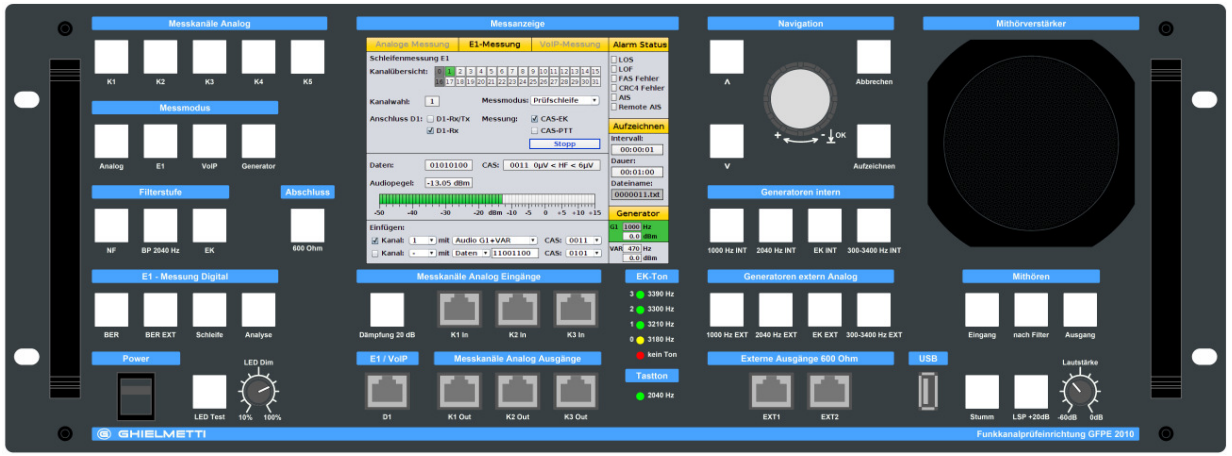
Measurement result:

→ **Continuous signal to noise ratio measurement**

Measuring of **signal propagation time** in analog and digital networks



E1- Measurement



Specification of E1

- E1 represents a digital telecommunication interface at 2048 kBit/sec. 32 channels are transmitted in a TDM frame

Standardisation:

• Data transmission	ITU-T G.703
• Format (Framing)	ITU-T G.704
• PCM-transmission format	ITU-T G.732
• PCM-Coding	ITU-T G.711

Coding

- HDB3
- PCM30, CRC-4

E1 - Measurements

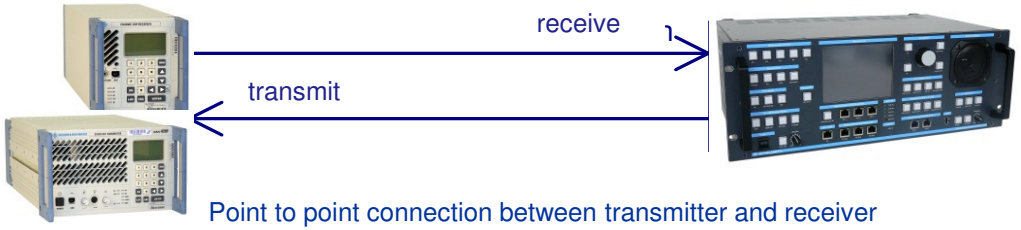
(ITU-T G.703 and G.704)

- **Detection and measuring** of framed E1 signals
- **Splitting** of a framed E1 signal in the different time slots
- **Generating** of a framed E1 signal
- **alteration or suppression** of time slots
- **Loop test** of E1 channels
- **BER test**, internal and external of framed E1 signals
- **Evaluation of alarms** and error bits of framed E1 signals
- **Paste of** error bits in time slots and frame bits.
- **Statistics** to no. of frames , bit errors and alarms.

Measurement mode E1-loop-back

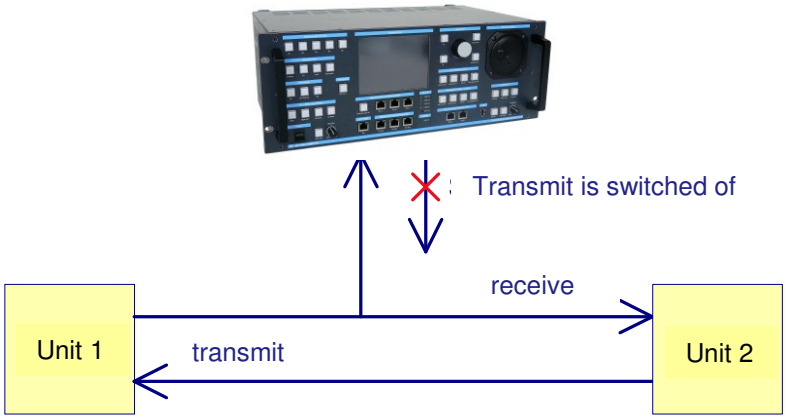
There are several options for loop-back measurements

- 4-wire connection between transmit and receive channel



Point to point connection between transmitter and receiver

- 2-wire connection, only receive channel



Detection of a transmit signal in an active 2 Mb/s connection

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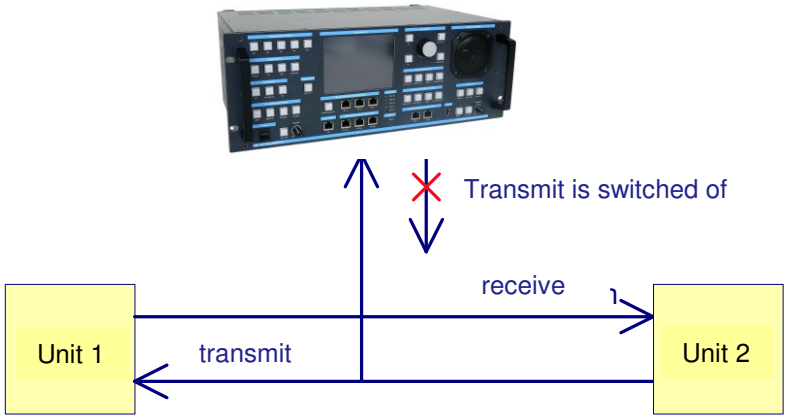
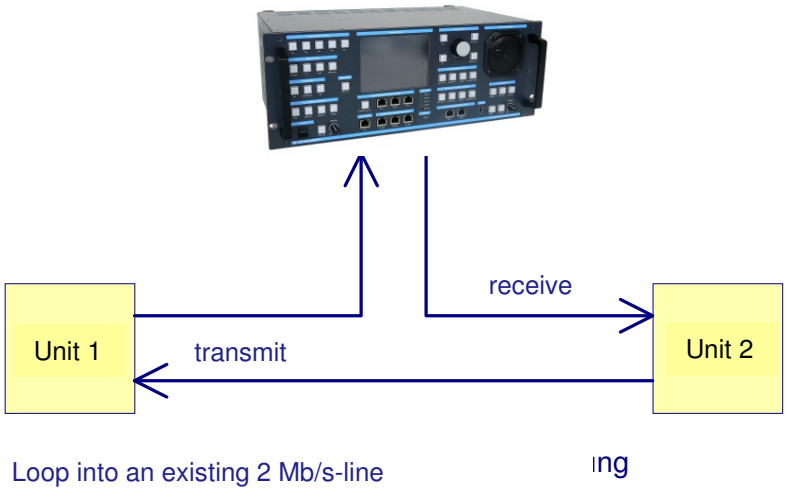
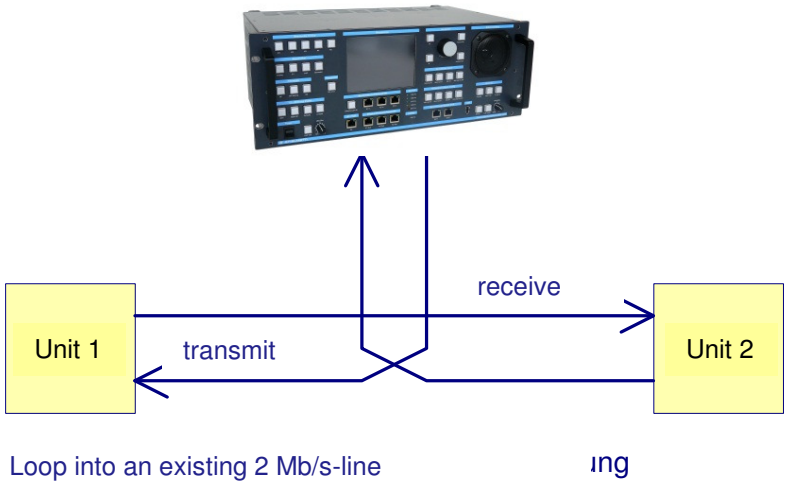


Detection of a transmit signal in an active 2 Mb/s connection

Measuring mode "Analyse"





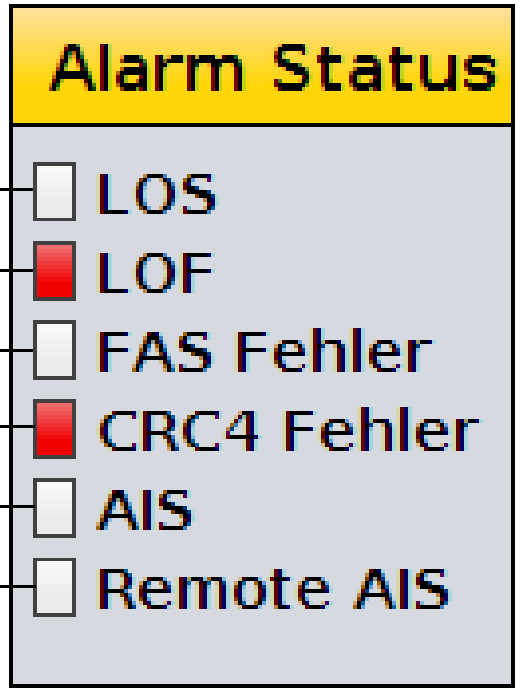
The GFPE 2010 is interconnected in an existing E1- connection.

Display of status of E1 and alarms

- Continous display by active line
- Record and store of alarms

Indication of alarms:

LOS	Loss of Signal	no error
LOF	Loss of Frame	error
FAS Fehler	Frame Alignment Signal	no error
CRC4 Fehler	Cyclic Redundancy Check	error
AIS	Alarm Indication Signal	no error
Remote AIS	ext. Alarm Indication Signal	no error



Record and store of E1 events

Recording of loop-back signal

```
Log file: 0000004.txt

Loop test:
TT.MM.JJ  hh:mm:ss  KANAL;LOS;LOF;FAS;CRC4;AIS;RAIS;CAS

Start
17.10.11  15:22:04  02;1;1;1;0;0;0;0000
17.10.11  15:22:34  02;0;0;1;0;0;0;0000
17.10.11  15:23:04  02;0;0;0;0;0;0;1100
Stopp
```

Recording of a BER measurement

```
Log file: 0000003.txt

Bit-Error-Test
TT.MM.JJ  hh:mm:ss  LOS;LOF;FAS;CRC4;AIS;RAIS;BER;ES;SES

Start
17.10.11  14:35:47  1;1;1;0;0;0;3.7126e-6;1;0
17.10.11  14:35:57  1;1;1;0;0;0;2.2139e-6;1;1
17.10.11  14:36:07  0;0;0;0;0;0;8.5741e-7;2;1
Stopp
```

The unit satisfies the requirements of following standard and recommendations:

EUROCAE
ETSI
ITU-T G.703
CCIR
ETSI
EN 301 489-22
CE
VDE
DIN

The delivery includes:

1 test cable 200 cm
Pin 1,2 BNC to RJ45

Documentation

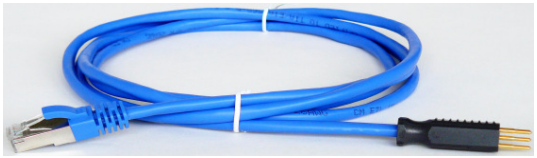
2 Adapter cable 200 cm
8-pole RJ45 to RJ45

1 test cable 200 cm
Pin 4,5 BNC to RJ45

GFPE 2010

2 Adapter cable 50 cm
8-pole RJ45 to RJ45

GFP-PP interface



2 Adapter cable 200 cm
Pin 1,2 G3P to RJ45

Y-Adapter

1 power supply cable

1 Adapter cable 200 cm
crossed, RJ45 to RJ45

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