

# Messenger 2.1 Product Specification

## 1. Introduction

Messenger 2.1 is designed as a reliable building block for a system builder. Messenger 2.1 takes care of everything telecom specific, i. e. functions which a general processor cannot easily handle. This includes physical interfaces and time critical functionality.

In a typical application, the application host is connected via ethernet. Commands and responses are sent as XML structured text over TCP/IP. XML structured text over TCP/IP allows complete freedom of choice in selecting the programming language and operating system on the application host.

GTH-C3 is the hardware component of Messenger 2.1. GTH-C3 consists of a 19" chassis, 1U in height, equipped with one, two or three GTH 2.1 modules.

The Generic Telecom Hardware (GTH 2.1) modules are fully independent of each other, they only share the same chassis. Each GTH 2.1 module is equipped with eight G.703 interfaces and two 10/100 ethernet interfaces.

The product is built for carrier class reliability. It is powered from 48 VDC and contains no moving parts. The low power consumption distributed over a large area makes it well suited for passive convection cooling.

## **2. GTH 2.1 module capacity/performance**

### **2.1 Switching**

2.1.1 256 simultaneous simplex connections, i e non-blocking switching of 8 G.703.

### **2.2 Conferencing**

2.2.1 Up to 20 simultaneous 3 party conferences using normal switching ("implicit conference").

2.2.2 Up to 10 participants in an implicit conference.

2.2.3 Up to 30 simultaneous N-party conferences using explicit conferences.

2.2.4 Up to 30 participants in each explicit conference.

2.2.5 Up to 60 participants in total in all explicit conferences.

### **2.3 DTMF detection**

2.3.1 Continuous detection of DTMF tones on up to 120 timeslots simultaneously.

### **2.4 Level detection**

2.4.1 Level detection on up to 120 timeslots simultaneously.

### **2.5 Message generation**

2.5.1 Message storage: Up to 2000 different messages with a total length of one hour can be downloaded.

2.5.2 Message generation: Generation of arbitrary messages on up to 120 time slots simultaneously.

### **2.6 Streaming player and recorder**

2.6.1 Up to a total of 120 simultaneous players or recorders in any combination.

### **2.7 LAPD signaling**

2.7.1 LAPD (Q.921) on one timeslot per G.703 interface.

### 3. GTH-C3 hardware specification

GTH-C3 is the hardware part of Messenger 2.1. It is the product GTH-C3 that is tested and approved for various EMC and safety requirements.

GTH-C3 consists of:

- A 19" chassis, 1U in height.
- A LED module, for front status indication.
- Two Power modules, each with a power connector, filter and protection.
- One, two or three GTH 2.1 modules.
- Internal cabling.

#### 3.1 External power interface

3.1.1 The external mechanical interface is XLR-3M.

3.1.2 Power can be connected to one or both inputs simultaneously. If both inputs are powered, power is drawn from the source with the highest voltage.

3.1.3 The supply input is polarity independent.

3.1.4 The supply range is: 38 - 60 VDC.

3.1.5 The maximum power consumption of a fully equipped chassis is 45 W. Typical consumption is 27 W.

### 4. GTH 2.1 module hardware specification

A GTH 2.1 module is equipped with the following interfaces:

- Eight external G.703 interfaces.
- Two external 10/100 Mbit/s ethernet interfaces.
- Two internal power inputs.

#### 4.1 G.703 interface

4.1.1 A module is equipped with eight external ITU-T G.703/G.704 interfaces.

4.1.2 The connector type is RJ-45. There are two G.703 duplex interfaces per connector.

4.1.3 The line termination can be individually configured to 75 or 120 ohm.

4.1.4 Balanced or unbalanced termination is selected by the external cable connection.

4.1.5 LEDs are used to indicate link status.

#### 4.2 Ethernet interface

4.2.1 A module is equipped with two external 802.3 10/100BASE-T ethernet interfaces.

4.2.2 The connector type is RJ-45.

4.2.3 Both interfaces can be used to control the module.

4.2.4 LEDs are used to indicate link status.

## 5. Layer 1

### 5.1 General

5.1.1 The interface data rate is 2.048 Mbit/s (E1).

### 5.2 Layer 1 configuration

The following parameters can be individually configured for each G.703 interface:

5.2.1 Termination: 75 or 120 ohm.

5.2.2 Linecode: AMI or HDB3.

5.2.3 Framing: Doubleframe or CRC4-Multiframe.

5.2.4 Idle pattern.

### 5.3 Layer 1 statistics

The following statistics are available for each G.703 link:

5.3.1 Current link state: (OK, LOS, LFA, RAI, AIS).

5.3.2 Error statistics: The number of occurrences of [slip(+), slip(-), Frame error, code violation, CRC error].

5.3.3 State statistics: The total duration of each state and the number of times the state is entered [OK, LOS, LFA, RAI, AIS].

### 5.4 Rate synchronisation

The module is rate synchronised to the telephone network via one of the G.703 interfaces. The synchronisation source is assigned via the API or a source is selected automatically (auto mode).

If the selected synchronisation source fails, the module changes to internal mode and continues on the last known good frequency. This has a minimal effect on the system and the high oscillator stability allows the application a long time to decide upon a new synchronisation source.

5.4.1 The source for frequency synchronisation can be configured to: (G.703 interface [1..8], auto, internal).

5.4.2 If the TC-VCXO is free running (internal mode), the oscillator stability is better than 2 ppm. (0 - 50 deg. Celsius)

### 5.5 Time synchronisation

Time is used for time stamping the logs.

5.5.1 Up to two NTP servers can be configured for time synchronisation.

## 6. Functionality

Almost all functionality is implemented in software in the processor, DSPs and FPGAs. This allows a stepwise development and addition of new functionality on already installed equipment. The product contains the following functionality:

- Switching
- Conferencing
- DTMF detection
- Level detection
- Message generation
- Streaming player
- Streaming recorder
- LAPD signaling

### 6.1 Switching

A module forms a switch with 8 G.703 interfaces.

Three different types of simplex connections can be set-up:

- Point-to-point (simplex) connections.
- Point-to-multipoint (broadcast) connections.
- Multipoint-to-point (conference) connections.

A point-to-point connection is the normal type of connection. One source and one end-point.

A point-to-multipoint connection consists of several simplex connections with a common source but with different end-points. Point-to-multipoint is used to create broadcast and conferences.

A multipoint-to-point connection consists of several simplex connections with different sources but with a common end-point. In the end-point the samples from the different sources are added to create a conference. See Conferencing below.

The connection bandwidth is 64 kbit/s.

### 6.2 Conferencing

A conference is created as a linear sum of all participants. Both full conferences where everybody hears each other and partial conferences can be created. An example of a partial conference is where a voice prompt is sent to only one of the subscribers in a conversation.

Implicit conferences are created with point-to-multipoint/multipoint-to-point connections. Explicit conferences allow a larger number of participants.

### 6.3 DTMF detection

Tone detectors are used to receive inband signaling in the form of DTMF.

6.3.1 A DTMF receiver can be assigned to any timeslot.

6.3.2 The DTMF detector fulfills the requirements in Q.24 for use in AT&T's networks. It has been tested according to MITEL and Bellcore (Telcordia) tests.

### 6.4 Level detection

Level detectors are used to detect when the audio power on a timeslot exceeds a certain level.

6.4.1 A level detector can be assigned to any timeslot. The trigger level is configurable on a per-timeslot basis.

### 6.5 Message generation

A message is a sequence of samples. When played, several messages can be concatenated, without interruption, to form one longer message.

Example: The message "the time is", "nine", "forty", "five", "and", "thirty", " ", "beep" can be generated, without intermediate pauses, by concatenating several sample sequences. The messages to be played are downloaded to the module in advance.

### 6.6 Streaming player

An application host can stream data, via TCP, out on a timeslot. This is useful for playing long messages and messages generated by the host at runtime.

### 6.7 Streaming recorder

Data on a timeslot can, via TCP, be recorded to a semi-permanent storage on an application host. This is for example useful for recording a greeting or a message in a voice mail application.

### 6.8 LAPD signaling

Out of band signaling in the form of ISDN layer 1 and 2 is supported.

6.8.1 ISDN layer 1 according to ITU-T I.431.

6.8.2 ISDN layer 2 (LAPD) according to Q.921.

## 7. O&M

### 7.1 General

7.1.1 A GTH 2.1 module has two types of interface, an XML based interface and a Web interface. The web interface is intended to simplify installation and supervision.

7.1.2 The XML interface can be used to configure the module, to query statistics and to reset statistics.

7.1.3 The Web interface can be used to view configuration and statistics. It can not be used for configuration unless specifically stated.

#### Asynchronous events

An asynchronous event is sent from the GTH 2.1 module to the application host via XML when any of the following events occur:

7.1.4 A layer 1 or layer 2 state change occurs.

7.1.5 A configured limit is exceeded (Link, CPU, ethernet, temperature, packet buffer).

7.1.6 The configured synchronisation source is lost.

### 7.2 Configuration

7.2.1 At delivery the module is configured to a default IP address.

7.2.2 The IP address can be configured via the XML or Web interface.

7.2.3 The possibility to configure the IP address from the Web interface can be blocked via the XML or Web interface but can only be unblocked from the XML interface.

7.2.4 The software can be upgraded remotely.

7.2.5 The Real Time Clock (RTC) can be set, manually or via NTP.

7.2.6 A-law or mu-law can be set for the module. The law setting affects tone detection and conferencing.

### 7.3 Statistics

Key indicators of the module's environment and performance are available through the following statistics:

7.3.1 Current status of module resources.

7.3.2 Module temperature.

7.3.3 Module power consumption.

7.3.4 Load: The current, maximum and average load of [CPU, ethernet].

### 7.4 Logging

In order to support system analysis, two types of logs are produced:

7.4.1 A system log which logs important system events.

7.4.2 An API log which logs API events.

7.4.3 The logs are stored on the module and are available both via the API and via the web server.

## 8. Environment

### 8.1 Storage and transportation environment

- 8.1.1 Temperature range: -25 to +70 deg. Celsius.
- 8.1.2 Humidity range: 5-95% RH, non-condensing.

### 8.2 Operating environment

- 8.2.1 Temperature range: +10 to +35 deg. Celsius.
- 8.2.2 Humidity range: 20-80% RH, non-condensing.

## 9. Deliverables

### 9.1 Deliverable unit

Cardboard protective carton containing:

- 1 Chassis with mounted modules.
- 2 Power cables.
- 1 Ground cable.
- 1 Installation guide: "Getting started - GTH-C3".

## 10. References

Q.24: ITU Q.24 "Multifrequency Push-button Signal Reception", 1993.

MITEL tests: Mitel DTMF tests as per Mitel CM7291 data sheet.

Bellcore tests: Bell cassette tape, in accordance with Bell TR-TSY-000763.

## Revision history

Rev. 1.2 dated 120331

- Updated for GTH 2.1 hardware module. No change of features or capacities.

Rev. 1.1 dated 060629

- EMC and electrical safety approvals moved to a separate document.

Rev. 1.0 dated 060413 First release.