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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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1 INTRODUCTION

1.1 PROJECT SCOPE

The CHORIST project will propose solutions to increase rapidity and effectiveness of interventions following natural hazards and industrial accidents, in order to enhance citizens' safety and communications between rescue actors.

1.2 PURPOSE OF THE DOCUMENT

This document describes the interface for the Personal Communication Gateway.

Personal communication is considered to be using the 3GPP mobile network and within CHORIST only Cell Broadcast is going to be used to warn citizens of emergency situations. Therefore, this document describes the interface between the Message Dispatcher and the Cell Broadcast Centre.

This document is the public version of SP3.D7. The full SP3.D7 document is only available for CHORIST members.

1.3 DOCUMENT VERSIONS SHEET

Version	Date	Description, modifications, authors
1.0	13-08-07	First public version of SP3.D7 by LOGICACMG

Table 1: Document versions sheet

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2 REFERENCE DOCUMENTS

2.1 REFERENCE DOCUMENTS

- [1] CHORIST SP3.D4, Communication network architecture definition and requirements.
- [2] 3GPP TS 23.041, Digital Cellular Telecommunications System (Phase 2); Technical Realisation of the Short Message Service Cell Broadcast (SMSCB), version 7.0.0
- [3] SMPPv5, Short Message Peer-to-Peer Protocol Specification Version 5.0, SMS Forum
- [4] 3GPP 23.038], Digital Cellular Telecommunications System (Phase 2+), Alphabets and language-specific information, version 7.0.0
- [5] RFC2109, HTTP State Management Mechanism, Internet Standard

2.2 DEFINITION

Broadcast	A transmission to multiple, unspecified recipients.
BSC type	Vendor and type of BSC.
BTS configuration data	Coordinates and, optionally, geographical area that is covered.
Cell broadcast area	Geographical area(s) to which messages are broadcast. Cell broadcast areas may comprise one or more cells or entire PLMN. (See "Area")
Cell broadcast message	Message sent from the MD through the CBC to the PLMN. (see "Message")
External interface	Interface from one system to another system or entity.
File	An element of data storage in a file system.
Message Dispatcher	Sends messages to the CBC.

2.3 ABBREVIATION

3GPP	Third Generation Partnership Project
BSC	Base Station Controller
BTS	Base Transceiver Station
CB	Cell Broadcast
CBC	Cell Broadcast Centre
CBS	Cell Broadcast System
CLI	Calling Line Identification
GSM	Global System for Mobile communications
IP	Internet Protocol
ISDN	Integrated Switched Data Network
MD	Message Dispatcher
RPC	Remote Procedure Call
SMSCB	Short Message Service Cell Broadcast
TCP	Transmission Control Protocol

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3 INTRODUCTION

Document SP3.D4 [1] describes the Communication network architecture definition and requirements for SP3. A Message Dispatcher (MD) and a Cell Broadcast Centre (CBC) are entities in this architecture.

The MD-CBC interface is derived from the interface definition between the CBC and the Base Station Controllers (BSCs) as referred to in the 3GPP TS 23.041 [2] specification. In the MD-CBC interface, network information has been replaced by geographical information and a feature enabling scheduling of messages has been added.

This interface, further called the MD Gateway, is an XML based interface that exists for many years. Recently SMPP v5 [3] has been released, which now includes an interface specification for this same interface.

3.1 GLOBAL ARCHITECTURE

The below figure provides an overview of the global architecture of the MD-CBC interface.

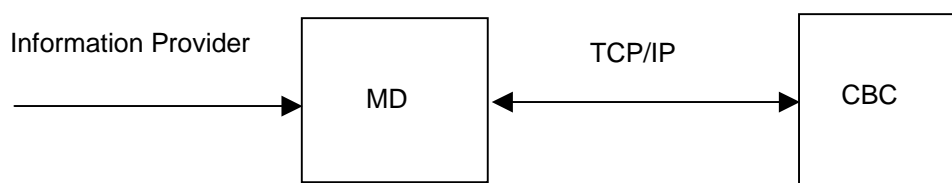


Figure 1: Global Architecture MD – CBC Interface

3.1.1 Message Dispatcher (MD)

The MD is a system outside CBC sending requests to the CBC. The MD can, for example, be located at a government controlled central location. Information Providers submit messages into an MD.

3.1.2 Network Interfaces

Possible network interfaces between the MD and the CBC are TCP/IP. The CBC is able to interface with multiple MDs concurrently using a network interface. In the CHORIST demonstration, only a single CBC and a single MD will be used and TCP/IP will be used on the interface.

3.1.3 Authorization/ Access Control

The CBC has implemented the following two methods for access control:

- Calling Line Identification (CLI): a MD trying to access the CBC must have a unique network address, which must be registered within the CBC.
- Name and password with which the MD logs into the CBC is checked; when logging in to the CBC.

A combination of these two methods may be configured per MD. Each connection to an MD is provided with idle time detection: when no transmission occurs on a link within a specified time-span (specified in system settings), the CBC will terminate the connection.

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4 MD – CBC INTERFACE

4.1 OVERVIEW

This chapter describes the communication protocol used by the MD Gateway.

The transport protocol is HTTP and the message content is formatted in XML-RPC. The global picture is shown in Figure 2.

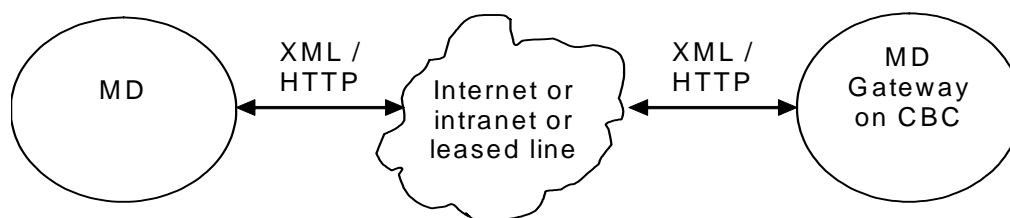


Figure 2: Global Overview

4.2 HTTP

The transport protocol being used is HyperText Transfer Protocol (HTTP), which is the most widely used synchronous transport protocol today. It is a generic, stateless protocol. Support is included in almost every language/OS and it is relatively easy to implement. The required minimum version of HTTP protocol is HTTP-1.0.

4.3 XML – RPC

The message content is based on XML-RPC. XML-RPC is a specification and a set of implementations that allow software running on disparate and different operating systems and environments to make procedure calls over the Internet. It has been designed to be as simple as possible, while allowing complex data structures to be transmitted, processed and returned.

4.4 INTERACTION DIAGRAM

For each service the client wants to perform on the MD Gateway, an XML request must be constructed and sent to the CBC.

After receiving and interpreting a request message, the MD Gateway will respond in the form of an HTTP response message. A typical interaction between a client and a MD Gateway is shown in Figure 3. In this example, the client issues three HTTP requests to the MD Gateway.

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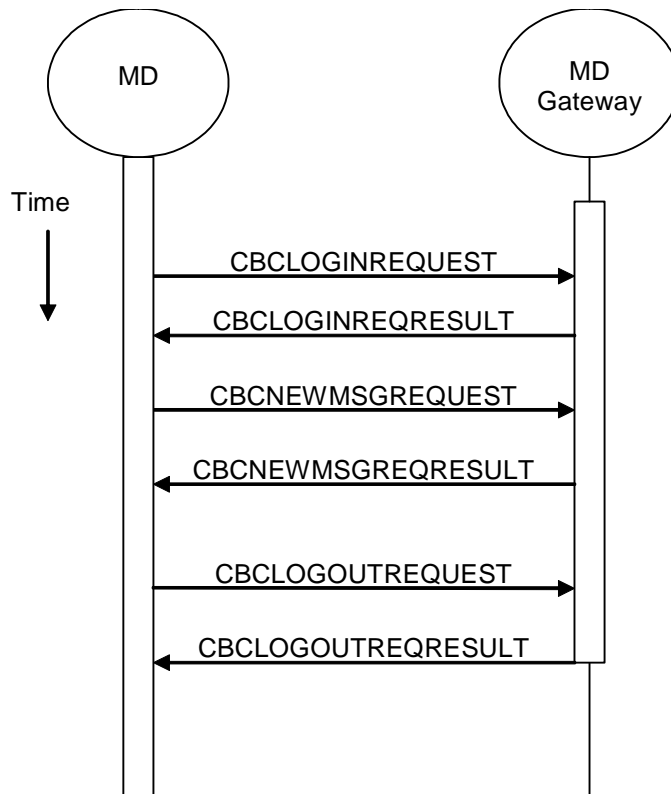


Figure 3: Client – MD Gateway Typical Interaction Diagram

The first request that a client sends to the MD Gateway must be a login request. When the login was successful any other request can be sent to the MD Gateway. When the client is finished, a logout request must be sent to MD Gateway, so that the MD Gateway can clean up the resources that are associated with that client.

The MD Gateway can handle multiple requests from multiple clients at any time. This means that one client may send multiple HTTP requests to the MD Gateway at any time. The client could implement this by executing each request in a separate thread. Exceptions to this are the `CBCLOGINREQUEST` and `CBCLOGOUTREQUEST`. These requests may NOT be used while other requests are running from the same client!

4.5 SESSION TRACKING

The HTTP protocol is by design a connection-less/stateless protocol. The MD Gateway uses HTTP State Management Mechanism as described in RFC2109 [5]. Session tracking through HTTP cookies is the most used session tracking mechanism. The session tracking mechanism will not be explained in this document. When the client sends a login request, the MD Gateway responds by sending a response to the client. In the response a cookie is included that the client must retrieve and store. The cookie contains a session-id that the MD Gateway uses for session tracking. It does not contain any security-related information. The cookie must be returned to the MD Gateway on each subsequent request to the MD Gateway. Refer to the references for more information.

4.6 SECURITY

Security can be provided at transport level through HTTP-SSL if the web server and the client have support for it.

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4.7 CBC CONNECTION

Before an MD can send any requests to the CBC, it must first open a connection. A connection can be made via a network. By means of CLI, the CBC will check if the originating address of the call is allowed to open a connection. An Information Provider may have more than one connection open concurrently.

4.7.1 Access Security

As the CBC may be an interesting object for unauthorized use, special attention has been paid to access security. The basis for access security is a four-fold check: CLI, MD name, Information Provider name and Information Provider password. Access security can be recognized at different system levels.

4.7.1.1 Access Protocol Level Security

The CBC can be accessed via the TCP/IP protocol. For "safe" CLIs, a X.25 / ISDN router may be used.

4.7.1.2 Application Level (IP Authentication) Security

At the CBC application level, security will check for an MD name, an Information Provider name and a password. Once a call has been accepted, the MD needs to login using the two names and password combination before any CB-service may be used.

4.8 CBC DISCONNECTION

A MD may be disconnected from the CBC in several ways:

- Explicit disconnect by an Information Provider: communication links of this connection will be closed. Communication links of other connections will remain unaffected (gentle disconnect).
- Idle time detection: if there has been no communication with an information provider over a connection during a specified time, this connection will be closed (forced disconnect).
- Connection or link failure: if, due to a technical failure or mishap, a link or a connection has broken down the MD is responsible for restarting communication.

4.9 MD – CBC PRIMITIVES

Primitives are defined in terms of requests and responses. The CBC can generate several types of answers to the MD. Answers are optionally stored in a history file in the CBC. Possible answers are acknowledgements (class 0), informational messages (class 1) and error messages (class 2).

The MD-CBC interface supports the following primitives:

1. Login to the CBC.
2. Change password.
3. Create a new message.
4. Create a new message using a predefined area.
5. Change contents and scheduling of a message.
6. Kill a message.
7. Get information about a message.
8. Define an area, to be used as a predefined area.

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9. Remove a predefined area.
10. Get information about a request.
11. Create a new message specifying a list of cells.

4.10 MESSAGE CLASS

The `messageclass` provides information about the type of status code. According to the source code, the `messageclass` can have 3 values:

- 0: Status code is of the type "ACK" (acknowledgement)
- 1: Status code is of the type "INF" (information)
- 2: Status code is of the type "ERR" (error)

Only the values "0" and "2" are used by the CBC. When the status code is "0" this means that operation of the MD was successful, and therefore the `messageclass` will also have the value of "0". When the status code has any other value, it means errors have occurred and in all these cases the `messageclass` tag will have value "2".

4.10.1 CBC Login

After a connection to the CBC has been established, the MD needs to login using an Information Provider name, an MD name and password. Using the login request, a MD may login to the CBC. The CBC will automatically disconnect after three attempts have failed. The CBC will also disconnect if the first request to the CBC was not a login request. (See Figure 4)

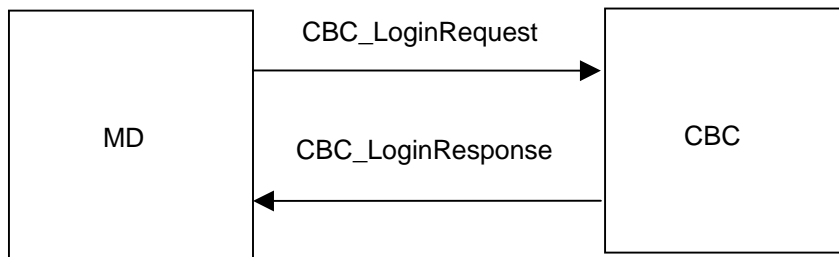


Figure 4: CBC Login

4.10.2 Change Password

Using this request, an Information Provider can change his/her password in order to maintain access security.

4.10.3 Create New Message

Using the new message request, the MD can ask the CBC to send a new message. The start time is one of the parameters of this function. If the parameter start time is used, the request will be kept in the CBC until the specified start time allowing for deferred delivery. After the request has been processed successfully, the CBC will respond with a message handle.

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4.10.3.1 Areas/ Reference Areas

An Information Provider can use reference areas (areas that have been predefined by the network operator) or define his/her own areas (if allowed: depending on CBC configuration). An area is specified by a sequence containing at least three geographical coordinates (x and y-coordinates-pair).

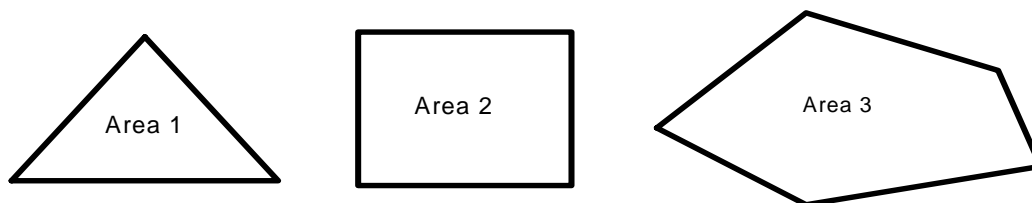


Figure 5: Areas/ Reference Areas

Within the CBC, reference areas are defined by the network operator and identified by a unique number (area ID). These area ids must be known within the MD. Precautions will have to be taken to make sure that the coordinate system used within the MD is identical to the coordinate system used within the CBC.

4.10.4 Create Message using Predefined Area

Using this request, the MD can define a message using a predefined area list. This will improve processing speed, since BSCs and BTSs that need to be addressed are already known within the CBC.

4.10.5 Change Message Contents

Using this request, the MD can ask the CBC to change contents of an existing CB-message. After each Change Message a new record is added to the original message. These records can be retrieved with the Info Message request.



Changed contents must have the same number of pages or less than original message.

4.10.6 Kill Message

Using this request, the MD can ask the CBC to stop (or prevent) transmitting a CB-message.

4.10.7 Message Information

Using this request, the MD can ask information about an existing CB-message.

4.10.8 Predefine Area

A MD can predefine an area to be used to speed up creation of new CB-messages. A predefined area will be stored in the CBC.

4.10.9 Remove Predefined Area

Using this request, a MD can ask the CBC to remove a predefined area. The area to be removed must be owned by the same Information Provider. Reference areas (areas defined by the operator) cannot be removed.

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4.10.10 Command Information

Using this request, the MD can ask the CBC for information about a previous command (request). This primitive is especially useful in case of network errors. After a network problem has been solved, the MD can check if the CBC has processed the previous request successfully. If the previous request was a Create New Message or a Create New Message Using a Predefined Area, the messagehandle parameter will be available. If the previous request was a Create New Message Using a Predefined Area, the parameter Area ID will be available.

4.10.11 New Message Cells

Using this request, a MD can define a new message to be sent to all cells in the cell list.

4.10.12 Index Message

All the above-described primitives are the same for an index message. In addition, the type of answers generated by the CBC described above is the same for an index message.

4.11 PARAMETER VALUE SETTINGS

4.11.1 Start Time & End Time/ Scheduling Method

The CBC allows CB messages to be either sent directly or to be given a specified start time. Requests without a specified end time will be scheduled to run indefinitely and can only be stopped using a Kill Message request.



Start and end times are assumed to be CBC current local time, not MD current local time.

4.11.1.1 Immediate Execution

MD requests without a specified start time will be executed as soon as possible. Requests with a specified start time being less or equal to current local time have a start time a . s . a . p .

4.11.1.2 Deferred Delivery

For MD requests with a specified start time later than current local time, deferred delivery is possible. In this case, the CBC will keep track of the actual time a message should be sent and will calculate how much time it will take to process the complete MD request. Requests taking more than the configured maximum in the CBC will not be executed.

Messages are sent from the CBC to Mobile Stations (MSs) by means of BSCs and BTSs. However, the actual processing of messages in BSCs and BTSs will cause delays. To solve these delays problems, a message should be sent to the BSC at an earlier time.

The send time of a message is defined as time when the message will be sent to the BSC. The delay time is defined as total time required for BSCs and BTSs to process the message. To the information provider, the CBC allows three scheduling methods, using specified start time and end time of a message:

1. Send time = Start time.
2. Send time = Start time – delay time.
3. Send time = Start time – delay time / 2.

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Example of Scheduling Methods

A CB message has been sent to the CBC including the specified start time 12:00. The delay time caused by BSC and BTS is 6 minutes.

The following send times will be calculated for the three scheduling methods:

- Method 1: Send time will be 12:00.
- Method 2: Send time will be 11:54.
- Method 3: Send time will be 11:57.

4.11.2 Repetition Interval

The repetition interval is an integer between 0 and 1024, specifying the number of time units to wait before the message is to be repeated. Each time unit equals 1.883 seconds.

4.11.3 Cell List

A cell ID comprises three fields:

- Cell Id (CI)
- Location Area Code (LAC)
- BTS name
- Reason

A cell can be specified in two ways:

- Specifying both the CI and the LAC
- Specifying the BTS name

Any other combination is not valid. The reason field should not be present in cell lists in request.

The reason parameter is only present in the Cell list if there were unknown or disabled cells found in the cell list for a New Message using a Cell List request.

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5 MD – CBC REQUESTS

All CBC – MD requests and responses follow the XML-RPC notation. The BNF notation of XML-RPC is shown in detail in SP3.D7 (confidential version).