

OMTP

Open Mobile Terminal Platform

OMTP

CAMERAS

DEFINITION AND REQUIREMENTS

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1 INTRODUCTION

This document represents the Camera De-fragmentation and Requirements developed within OMTP.

It defines some recommended classes of cameras for mobile terminals. Further classes will be added in future versions of the documents with the availability of on-going technologies.

The classes are defined in order to resolve issues caused by the large variety of minimum characteristics supported by cameras in mobile terminals. The potential issues are:

1. The user experience of 'look&feel' is affected.
2. By making application developers and content providers address all the display and camera formats of different mobile terminals, operational costs are increased.
3. The services based on camera usage are affected by camera characteristics.
4. The perceived quality of video services is heavily influenced by camera characteristics.
5. The bandwidth occupation and encoder performances depend on camera acquisition characteristics.

OMTP have addressed the camera de-fragmentation issue to:

1. Reduce operational costs.
2. Improve user perception of the video services provided.
3. Make the specification of requirements for mobile terminals easier and more precise.
4. Reduce the NRE cost due to the re-engineering of applications and content to support new terminals

See 4 for some example cases.

1.1 DOCUMENT PURPOSE

This document has the general objective of helping to define the terminal requirements and allowing development and deployment of new services as well as de-fragmenting the camera offering within terminals. In particular, the document adheres to the OMTP Main Objectives:

Facilitate the Implementation of Open Mobile Terminal Platforms

- Work as appropriate to drive the development of specific mobile terminal platforms to meet OMTP requirements.
 - Influence standardisation of relevant platforms.
 - Work with vendors of proprietary platforms to adopt OMTP requirements and/or resulting standards.
 - Understand the implementation roadmap and ensure conformance to OMTP requirements.

In particular, it addresses the hardware enablers through the production chain to facilitate OMTP terminal development.

Define De-fragmentation Guidelines

- De-fragmentation guidelines to reduce costs (both for operators and manufacturers) and increase consistency by defining:
 - Hardware component parameters.
 - Software component parameters.
 - Performance guidelines and benchmarks.

1.2 INTENDED AUDIENCE

The document is intended to be used as reference in:

- Terminal requirements definition.
- Platform and terminal characteristics definition.
- Detailing supported cameras in the definition of mobile terminal performance.

Some examples of usage follow:

Within hardware requirements for an application: *“The application needs a camera capable of OMTP definition CV2 (as defined into OMTP CAMERAS v1.0) to run”.*

Within codec performance: *“The codec X performs at 12fps with a camera capable of OMTP definition CV1 and a display capable of OMTP definition D2 (as defined into OMTP DISPLAYS v1.0 and OMTP CAMERAS v1.0)”.*

Within hardware requirements for a mobile handset: *“The handset SHALL have a OMTP front camera capable of OMTP definition CS1 (as defined into OMTP CAMERAS v1.0) and a back camera capable of OMTP definitions CV2 and CS2 (as defined into OMTP CAMERAS v1.0)”*.

2 DEFINITION OF TERMS

This chapter contains the definition of terms used in this document.

2.1 CONVENTIONS

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119] (see [1] in 8).

- **MUST:** This word, or the terms "REQUIRED" or "SHALL", means that the definition is an absolute requirement of the specification.
- **MUST NOT:** This phrase, or the phrase "SHALL NOT", means that the definition is an absolute prohibition of the specification.
- **SHOULD:** This word, or the adjective "RECOMMENDED", means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- **SHOULD NOT:** This phrase, or the phrase "NOT RECOMMENDED" means that there may exist valid reasons in particular circumstances when the particular behaviour is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behaviour described with this label.
- **MAY:** This word, or the adjective "OPTIONAL", means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation that does not include a particular option **MUST** be prepared to interoperate with another implementation that does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option **MUST** be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides).

3 CAMERA SYSTEM

The camera system includes optics, sensor and image processing such that the data is presented in a usable form to the codec interface. The camera system is expected to support the codecs and displays identified in OMTP work streams P4T1 (Displays) and P4T2 (Codecs).

In this section, the parameters for camera are listed.

3.1 STILL IMAGE

RESOLUTION	Resolution of the camera system for capturing Still Image: 'A' x 'B' active pixels. It represents the capturing resolution of the camera system. The camera SHALL be able to be configured to support this resolution (but may also support higher resolutions). This resolution is prior to any zoom has been applied.
MINIMUM FOCUS DISTANCE	Cm. The camera system SHALL be able to take sharp images (see 6) from this distance to infinity. (Focus may be fixed or variable.)
HORIZONTAL FIELD OF VIEW	Degrees. The camera system SHALL have at least this field of view.
ZOOM MULTIPLIER	Zoom from maximum field of view (i.e. focal length x zoom). The camera system SHALL have at least this zoom capability. Note: the type of zoom (optical or digital) is <i>not</i> specified.
MINIMUM SCENE ILLUMINATION	Minimum scene illumination to give acceptable image quality.

3.2 VIDEO CAPTURE

RESOLUTION	<p>Capturing Resolution of the camera system for video: 'A' x 'B' active pixels.</p> <p>It represents the capturing resolution of the camera system for video capture. The camera SHALL be able to be configured to support this resolution (but may also support higher resolutions).</p> <p>This resolution is prior to any zoom has been applied.</p>
FRAME RATE	<p>Minimum frames per second.</p> <p>The camera system SHALL be able to be configured to capture video at this rate at the resolution defined in the same class.</p>
MINIMUM FOCUS DISTANCE	<p>Cm.</p> <p>The camera system SHALL be able to take <i>sharp videos</i> (see 6) from this distance to infinity. (Focus may be fixed or variable.)</p>
HORIZONTAL FIELD OF VIEW	<p>Degrees.</p> <p>The camera system SHALL have at least this field of view.</p>
ZOOM MULTIPLIER	<p>Zoom from maximum field of view (i.e. focal length * zoom).</p> <p>The camera system SHALL have at least this zoom capability.</p> <p>Note: the type of zoom (optical or digital) is NOT specified.</p>
MINIMUM SCENE ILLUMINATION	<p>Minimum scene illumination to give acceptable image quality.</p>

4 USE CASES

In this section some example cases are provided to explain the purpose of this document.

4.1 USE CASES

UC1: USER SERVICE PERCEPTION

Nigel wants to use his operator's new service "View & Send" based on sending a video previously recorded with the camera. Fabio receives the video but the resolution is not very good. Fabio calls his operator's customer service wanting to know why.

Marta and Fabio are having a video call. Marta's picture of Fabio is very good but Fabio sees low quality video. Fabio calls his operator to understand the reason for the problem. He doesn't receive a satisfactory answer so he calls his mobile terminal provider to complain about the mobile handset.

In a video call, Marta prefers to have the video just showing her face but Mike likes to be able to show a wider view. Carl wants to send an image of the landscape.

Carl wants to use his operator's new service "View Call" with Magnus. The video quality is lower than expected. Carl and Magnus call their operator's customer service to understand why that was.

UC2: APPLICATION PORTING

Jarmo downloads an application from his operator's site. He launches the application but the application requests minimum camera characteristics not met by the handset camera.

4.2 INDUSTRY USE CASES

UC3: Fragmentation and segmentation

Fabio, an application developer from an operator, is going to deploy his brand-new "personal video exchange" application. He has to adapt the application to a great variety of mobile terminal cameras. So, he decides to support only some mobile terminals. Fabio's head of marketing is very angry with him: the service can only be fully used by a small percentage of customers!

UC4: Integration on a terminal

Ingolf, a chip architect, is going to design a new video encoder. He requests details of the required quality from Fabio in a telecoms operator service division and designs the chip to meet the requirements. The chip is used in a new cellular terminal in conjunction with a certain camera. The quality is lower than expected. Fabio asks Ingolf "Where is the problem ?"

5 CLASS VALUES

The following sections define some camera classes. The classes can be used as referred in 1.2.

5.1 CAMERA CLASSES

In this section, the camera classes within OMTP are defined. C0 is for handsets without a camera, CV1 and CV2 define video capture and CS1, CS2 and CS3 define still image capture. A camera must be compliant to one video capture class and one still image class (or have no camera at all – i.e. C0). A handset that contains two cameras should specify the OMTP video class and the OMTP still class for each camera.

5.1.1 CAMERA OMTP C0

This class indicates that the handset does not include a camera.

5.1.2 CAMERA OMTP CV1

RESOLUTION: SHALL SUPPORT BOTH	176x144 (QCIF) 128x96 (SQCIF) 88x72 (QQCIF)	352x288 (CIF)
FRAME RATE	30 FPS AT QCIF	15 fps at CIF
MINIMUM FOCUS DISTANCE	25 CM	
HORIZONTAL FIELD OF VIEW	54 DEGREES ± 15%	
ZOOM MULTIPLIER	N/A	
MINIMUM SCENE ILLUMINATION	10 LUX	

5.1.3 CAMERA OMTP CV2

RESOLUTION	640x480 (VGA)
FRAME RATE	15 fps
MINIMUM FOCUS DISTANCE	25 cm
HORIZONTAL FIELD OF VIEW	54 degrees ± 15%
ZOOM MULTIPLIER	4x
MINIMUM SCENE ILLUMINATION	10 lux

5.1.4 CAMERA OMTP CS1

RESOLUTION	640x480 (VGA)
MINIMUM FOCUS DISTANCE	25 CM
HORIZONTAL FIELD OF VIEW	54 DEGREES ± 15%
ZOOM MULTIPLIER	4X
MINIMUM SCENE ILLUMINATION	5 LUX

5.1.5 CAMERA OMTP CS2

RESOLUTION	1280x1024
MINIMUM FOCUS DISTANCE	50 CM
HORIZONTAL FIELD OF VIEW	54 DEGREES ± 15%
ZOOM MULTIPLIER	6X
MINIMUM SCENE ILLUMINATION	8 LUX

5.1.6 CAMERA OMTP CS3

RESOLUTION	1600x1200
MINIMUM FOCUS DISTANCE	10 CM
HORIZONTAL FIELD OF VIEW	54 DEGREES ± 15%
ZOOM MULTIPLIER	6X
MINIMUM SCENE ILLUMINATION	10 LUX

6 FURTHER WORK

The next release of this document will address:

- Camera system quality issues.
- Higher resolutions (including 3Mpixel and above).

7 ABBREVIATIONS

ABBREVIATION	DESCRIPTION
OMTP	Open Mobile Terminal Platform
fps	Frames per second
CIF	Common Intermediate Format [352x288]
QCIF	Quarter Common Intermediate Format [176x144]
SQCIF	Sub Quarter Common Intermediate Format [128x96]
QQCIF	Quarter Quarter Common Intermediate Format [88x72]
VGA	Video Graphics Array [640x480]

8 REFERENCED DOCUMENTS

No.	DOCUMENT	AUTHOR	DATE
[1]	RFC 2119 - Key words for use in RFCs to Indicate Requirement Levels	IETF documents	March 1997
[2]	OMTP DISPLAYS – Definitions and Requirements	OMTP P4 – HW Project	March 2005