

# The SpeedTags™ Camera Solution

## SpeedTags Camera SDK and SpeedTags™ - For instant picture capture.

### **1 Summary: Instant viewing, zero shutter lag**

Using Scalado's SpeedTags™ Camera Solution, photographers using a camera phone can instantly capture multi-megapixel images, without any shutter lag, freezing the moment of capture. Users can then instantly zoom into the resulting JPEG images to review the details of the image. This gives greater freedom to photographers and enhances a whole variety of camera phone functions, including burst and panorama.

The SpeedTags Camera Solution enables instant random access to the captured JPEG, allowing unprecedented JPEG handling performance by applications using the CAPS imaging suite. It also enables quick SpeedView metadata creation for faster image browsing in the photo album.

#### **1.1 About Scalado CAPS™**

The Scalado CAPS™ SDK enables device manufacturers to provide stunning imaging applications at a fraction of normal development costs and with minimal use of valuable memory. Scalado CAPS is the most effective and powerful imaging tool for mobile camera phones on the market today.

CAPS solve the problems of image processing in multi-megapixel camera phones. With CAPS, instant viewing, cropping and adding special effects are just a click away. Users get instant feedback, making photo applications sticky and appealing.

#### **More speed, less memory**

CAPS include a highly efficient JPEG Codec (Scalado RAJPEG™) that is up to 10 times faster than standard libraries. The image processing engine in CAPS decreases demands on RAM (heap) memory by up to a factor of 25x, freeing up valuable memory capacity to perform other functions.

#### **The CAPS advantage**

CAPS includes a full set of tools, software libraries, reference applications such as album and editing, sample code and documentation. Using CAPS, software engineers can develop sophisticated imaging applications for mobile devices at a fraction of the time and cost, enhancing products and creating a real imaging advantage.

## 2. SpeedTags Camera Solution products

The **SpeedTags Camera Solution** is based on two products:

- The **SpeedTags™**, a minimal modification to the HW JPEG Encoder that enables the encoder to produce modified JPEG images, referred to as **SpeedTagged JPEG images**. SpeedTags allow images to be processed significantly faster than normal JPEGs. SpeedTags are automatically removed as soon as the image has been processed. This modification requires an insignificant number of additional gates, and hardly any further expense from a silicon perspective.
- The **SpeedTags Camera SDK** uses SpeedTagged JPEGs for providing high performance camera functions. It enables zero shutter lag, instant viewing, zooming and panning, powerful burst mode viewing, and quick SPMO (SpeedView meta object) generation for ultra-quick use of CAPS functions-.

### 2.1 The SpeedTags™ - creating Speed tagged JPEGs

SpeedTags modify a JPEG to make it much faster to process. The image that is finally saved to the disk has already had SpeedTags removed, while relevant information for speeding up the next decoding of the image is moved to its header as an SPMO (SpeedView meta object). This results in a fully compatible JPEG image being very fast to process.

### 2.2 The SpeedTags Camera SDK

The Scalado Camera Engine currently consists of 2 modules designed for processing of SpeedTagged JPEG images:

- Zero Shutter Lag Module
- CAPS Acceleration Module

#### 2.2.1 Zero Shutter Lag Module.

This module uses the SpeedTagged JPEG format to view a stream of megapixel images decoded to the screen in real-time. This allows users to capture the exact picture they see, removing any shutter lag. It also enables advanced capturing modes, allowing storing and viewing of megapixel images from a time point before capture. This high performance lets developers build really user-friendly applications that require instant capture and viewing.

#### 2.2.2 CAPS Acceleration Module

This module rapidly creates SPMOs using SpeedTagged JPEGs. The final product is a regular JPEG image with the SPMO placed in the header. The SPMO can then be used to initiate a CAPS session for immediate processing of the JPEG image in CAPS. The SPMO can be stored in the JPEG header or anywhere else in the file system enabling users to instantly view or process the image at a later stage, for instance in an album.

## Super-fast processing thanks to SPMO

SpeedTags accelerate the processing speeds of images by instantly creating SPMOs. This means that the metadata is already available for processing at the moment of capture.

The results are instant and greatly increase user satisfaction thanks to direct feedback when using View, Capture, Burst or Panorama modes in their phones.

This unique method of processing images enables bursts of large megapixel images in full frame rate while quickly allowing zooming and panning into the details of the individual images.

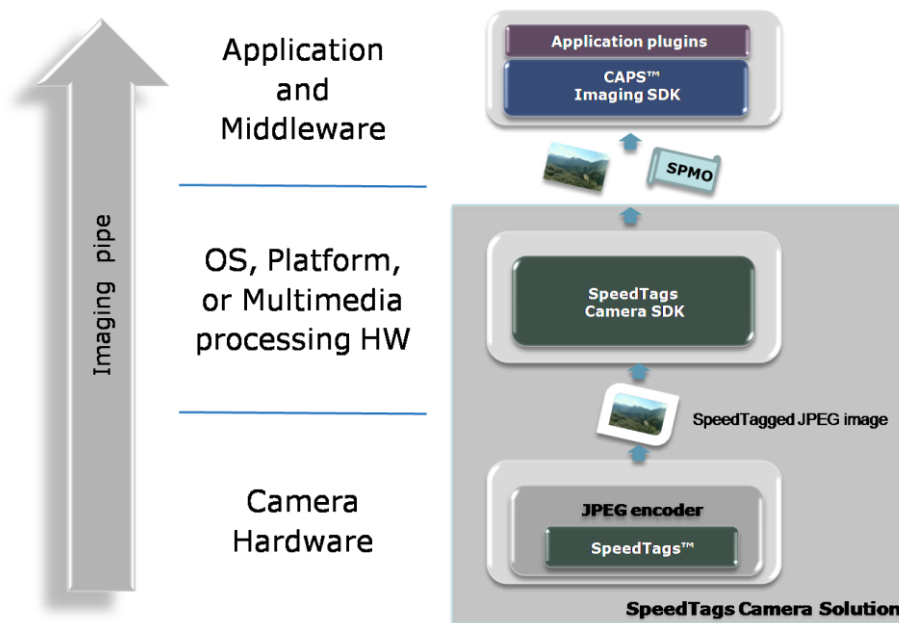


Figure. SpeedTags Camera Solution with SpeedTags in the encoder and SpeedTags Camera SDK in the ISP also enabling accelerated CAPS performance.

## 3. End user Benefits

Thanks to SpeedTags Camera Solution, manufacturers can now offer real-time viewing and capturing of high-resolution images, totally eradicating shutter lag. Now, users really can take a picture of a sporting event, not a picture of concrete after the sports car has already passed.

The SpeedTags Camera Solution offers the following advantages:

- Enables viewing of captured JPEG images with instant zoom and pan.
- Zero shutter lag. Instant viewing and zero shutter lag let users take pictures of exact images as they see them.
- Capture and view full-resolution burst of images instantly.
- Burst mode: The streaming and displaying of large megapixel images in full frame rate enables capturing and viewing of images from a time point BEFORE the user hits the capture button.

## 4. Implementation

Implementing the CAPS Acceleration module of the SpeedTags Camera SDK is straightforward. It takes the SpeedTagged JPEG as an input and creates a regular JPEG together with an SPMO, much like the CAPS SDK would do based on a regular JPEG. The only difference is that the process becomes much quicker

The Zero Shutter Lag Module poses a bit more requirements on the underlying platform; it requires a platform that supports data-rates of up to 10-20mb/s, and a CPU powerful enough to run the Zero Shutter Lag code.

### Enabling speed tags

SpeedTags are enabled by making minor modifications to the JPEG encoder hardware, allowing it to encode SpeedTagged JPEGs. Complete technical specifications and verification tools are provided by Scalado, as well as any support during the integration and test period.

## 5. About Scalado

Scalado is a leading provider of high-performing imaging technologies, applications and engineering services for the camera phone industry. We work closely with our customers to provide them with high performing imaging software products and expertise to make mobile imaging more efficient and valuable for their end-users.

Our solutions enable mobile phone manufacturers to increase to multi-megapixel resolution, while enjoying high performance and a great user experience. Our technologies and products are platform independent and easy to port to any OS and application. We also offer superior, attractive imaging features that differentiate their products from their competitors.

We have developed CAPS<sup>™</sup>, a unique software imaging platform that is considerably more CPU and memory efficient and drastically decreases processing times when performing imaging tasks.

To meet our customers' future requirements we invest extensively in R&D and lead market development in mobile imaging. By selecting Scalado as a solution and development partner mobile phone manufacturers are assured an imaging advantage through superior technologies, greater end-user appeal and reduced development costs.

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