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Author(s)	Corcoran, Peter
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Digital Imaging Services Using PTP (Picture Transfer Protocol)

Petronel Bigioi ¹⁾

Peter Corcoran, George Susanu ²⁾

1) Dept. of IT, National University of Ireland, Galway

2) FotoNation Ltd., Galway, Ireland

Abstract

Interconnectivity of digital camera with other devices seem to be one of the main concern of consumers and digital camera manufacturers. Interconnectivity features in digital cameras provide, before hand, better usage of digital cameras. More over, with the adequate application layer software, the digital photographs could go directly from camera to desired target: disk, printers, web sites, e-mail or web prints, using just one communication protocol: PTP.

Introduction

Digital photography is gaining day by day more and more credibility over conventional photography due to a number of factors easy to guess (no development costs, no film costs, easy to preview the picture before printing, easy sharing, easy portability, easy presentation in a number of different formats, etc...). Still, amazingly, the conventional photography is having more credibility from the consumers point of view, in other words, the conventional cameras are selling better than the digital cameras. This paradox is possible just because the digital photography manipulation (starting from the acquisition process to the print) is too difficult and too targeted towards PC users.

A couple of years ago each digital camera manufacturer had its own specific communication protocol to access and control a digital still camera. Method had a number of disadvantages: the camera manufacturer had to provide device drivers for all the operating systems and hardware platforms that they wanted to support and therefore, added costs in the digital camera selling price. On the other hand, the users were required to have a certain degree of technical abilities in order to understand the whole mechanism.

Even if the above method still exists, now days, the most popular approach is to make the digital camera look like a storage device whenever attached to a PC or embedded system. Even if this method become shortly a success and more and more camera manufacturers adopted it, soon enough, a number of downsides and limitations started to emerge. First of all, the digital camera is able to deliver pictures when attached to the PC. The second problem was that the camera turned to be a pooled device. An upload process from the digital camera to the PC or receiving device was not possible using the mass storage approach.

Another downside of this approach is that there is no way of controlling the digital camera using the mass storage solution. Of course, once more, a number of custom solutions emerged, starting again chaos in the connectivity of the digital cameras.

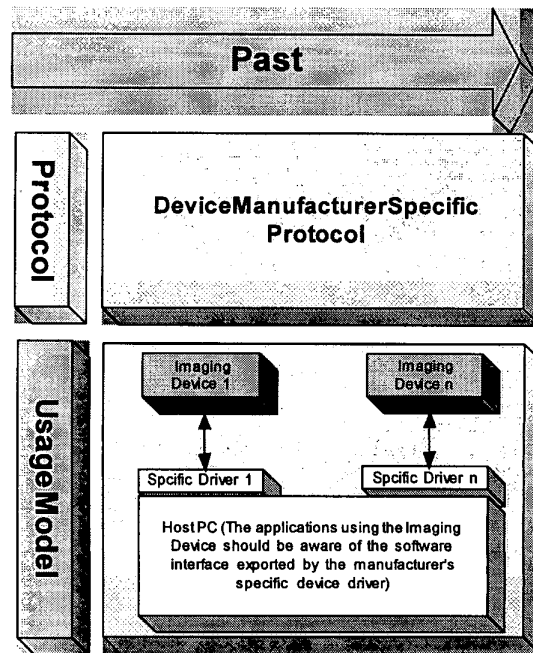


Figure 1: DSC Communication Protocols - Past

Standardizing the operations and data requirements for still imaging devices will assist transport implementers, platform aggregation of conforming devices across all transports, and device manufacturers by providing a common ground for interface support. It will also assist developers of host software and image receiving devices by ensuring that their products can interface to many different imaging devices from different manufacturers, and assist users by ensuring that the imaging devices they purchase will inter-operate with those of different manufacturers.

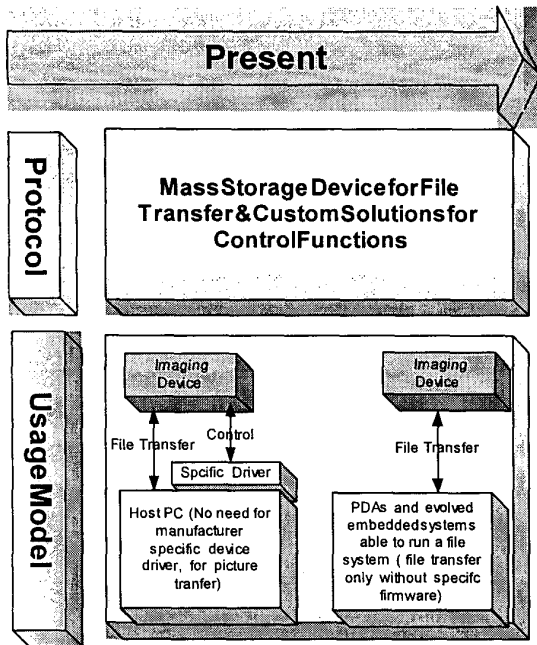


Figure 2: DSC Communication Protocols - Present

This paper will describe a recently emerged standard (Picture Transfer Protocol or PIMA 15740) for connectivity of digital still photography devices that intends to replace and unify the communication between still imaging devices and other receiving devices (such as PC but not only). Most imaging devices include hardware interfaces that can be used to connect to a host computer or other imaging devices, such as a printer. A number of new, high-speed interface transports have recently been developed, including IrDA, USB, and IEEE1394. This standard is designed to provide requirements for communicating with still imaging devices. This includes communications with any type of device, including host computers, direct printers and other still imaging devices over a suitable transport. The requirements include standard image referencing behavior, operations, responses, events, device properties, datasets, and data formats to ensure interoperability.

One of most interesting facts about the PTP standard is that provides optional operations and formats, as well as extension mechanisms, allowing digital camera manufacturers to use the communication standard even if they want to implement custom behavior for their imaging devices. This standard has been designed to appropriately support popular image formats used in digital still cameras, including the EXIF and TIFF/EP formats defined in ISO 12234-1 and ISO 12234-2, as well as the Design Rule for Camera File System (DCF) and the Digital Print Order Format (DPOF).

This paper will provide detailed explanation of the following main issues:

- Description of the PTP protocol as a common protocol for any device to exchange images with still imaging device, either by retrieving images from it or by sending images to it.
- Presentation of the mechanism for devices to control the imaging devices (e.g. a PC can request that a digital still camera change its shutter duration setting and capture a new picture) and the ability to transfer auxiliary information such as non-image data files and associated information, such as a digital print order file (DPOF).
- Usability models (push and pop models) and usage scenarios (a number of typical usage scenarios for the two typical usage models).
- PTP protocol transport requirements and practical examples using the USB transport. Operating systems support for PTP USB devices.
- Proposal for PTP implementations over wireless transports. Transport specific issues and solutions.
- Imaging devices as Internet connected devices using PTP protocol mapped on TCP/IP protocol. Firewalls, authentication and security issues and solutions.

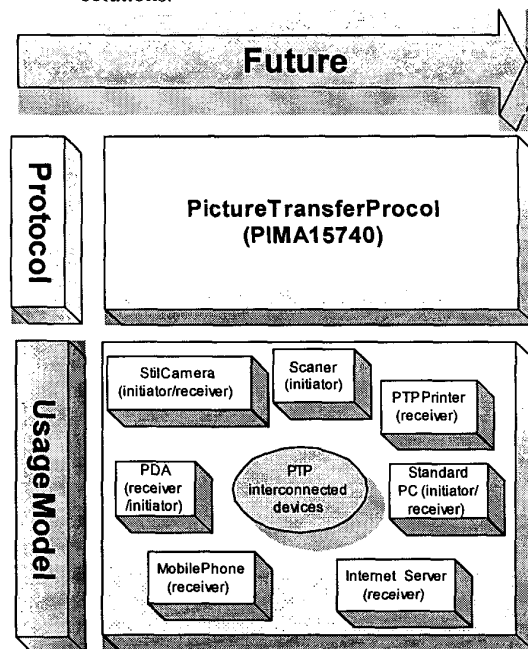


Figure 3: DSC Communication Protocols - Future