the decisions made in designing the file format, they may not even be designed to reproduce the same visual appearance of a page or part of a page. Facility for this kind of backward compatibility is built into the XPS specification, even though that is only in its first version at the time of writing.

[0016] Even where the intention is to represent the same visual appearance in different versions of the PDL, the fall-back to the older version of the spool file format may, for instance, involve representing the appearance of a new feature as a pre-rendered raster. Such a raster will have an implicit or explicit resolution (in dots per inch or equivalent unit), color depth (the number of color levels in any one pixel for any one colorant) and color space (e.g. RGB, CMYK etc). In such cases the specifications involved will set out the behavior to be followed by a consuming application (such as a printing device) that only supports an older version of the PDL, and that behavior will include the use of fall-back structures.

[0017] As an example, the XPS specification (v1.0), section 2.3.1 references the Ecma International standard "Office Open XML Part 5: Markup Compatibility and Extensibility." (This standard is in the process of adoption as an ISO standard at the time of writing). Section 9 of that standard describes the technical approach of including fall-back structures, using a variety of versions of a specification. Example 9-1 and FIG. **9-1** explicitly show that the fall-back structures may produce different printed results for devices conforming to different versions of the specification.

[0018] If such a raster is created without complete knowledge of the capabilities, requirements, and configuration of the printing device it is unlikely to result in the highest possible quality of rendition when a document is printed. It is even less likely to visually match other areas of the document or page that should appear in the same color on the print, but that are rendered by the RIP on the printing device's embedded controller card.

[0019] In addition, many RIPs for office printing devices utilize information about the type of object which makes each mark on the page. Vector fills, for instance, may have different halftone screens applied to them from images, and image data may be automatically reviewed and improved, e.g. by enhancing contrast.

[0020] Thus the use of fall-back structures to provide compatibility for changes in PDL versions is likely to be an imperfect solution.

BRIEF SUMMARY

[0021] One embodiment is a method of providing backward compatibility for a newer version of a page description language to a system comprising a computer and a printer coupled to the computer, where the printer is configured and arranged for operation with an earlier version of the page description language and has not been updated for the newer version of the page description language. The method includes providing an updated printer driver with a component that incorporates information about the printer to convert a file in the newer version of the page description language into a file in the earlier version of the page description language while substantially retaining a same visual appearance of the file when printed and compared to the file printed by a printer configured and arranged to print the file using the newer version of the page description language. The updated printer driver is stored on the computer.

[0022] Another embodiment is a method of printing a document encoded in a newer version of a page description language using a system comprising a computer and a printer coupled to the computer, where the printer is configured and arranged for operation with an earlier version of the page description language and has not been updated for the newer version of the page description language. The method includes converting the document from the newer version of the page description language to the earlier version of the page description language using an updated printer driver that comprises a component for converting the document that incorporates information about the printer and substantially retains a same visual appearance when printed and compared to the document printed by a printer configured and arranged to print the document using the newer version of the page description language. The document, as converted using the updated printer driver, is printed using the printer.

[0023] Yet another embodiment is a computer-readable medium having processor-executable instructions for printing a document encoded in a newer version of a page description language using a system comprising a computer and a printer coupled to the computer, where the printer is configured and arranged for operation with an earlier version of the page description language and has not been updated for the newer version of the page description language. The processor-executable instructions when installed onto a system enable the system to perform actions including i) converting the document from the newer version of the page description language to the earlier version of the page description language using an updated printer driver that comprises a component for converting the document that incorporates information about the printer and substantially retains a same visual appearance when compared to the document printed by a printer configured and arranged to print the document using the newer version of the page description language; and ii) providing the document to the printer.

[0024] A further embodiment is a system that is operative to print a document encoded in a newer version of a page description language. The system includes a printer configured and arranged for operation with an earlier version of the page description language, where the printer has not been updated for the newer version of the page description language; and at least one processor coupled to the printer for executing processor-readable instructions that enable actions, including converting the document from the newer version of the page description language to the earlier version of the page description language using an updated printer driver that comprises a component for converting the document that incorporates information about the printer and substantially retains a same visual appearance when printed and compared to the document printed by a printer configured and arranged to print the document using the newer version of the page description language.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Non-limiting and non-exhaustive embodiments of the present invention are described with reference to the following drawings. In the drawings, like reference numerals refer to like parts throughout the various figures unless otherwise specified.

[0026] For a better understanding of the present invention, reference will be made to the following Detailed Description, which is to be read in association with the accompanying drawings, wherein:

[0027] FIG. **1** is a schematic diagram of one embodiment of a system for printing documents, according to the invention;

[0028] FIG. **2** is a flow chart illustrating schematically one embodiment of a method of printing a document;