# AXS
# File
# Concatenation
# Protocol

Following is a brief explanation of the AXS File Concatenation Protocol (AFCP). The specification, in its simplest form, calls for the addition of a small "package" of information to the end of any image file, like sticking a label on the back of a photograph. This package is an unambiguous, reliable and easily digestable method of enabling a wide range of image browsing and management tools. As you will see, the package is only a label. It assumes nothing about the image data itself and is neither destructive nor redundant to it.

Although this material is copyrighted, please feel free to distribute it. The AFCP has been established in order to facilitate everyone's management, use and distribution of images.

## Abstract

Image content providers and users need a simple, speedy, and unambiguous method for binding IPTC-ANPA data, thumbnails, previews, and other information to image files. Image management software needs this information for routing, selection, display and output of these images. The method used to attach this data should, ideally, be cross-platform. AXS proposes a file concatenation protocol as an immediate solution.

## Background

The proliferation of large digitized image files has created an urgent need for image management software. Until recently, users could only manage their files by naming them at the DOS prompt or grouping and naming them in Apple's Finder™. While these solutions are simple, they are necessarily ambiguous due to the idiosyncrasies of each individual's naming convention scheme. Worse, their usefulness extends only as far as that naming scheme's acceptance.

Currently, when an image database "acquires" an image file, it must image the entire file and resize it to create a thumbnail image and then allocate disk space for the desired information fields. Further, when traditional database management techniques are applied to image files, the user must enter considerable data about each image to enable those management capabilities. While this data is available when the file is created, e.g., the photographer in the field is the only one who knows what he has just photographed, there has been no standard method to bind that knowledge, that information, to the image file.

While some image editing applications permit the storing of thumbnail and caption data in their data files, they do not guarantee that this additional data is concurrent with the file. It is not uncommon to find files whose thumbnails and captions are no longer valid.

Another problem stems from the fact that on the Macintosh, many file formats utilize the Macintosh resource fork to store both required pixel information and data. For example, Photoshop™

stores image size, depth and mode in a resource.  This information is easily lost and not readily available to DOS applications.

These problems could be solved by a wholesale conversion of files to the IPTC-ANPA format.  Realistically however, an industry solution must take into account the existing mass of image files, the persistent need for proprietary file formats, the limited ability of users' applications to support various file formats and the simple desire for image managers to manage their collections at a high level, without needing a file editor to identify them.

## Solution

**AXS File Concatenation Protocol (AFCP)**
AXS proposes the attached AFCP format as a reliable means for image files to pass IIM, non-pixel DNPR and other data to applications which otherwise would be unable to image the pixel data of the file itself.

AXS supports the IPTC-ANPA Information Interchange Model (IIM), as well as the IPTC-ANPA Digital Newsphoto Parameter Record (DNPR). IIM clearly specifies the protocol for content providers to format subject, byline, keywords, location, dates, etc. DNPR provides the format for describing the pixel data itself. While it may be premature to expect users to have DNPR image readers, AXS supports the capture of this protocol's binary descriptor fields, e.g., if the image is gray scale or RGB.

Rather than convert all existing pictures to pure IPTC-ANPA format, AFCP will support the simple addition of relevant IIM/DNPR data to existing image files.  Content providers should be able to add this relevant data to their proprietary formats with the confidence that subsequent AFCP-aware management software will correctly identify, sort, and distribute their images.

**TIFF**
Aldus Corporation's Tagged Image File Format provides a fully documented cross platform standard for image files.  In fact, TIFF currently is a *de facto* cross platform standard.  Unfortunately, the utility of the TIFF file format is achieved at the expense of the

required complexity of the TIFF readers.  It is not uncommon for a syntactically perfect TIFF file to be unreadable to even the most versatile TIFF reader.  Therefore, any TIFF reader always makes decisions before reading a TIFF file as to which TIFF files it supports.

To assist those content providers already distributing images in TIFF format, a new tag has been established for IIM and non-pixel DNPR data:

**ANPAheaderTIFFtag_SEG 34152** (Hex 0x8568)

This method is presented to inform content providers who are committed to the TIFF format that they may include IPTC-ANPA information without following our protocol, by utilizing this tag. This tag has already been registered by Aldus, is currently supported by AXS, and is in fact redundantly referenced in the AFCP when the source file type is TIFF.

The two methods described, AFCP and TIFF are neither mutually exclusive nor are they redundant as far as the IPTC data is concerned. **AFCP can lay transparently on top of existing TIFF files.** The TIFF file format can still be the standard means for describing image files. The AFCP tag can point to the same IPTC data as the TIFF tag. So, the "Image File" portion of the protocol could be a TIFF with the IPTC-ANPA tag. The AFCP simply provides another route to that data, just as the mouse and keyboard provide alternate ways to initiate the same action. The end result is the same.

AXS File Concatenation Protocol (AFCP) makes no assumptions about the image file itself, which may be, but is not limited to, a TIFF. Any kind of image data may occupy that space. Our data is added to the end of the existing file (concatenated) just as a label is added to the back of a picture. One need never ask, "What's this?" Simply turn the picture over and look at the label. Minimal programming can make use of the Thumbnail, Preview, and information included, on either an IBM or Macintosh platform. Currently, in order for the Thumbnail and Preview to be cross-platform, we support simple uncompressed RGB or Gray scale pixel data. The addition of data via AFCP is wholly reversible and fully compatible with TIFF file format.

**File Layout Synopsis**

AFCP simply indicates that the reader application should locate a record guaranteed to be at the end of an image file. That record then points back into the file to a sister record. If the application finds that sister record, subsequent records point to simple defined data objects. These data objects currently include:

"Text" for simple captions or slugs for those unable or
unwilling to fully support the IPTC-ANPA Information
Interchange Model;

"Nail" for a small, fast reproduction (e.g., 128 x 128 pixels) of
the full-resolution file;

"PrVw" for a somewhat larger (e.g., 512 x 512 pixels) view of
the full-res... file that might be used for placement (OPI,
DCS) or cropping;

"IPTC" for as much of the IIM/DNPR packed record as the
content provider wishes.

# Conclusions

We believe that our protocol is both more flexible and reliable, as well as less ambiguous than the TIFF format by itself. More flexible because we can rapidly and seamlessly respond to a whole range of future data needs, and accommodate more specific transmission data without the necessity to develop and register official TIFF tags with Aldus. More flexible because the pertinent information, Thumbnail and Preview can be used without the necessity of reading the source file or parsing the TIFF tags. For example, programs that cannot read TIFF files, or image PostScript files, CMYK separations, Group 4 CCITT transmissions or any other format for that matter, can still manage, use and distribute these files if the AFCP is followed. We believe our protocol is more reliable because we provide for repeated checksum verification of critical record data. Finally, the AFCP is less ambiguous than TIFF from an image management point of view, because it points to a limited set of simple, pre-defined data objects (such as a Thumbnail or Preview) within the file. These data objects are specifically designed to serve the needs of image management, display, distribution and output, rather than simply display.

**Technical Specification/Source Files**
AXS will make available applicable data definitions for any vendor who wishes to support AFCP. The AFCP has been established with an eye toward facilitating everyone's management, use and distribution of images.

# AXS File Concatenation Protocol

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AFCP Start Tag Record

EOF Record

Image File

Previous EOF

Points to AFCP Header

Points to AFCP data

| A | X | S | ! |

Validation flag ∗

version (2 byte integer)

AFCP Record Count (2 byte integer)

Reserved for validation

| A | X | S | ! |

Validation flag ∗

Start Tag offset (4 byte long integer)

Reserved for validation

Data Set Identifier (ASCII characters)

Byte Count (4 byte long integer)

Offset (4 byte long integer)

∗ AXS! = binary data is in Motorola byte order

AXS* = binary data is in Intel byte order

## Predefined Data Sets:

1) | T | E | X | T | Byte Count is the actual number of ASCII characters; Offset is position relative to beginning of file.

2) | N | a | i | l | & | P | r | V | w | Byte Count is the size of the record. Thumbnail & Preview Data Set Records both point to identical structures.

Version 1 Record Format ⟶

Record Version

Image width

Image height

Image Data Type

Reserved bytes

Image Data

3) | I | P | T | C | Byte Count is the size of the entire IPTC-ANPA Information Interchange Model / Digital Newsphoto Parameter Record data.