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Picture this - APE-FC-2 and ARINC818

ARINC818 at a Glance - by Joachim Schuler and Marco Maier

The ARINC818 Specification defines a digital video link that is used for uncompressed video data transmission.

This Specification enables Avionics Display manufacturers to choose the video format that best suits their Application. Video formats can differ in their Frame Rates, resolution, pixel density, and interlacing techniques which drive the required data rates. Different classes of video transmission are defined, which vary from simple asynchronous to pixel synchronous video transmission which require corresponding display capabilities. On ARINC818 the large contiguous video frame data are mapped onto a Fibre Channel connection. Each picture equates to one ADVB (Avionics Digital Video Bus) Container, which is transmitted within one Fibre Channel Sequence. For example, a XGA resolution video has a picture size of 1024x768 pixel, which means one line has 1024pixel, and the picture has 768lines. Each pixel needs three bytes for colour information, so one line has an overall size of 3072bytes. This exceeds the maximum payload size of a single FC frame, hence it is split into two frames with each 1536bytes, carrying half a line each. The complete picture data will be sent within 1536 FC frames, called the Object2, with an additional ADVB header frame, called the Object0.

continued overleaf: **Page 1 of 4**

Technical & Application Note

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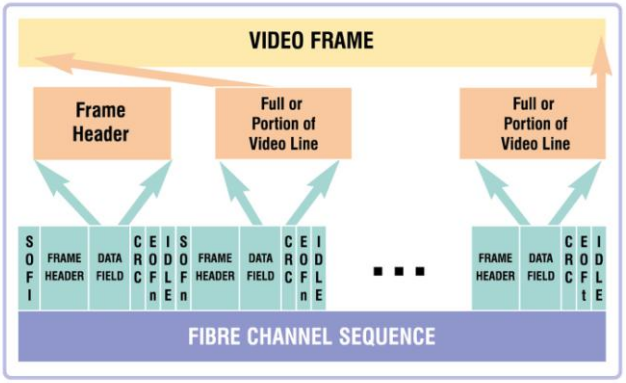

These frames are all packed with one FC Sequence. Each full picture is therefore a single FC Sequence as shown above. Receiving picture information is quite similar.

All necessary information for 're-assembly' of the picture data is contained within the leading Object0 frame, and within the FC Header of each Object2 frame. The receiver has to check each incoming frame for its position within the picture (based on a Sequence number) and of course for errors during the transmission. Placing now all the FC payload data of the Object2 frames of one Sequence in proper ordering will re-assemble the picture.

Beside the known APE-FC-2 Fibre Channel Layer 2 capabilities, which provide a comprehensive set of test and analysis possibilities, the APE-FC-2 offers full-function ARINC818 analyser capabilities now. These allow the user to handle ARINC818 traffic over Fibre Channel with a max. of 1GFC currently. That would basically allow the periodic transmission of 1024x768 pixel resolution with 24-Bit color depth and 40Hz refresh rate. With the new successor hardware APS-FC-2, available for later in 2013, data rates up to 4GFC will be possible, with S/W compatibility to the APE-FC-2. The Application Programming Interface (API) which is included in the board price, offers transmitter side functions to load single picture data or picture sequences and send them over Fibre Channel to drive ARINC818 capable devices/ display in real time.

continued overleaf: **Page 3 of 4**

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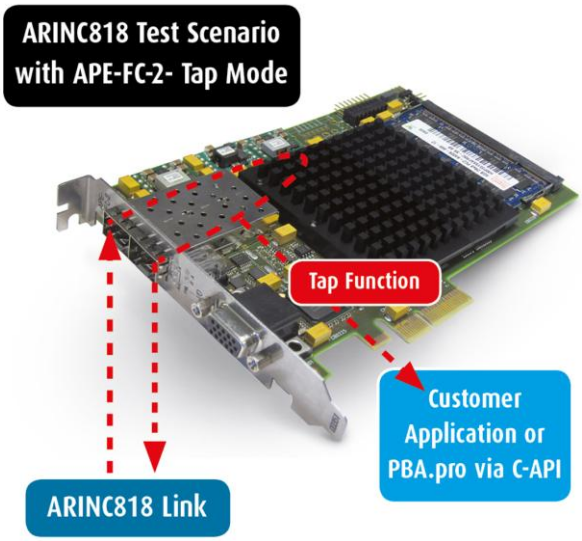

For example a single picture can be sent periodically with a S/W configurable refresh rate or simply acyclic (e.g. on application request). Same is also applicable for picture sequences which can be sent in a single shot or repetitive mode. In all modes it is possible to change or reload picture data during operation 'on-the-fly' while the board maintains picture data integrity and the configured refresh rates on the ARINC818 link accordingly. Import of picture data e.g. in Windows BMP/ DIB format for transmission is also supported by the API which also does the translation into the corresponding ARINC818 Object0/ Object2 format, required for transmission over FC. Application notification provisions, like call backs, are also offered to provide maximum on flexibility for customer applications.

Different modes on receiver side of the APE-FC-2 API offer great flexibility for analysing incoming ARINC data on Upper Layer Protocol (ULP) level as well as on Layer 2 level.

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Furthermore a receive mode for getting the latest received picture is also offered. A unique feature of the APE-FC-2 interface is the Tap mode which allows to 'insert' the interface into an existing connection e.g. between a generator and a display in order to tap-out ARINC818 data for monitoring, analysis and display purposes.

Finally to mention, that the PBA.pro™ will also support the ARINC818 modes of the APE-FC-2 via the ARINC818 Upper Layer Protocol option for the PBA.pro-FC-2 resource component, taking advantage from all PBA.proTM functions like Scripting, customised GUIs, etc. So the known scalability of the PBA.pro™ offers provisions for 'pure' ARINC818 based test, simulation and analysis solutions (including all FC Layer 2 capabilities) up to heterogeneous avionics data bus test systems with a seamless integrated ARINC818 functionality.

AIM Office Contacts:

AIM GmbH
Sasbacher Str. 2
79111 Freiburg
Germany

tel: +49 761 45 22 90
fax: +49 761 45 22 93 3
email: sales@aim-online.com

AIM UK
Cressex enterprise Centre
Lincoln Road
High Wycombe
Bucks, HP12 3RB
UK
tel: +44 1494 446844
fax: +44 1494 449324
email: salesuk@aim-online.com

AIM-USA
Seven Neshaminy Interplex
Suite 211,
Trevose, PA 19053
USA
tel: 267-982-2600
toll free: 877-520-1553
fax: 215-645-1580
email: sales@aim-online.com