

ICD

ARINC 818
ADVB Interface Control Document



**Template for system
interoperability**

ARINC 818 ICD Template

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ARINC 818 ICD Template

✓ **Purpose of this Template**

- ✓ This template is intended to streamline the effort in developing an Interface Control Document (ICD) for ARINC 818 links. With care, designers can use this template as a starting point to achieve a concise and complete ICD that ensures interoperability between all equipment built to that ICD.
- ✓ The template includes sections for important parameters that should be captured by the ICD. An effort was made to include all pertinent parameters required for compatibility, in more common ARINC 818 systems. However, for more complex systems, such as designs that use dual links, or multiple interlaced containers on a single link, there may be parameters not discussed.
- ✓ This template is intended for engineers sufficiently familiar with the ARINC 818 protocol who need to define a particular ARINC 818 implementation. For engineers unfamiliar with ARINC 818, it is best to review the ARINC 818 specification, the “ARINC 818 Implementer’s Guide”, and www.fcav.info and www.arinc818.com.

✓ **Reference Documents**

- ✓ The following ARINC documents should be reviewed in the ICD development effort:
 - ARINC Specification 818: Avionics Digital Video Bus*
 - ARINC Specification 801: Fiber Optic Connectors*
 - ARINC Specification 802: Fiber Optic Cable*
 - ARINC Specification 803: Fiber Optic System Design Guidelines*
 - ARINC Specification 804: Fiber Optic Active Device Specification*
- ✓ The following specifications are useful for reference:
 - Fibre Channel – Audio Video (FC-AV) (ANSI INCITS 356-2002, 25 Nov 2002)*
 - Fibre Channel – Framing and Signaling Interface (FC-FS) (ANSI / INCITS 373-2003)*
 - Fibre Channel – Physical Interfaces (FC-PI) (INCITS 352-2002)*

✓ **Notes for using the Template**

- ✓ In some instances the template includes blanks where parameter values are to be filled in. In these cases, example values are given; however, this ICD does not enumerate all possible values to be filled. Example values are italicized.

(Example: 850nm multimode fiber)

- ✓ In some instances, that template includes text that describes the intent of the section. This text is enclosed in brackets and is italicized.

{This section should contain ...}

- ✓ Where possible, referenced to the relevant ARINC 818 section are given in brackets.

[See ARINC 818 Section 4.2]

- ✓ The Template does not include a cover page, table of contents, revision blocks, or other boilerplate pages. These must be added such that they meet the documentation requirements of the particular organization developing the ICD.

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1 Physical Medium and Speed

Physical Medium _____ [See ARINC 818 Section 4.2]
Example: 850nm multimode fiber

Connector Type: _____
Example: LC type plug

Link Speed: _____ [See ARINC 818 Section 4.1]
Example: 2.125 Gbps

2 Video Parameters

2.1 Video Format

{This section should contain the basic attributes of the video being transmitted}

The ADVB shall have the following video format:

- Video Resolution [see ARINC 818, Figure 3]
 - Active Image Size: _____ pixels x _____ lines
 - Visible Image Area: _____ pixels x _____ lines
 - Image Offset: _____ pixels x _____ lines (from upper left)
- Scan: _____ [see ARINC 818, section 3.2.2.5.1.3]
Example: Progressive (left to right, starting at top)
- Frame rate: _____ Hz [see ARINC 818, Table 3]
- Pixel format: _____ [see ARINC 818, Table 5]
Example: RGB 8:8:8

2.2 Synchronization and Segmentation Class

{This section identifies the synchronization and segmentation class of transmitters and receivers. Transmitters may be restricted in the way that Object 0 data and video payload is packetized (segmentation). Transmitters may also be restricted in the timing of packet deliver, thereby reducing the complexity of the receiver (Synchronization)}

Asynchronous			Frame Sync.			Line Sync.		Pixel Sync.		
A1	A2	A3	B1	B2	B3	C1	C2	D1	D2	D3

[See ARINC 818, Attachment C]

- Transmitter: _____
- Receiver: _____

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2.2.1 Segmentation

{This section states explicitly the rules for segmentation}

All transmitted ADVB frames shall conform to the following segmentation rules for Object 0 and Object 2 & 3 video payload:

- The ADVB shall assign _____ containers per video image.
- Object 0 shall be segmented into the first transmitted ADVB frame in each Video frame
- Object 2/3 frames shall have:
 - _____ ADVB Frames total per container
 - _____ Video lines per FC Frame

2.2.2 FC Frame and Video Timing

{This section should specify all timing parameters associated with the ADVB packets as well as the timing of delivery of those ADVB packets}

[These timing requirements are explicit in, or derived from ARINC 818, Attachment B]

All transmitted ADVB frames shall conform to the following timing:

32 BIT CHARACTER TIME (ns)	
BYTES PER VIDEO LINE	
NUMBER OF LINES PER ADVB FRAME	
ADVB FRAME PAYLOAD SIZE (BYTES)	
NUMBER OF FC OBJ2 FRAMES	

The line synchronous timing shall be achieved using the following parameters:

INACTIVE LINES (VERT. BLANKING)	
Pre – FC 0	
Post - FC 0	
HORZ. LINE TIME (us)	
HORIZONTAL LINE RATE (KHZ)	
ACTUAL FRAME RATE(Hz) (with sync'ed lines)	

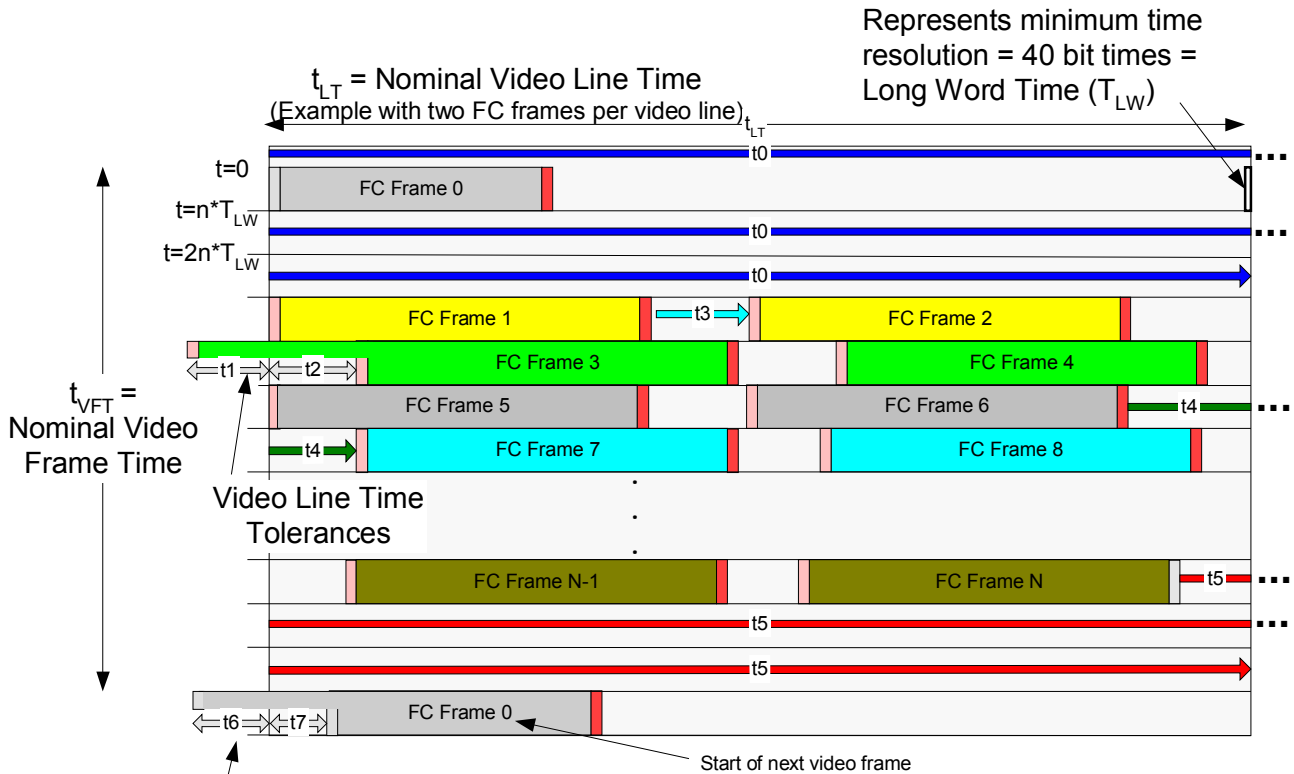
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The above parameters lead to the following times:
 [See ARINC 818, Attachment B]

TIMES

	Timing Parameters	TIME	32-bit CHAR COUNT	HORZ. LINES
	FC Frame 0 frame time (us)			
	FC Frame 1 frame time (us)			
t_{VFT}	Nominal Video Frame Time SOFi TO SOFi (ms)			
t_{LT}	Nominal Video Line time (us)			
t_0	SOFi TO SOFn(first) (us)			
t_1	Line Time Tolerance (-us)			
t_2	Line Time Tolerance (+us)			
	SOFn(first) TO SOFnlast (us)			
	SOFnlast TO SOFi (us)			
t_3	Intraline IDLEs (us)			
t_4	Interline IDLEs (us)			
t_5	EOFt TO SOFi (us)			
t_6	Video Frame Tolerance (-us)			
t_7	Video Frame Tolerance (+us)			

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- t_{LT} = Nominal Line Time
- t_{VFT} = Nominal Video Frame Time
- $t_0 = n_0 * T_{LW}$ time from SOFi to first SOFn (+/- Tol)
- $t_1 = n_1 * T_{LW}$ Video Line Tolerance (Faster than nominal)
- $t_2 = n_2 * T_{LW}$ Video Line Tolerance (Slower than nominal)
- $t_3 = n_3 * T_{LW}$ (intra~~line~~ idle OS) (+/- Tol)
- $t_4 = n_4 * T_{LW}$ (inter~~line~~ Idle OS - EOFn to SOFn) (+/- Tol)
- $t_5 = n_5 * T_{LW}$ (inter~~frame~~ Idle OS) (+/- Tol)
- $t_6 = n_6 * T_{LW}$ Video Frame Tolerance (Faster than nominal)
- $t_7 = n_7 * T_{LW}$ Video Frame Tolerance (Slower than nominal)
- nX = number of ordered sets
- Video Line Time = t_{LT} with tolerance of (-t1 or +t2)
- Video Frame Time = t_{VFT} with tolerance of (-t6 or +t7)

Note: Timing parameters may be fixed values or variable, depending on the class and implementation.

Definition of Timing Parameters from ARINC 818 Attachment B

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3 Ordered Sets

[See ARINC 818, section 3.4 and Table 15]

SOF Class: _____ (1 or 3)

Idle Characters: _____ (normal or low emissions)

4 Headers & Ancillary Data

{In this section, specific values for ADVB frame header and Object 0 data are defined}

4.1 ADVB Frame Header

{Values in the ADVB Frame header can be user defined, (indicated by xxxx), ARINC 818 required constants (indicated a binary value, like 0100), or unused (can be left 0000)}

[see ARINC 818, Section 3.3]

Word	Identifier	Byte 0	Byte 1	Byte 2	Byte 3
1	Frame Header	0100 0100 (R_CTL)	xxxx xxxx or 0000 0000 (Dest._ID)	xxxx xxxx or 0000 0000 (Dest._ID)	xxxx xxxx or 0000 0000 (Dest._ID)
2	Frame Header	0000 0000 (CS_CTL)	xxxx xxxx or 0000 0000 (Source_ID)	xxxx xxxx or 0000 0000 (Source_ID)	xxxx xxxx or 0000 0000 (Source_ID)
3	Frame Header	0110 0001 60h=FC-AV 61h=ADVB	0011 x000 (bit 19=END_SEQ) (F_CTL)	0000 000x (F_CTL)	0000 x0xx (F_CTL)
4	Frame Header	xxxx xxxx (SEQ_ID)	0000 0000 (DF_CTL)	xxxx xxxx (SEQ_CNT)	xxxx xxxx (SEQ_CNT)
5	Frame Header	1111 1111 (OX_ID)	1111 1111 (OX_ID)	1111 1111 (RX_ID)	1111 1111 (RX_ID)
6	Frame Header	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000

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4.2 Container Header

{Container Header Values indicated by xxxx must be established for the ARINC 818 implementation}

[See ARINC 818, Section 3.2]

Word	Identifier	Byte 0 (MSB)	Byte 1	Byte 2	Byte 3 (LSB)
0	Container Count	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
1	Clip ID	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000
2	Container Time Stamp	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000
3	Container Time Stamp	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000
4	Transmission Type	xxxx xxxx	xxxx xxxx	0000 0000	0000 0000
5	Container Type	0000 0000	0000 0100	0000 0000	0000 0000
6	Object 0 Class	0101 xxxx	xxxx xxxx or 0000 0000	1101 0000	0000 0000
7	Object 0 Size	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
8	Object 0 Offset	0000 0000	0000 0000	0000 0000	0101 1000
9	Object 0 Object Type Defined	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000	xxxx xxxx or 0000 0000
10	Object 1 Class	0100 0000	xxxx xxxx or 0000 0000	1101 0000	0000 0000
11	Object 1 Size	0000 0000	0000 0000	0000 0000	0001 0000 or 0000 0000
12	Object 1 Offset	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
13	Object 1 Object Type Defined	0000 0000	0000 0000	0000 0000	0000 0000
14	Object 2 Class	0001 0000	xxxx xxxx or 0000 0000	1101 0000	0000 0000
15	Object 2 Size	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
16	Object 2 Offset	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
17	Object 2 Object Type Defined	0000 0000	0000 0000	0000 0000	0000 0000
18	Object 3 Class	0001 0000	xxxx xxxx or 0000 0000	1101 0000	0000 0000
19	Object 3 Size	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
20	Object 3 Offset	xxxx xxxx	xxxx xxxx	xxxx xxxx	xxxx xxxx
21	Object 3 Object Type Defined	0000 0000	0000 0000	0000 0000	0000 0000

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4.3 Ancillary Data

{ Assumes “standard” sized ancillary data of 16 bytes. If the size of the Ancillary data is extended, as set by the Object 0 size in Word 7 of the container header, then additional bytes will need to be defined. Ancillary data can also include items such as palette data or cursor control data }

[See ARINC 818, Section 3.2.2.5]

Word 0

Byte 0								Byte 1								Byte 2								Byte 3							
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Word 1

Byte 0								Byte 1								Byte 2								Byte 3							
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Word 2

Byte 0								Byte 1								Byte 2								Byte 3							
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Word 3

Byte 0								Byte 1								Byte 2								Byte 3							
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Ancillary Data Summary (hex values)

	Byte 0	Byte 1	Byte 2	Byte 3
Word 0				
Word 1				
Word 2				
Word 3				

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5 Special Cases: Dual Link or Time-Multiplexed Video

{ARINC 818 includes the flexibility to send multiple video streams on a single link [see Section 3.5], and to use a dual link to send a single, high bandwidth video stream over two links [see Section 3.6]. This template does not cover these special cases. }