# IO MANIFESTS (FROM THE PLATFORM DEVELOPER)

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; IO MANIFEST TEMPLATE

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;--------------------------------------------------------------------------OPTIONS SYNTAX --------------------------

; options sets : { index list } { index list }

;

; when the list has one single element "X", this is the value to consider : {X} <=> {1 X} <=> X

;

; when index == 0 it means "any", the list can be empty, the default value is not changed from reset

;

; when index > 0 the list gives the allowed values the scheduler can select

; The Index tells the default "value" to take at reset time and to put in the graph

; the combination of index give the second word of stream\_format\_io[]

; At reset : (\*io\_func)(STREAM\_RESET, (uint8\_t \*)&stream\_format\_io\_setting, 0);

; For tuning : (\*io\_func)(STREAM\_SET\_IO\_CONFIG, (uint8\_t \*)&stream\_format\_io\_setting, 0);

; Example 2 5 6 7 8 9 ; index 2, default = 6 (index starts at 1)

;

;

; when index < 0 a list of triplets follows to describe a combination of data intervals : A1 B1 C1 A2 B2 C2 ...

; A is starting value, B is the increment step, C is the included maximum value

; The absolute index value selects the default value in this range

io\_platform\_sensor\_in\_0 ; IO name for the tools

analog\_in ; domain name, among the list below :

; domain name description and examples

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; general (a)synchronous sensor , electrical, chemical, color, .. remote data

; audio\_in microphone, line-in, I2S, PDM RX

; audio\_out line-out, earphone / speaker, PDM TX, I2S,

; gpio\_in generic digital IO , control of relay,

; gpio\_out generic digital IO , control of relay,

; motion accelerometer, combined or not with pressure and gyroscope

; 2d\_in camera sensor

; 2d\_out display, led matrix,

; analog\_in with aging control

; analog\_out D/A, position piezzo, PWM converter

; rtc ticks sent from a programmable timer

; user\_interface\_in button, slider, rotary button

; user\_interface\_out LED, digits, display,

; platform\_x platform-specific #x, decoded with callbacks

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; General information of the digital frame format

io\_commander0\_servant1 1 ; commander=0 servant=1 (default is servant)

; IO stream are managed from the graph scheduler with the help of one subroutine per IO using

; the template : typedef void (\*p\_io\_function\_ctrl) (uint32\_t command, uint8\_t \*data, uint32\_t length);

; The "command" parameter can be : STREAM\_SET\_PARAMETER, STREAM\_DATA\_START, STREAM\_STOP, STREAM\_SET\_BUFFER.

;

; And one subroutine for all IOs in charge of acknowledge the end of the data move,

; to update the circular buffer, manage overflows. This subroutine can be called from ISR

; void arm\_graph\_interpreter\_io\_ack (uint8\_t fw\_io\_idx, uint8\_t \*data, uint32\_t data\_size);

; Where fw\_io\_idx is the index given in "top\_manifest\_xxxx.txt"

;

; When the IO is "Commander" it calls arm\_graph\_interpreter\_io\_ack() when data is read

; When the IO is "Servant" the scheduler call p\_io\_function\_ctrl(STREAM\_DATA\_START, ..) to ask for

; data move. Once the move is done the IO driver calls arm\_graph\_interpreter\_io\_ack()

io\_buffer\_allocation 2.0 ; default is 0, which means the buffer is declared outside of the graph

; The floating-point number is a multiplication factor of the frame size (here 2 frames),

; the buffer size is computed with rounding (n = floor(X+0.5))

;

; When more than one byte are exchanged, the IO driver needs a temporary buffer. This buffer

; can be allocated "outside(0)" by the IO driver, or ">1" during the graph memory mapping preparation

; The memora mapping of this allocation is decided in the graph and can be in general-purpose or

; any RAM "0" or specific memory bank for speed reason or reserved for DMA processing, etc ..

io\_direction\_rx0tx1 1 ; direction of the stream 0:input 1:output from graph point of view

io\_raw\_format S16 ; options for the raw arithmetics computation format here STREAM\_S16

io\_interleaving 1 ; multichannel intleaved (0), deinterleaved by frame-size (1)

io\_nb\_channels 1 ; options for the number of channels

io\_frame\_length {1 1 2 16 } ; options of possible frame\_size in number of sample (can mono or multi-channel).

io\_frame\_duration {1 10 22.5} ; options of possible frame\_size in [milliseconds]. The default frame length is 1 sample

io\_subtype\_units VRMS ; depending on the domain. Here Units\_Vrms of the "general" domain (0 = any or underfined)

io\_subtype\_multiple {DPS GAUSS}; example of multi domain : motion can have up to 4 data units for accelerometer, gyroscope, magnetometer, temperature

io\_power\_mode 0 ; to set the device at boot time in stop / off (0)

; running mode(1) : digital conversion (BIAS always powered for analog peripherals )

; running mode(2) : digital conversion BIAS shut-down between conversions

; Sleep (3) Bias still powered but not digital conversions

io\_position meter 1.1 -2.2 0.01 ; unit and relative XYZ position with the platform reference point

io\_euler\_angles 10 20 90 ; Euler angles with respect to the platform reference orientation, in degrees

io\_sampling\_rate {1 16000 44100 48000} ; sampling rate options (enumeration in Hz)

io\_sampling\_period\_s {1 1 60 120 } ; sampling period options (enumeration in [second])

io\_sampling\_period\_day {1 0.25 1 7 } ; sampling period options (enumeration in [day])

io\_sampling\_rate\_accuracy 0.1 ; in percentage

io\_time\_stamp\_format {1 1} ; 0 no time-stamp, 1 absolute time, 2 relative time from last frame, 3 frame counter

io\_time\_stamp\_length {1 1} ; 0/1/2/3 corresponding to 16/32/64/64 bits time formats (default : STREAM\_TIME32)

;--------------------------------------------------------------------------COMMENTS SECTION --------------------------

; INFORMATION :

; jumpers to set on the board

; manufacturer references and internet URLs

; any other system integration warning and recommendations

;

;--------------------------------------------------------------------------DOMAIN-SPECIFIC OPTIONS --------------------

; general domain is using subtype\_units "stream\_unit\_physical"

io\_analog\_scale 0.55 ; 0.55V is corresponding to full-scale (0x7FFF or 1.0f) with the default setting

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; audio\_in domain is using subtype\_units "stream\_unit\_physical"

io\_subtype\_units DBSPL ; STREAM\_SUBT\_ANA\_DBSPL of the domain

io\_analog\_scale 90.1 ; 90.1 dBSPL is corresponding to full-scale with the default setting

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; audio\_in domain SPECIFIC (digital format)

; Samples = Full\_Scale\_Digital x (interpa x analog\_input + interpoff)

; analog\_input = invinterpa x ((samples/Full\_Scale\_Digital) - interpoff)

io\_rescale\_factor 12.24 -44.3 ; [1/a off] analog\_input = invinterpa x ((samples/Full\_Scale\_Digital) - interpoff)

io\_sampling\_rate {1 16000 44100 48000} ; sampling rate options (enumeration in Hz)

io\_sampling\_period\_s {1 1 60 120 } ; sampling period options (enumeration in [second])

io\_sampling\_period\_day {1 0.25 1 7 } ; sampling period options (enumeration in [day])

io\_nb\_channels {1 1 2} ; options for the number of channels

io\_channel\_mapping 1 ; mono (Front Left), 18 channels can be controlled :

; Front Left FL bit0

; Front Right FR 1

; Front Center FC 2

; Low Frequency LFE 3

; Back Left BL 4

; Back Right BR 5

; Front Left of Center FLC 6

; Front Right of Center FRC 7

; Back Center BC 8

; Side Left SL 9

; Side Right SR 10

; Top Center TC 11

; Front Left Height TFL 12

; Front Center Height TFC 13

; Front Right Height TFR 14

; Rear Left Height TBL 15

; Rear Center Height TBC 16

; Rear Right Height TBR 17

subtype\_units 104

io\_analog\_gain {1 0 12 24 } ; analog gain (PGA)

io\_digital\_gain {-1 -12 1 12 } ; digital gain range

io\_hp\_filter {1 1 20 50 300 } ; high-pass filter (DC blocker) ON(1)/OFF(0) followed by cut-off frequency options

io\_agc 0 ; agc automatic gain control, ON(1)/OFF(0)

io\_router {1 0 1 2 3 } ; router from AMIC0 DMIC1 HS2 LINE3 BT/FM4 LOOP/TEST5

io\_gbass\_filter {1 1 1 0 -3 3 6} ; ON(1)/OFF(0) options for gains in dB

io\_fbass\_filter {1 20 100 200 } ; options for frequencies

io\_gmid\_filter {1 1 1 0 -3 3 6} ; ON(1)/OFF(0) options for gains in dB

io\_fmid\_filter {1 500 1000 } ; options for frequencies

io\_ghigh\_filter {1 1 0 -3 3 6 } ; ON(1)/OFF(0) options for gains in dB

io\_fhigh\_filter {1 4000 8000 } ; options for frequencies

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; audio\_out

io\_subtype\_units 87 ; Units is [mV]

io\_analog\_scale 1400 ; 1400nV is corresponding to full-scale with the default setting

io\_sampling\_rate {1 16000 44100 48000} ; sampling rate options (enumeration in Hz)

io\_nb\_channels { 1 1 1 2 } ; multichannel intleaved (0), deinterleaved by frame-size (1) + options for the number of channels

io\_channel\_mapping 1 ; mono (Front Left), 18 channels can be controlled :

io\_router {1 0 1 2 3 } ; router from AMIC0 DMIC1 HS2 LINE3 BT/FM4 LOOP/TEST5

io\_analog\_gain {1 0 12 24 } ; analog gain (Class-D)

io\_digital\_gain {-1 -12 1 12 } ; digital gain range

io\_hp\_filter {1 1 20 50 300 } ; high-pass filter (DC blocker) ON(1)/OFF(0) followed by cut-off frequency options

io\_agc 0 ; agc automatic gain control, ON(1)/OFF(0)

io\_gbass\_filter {1 1 1 0 -3 3 6} ; ON(1)/OFF(0) options for gains in dB

io\_fbass\_filter {1 20 100 200 } ; options for frequencies

io\_gmid\_filter {1 1 1 0 -3 3 6} ; ON(1)/OFF(0) options for gains in dB

io\_fmid\_filter {1 500 1000 } ; options for frequencies

io\_ghigh\_filter {1 1 0 -3 3 6 } ; ON(1)/OFF(0) options for gains in dB

io\_fhigh\_filter {1 4000 8000 } ; options for frequencies

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; gpio\_in

0 ; time-stamp (none)

0 5 ; samp. rate format (1:Hz 2:s 3:days) accuracy in %

1 1 10 20 ; options : sampling rate (in Hz, index <0 for a range [min, step, max])

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; gpio\_out

0 ; time-stamp (none)

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; motion

io\_sampling\_rate 1 16000 44100 48000 ; sampling rate options (enumeration in Hz)

io\_sampling\_period\_s 1 0.01 0.02 0.04 ; sampling period options (enumeration in [second])

io\_sampling\_accuracy 0.8 ; sampling rate accuracy in percent

; subtype\_motion aXg0m0 1 /\* only accelerometer \*/

; subtype\_motion a0gXm0 2 /\* only gyroscope \*/

; subtype\_motion a0g0mX 3 /\* only magnetometer \*/

; subtype\_motion aXgXm0 4 /\* A + G \*/

; subtype\_motion aXg0mX 5 /\* A + M \*/

; subtype\_motion a0gXmX 6 /\* G + M \*/

; subtype\_motion aXgXmX 7 /\* A + G + M \*/

io\_motion\_format 4 ; imu\_channel\_format

io\_motion\_sensitivity acc 1 2 4 8 16 ; sensitivity options of accelerometer

io\_motion\_sensitivity gyro 1 2 4 8 16 ; sensitivity options of gyroscope [dps]

io\_motion\_sensitivity mag 1 2 4 8 16 ; sensitivity options of magnetometer

io\_motion\_averaging acc 1 1 4 16 32; averaging in nb of samples

io\_motion\_averaging gyro 1 1 4 16 32; averaging in nb of samples

io\_high\_pass 0 /1 ; remove clicks

io\_DC-canceller

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; 2d\_in

io\_raw\_format\_2d (U16 + RGB16) (U8 + Grey) (U8 + YUV422)

io\_trigger flash

io\_synchronize with IR transmitter https://developer.android.com/reference/android/hardware/HardwareBuffer

io\_frame rate per second

io\_exposure time The amount of time the photosensor is capturing light, in seconds.

io\_image size

io\_modes portrait, landscape, barcode, night modes

io\_Gain Amplification factor applied to the captured light. 1.0 is the default gain; more than 1.0 is brighter; less than 1.0 is darker.

io\_WhiteBalanceColorTemp Temperature parameter when using the regular HDRP color balancing.

io\_WhiteBalanceColorTint Tint parameter when using the regular HDRP color balancing.

io\_MosaicPattern Color Filter Array pattern for the colors.

io\_WhiteBalanceRGBCoefficients Custom RGB scaling values for white balance, used only if EnableWhiteBalanceRGBCoefficients is selected.

io\_EnableWhiteBalanceRGBCoefficients Enable using custom RGB scaling values for white balance instead of temperature and tint.

io\_Auto White Balance Assumes the camera is looking at a white reference, and calibrates the WhiteBalanceRGBCoefficients. Refer to the API for more details.

io\_time-stamp (none)

io\_wdr; wide dynamic range flag (tuya)

io\_watermark; watermark insertion flag (tuya)

io\_flip; image format (portrait, panoramic)

io\_night\_mode; motion detection sensitivity (low, medium, high)

io\_detection\_zones; + {center pixel (in %) radius}, {}, {}

io\_focus\_area

io\_auto exposure on focus area

io\_focus\_distance forced focus to infinity or xxx meters

io\_get\_distance from focus area

io\_zoom\_area

io\_time\_stamp; detection time-stamp format

io\_light\_detection;

io\_jpeg\_quality

io\_sound\_detection; sound level

io\_other sensors; humidity, battery%

/\* 6b Focus control and white balance

2 0.05 0.0 -0.05 ; relative position to the center of the light reference

2 0.05 0.0 -0.05 ; relative position to the center of the lens focus point

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; 2d\_out

8b backlight brightness control

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; analog\_in

0 ; time-stamp (none)

0 5 ; samp. rate format (1:Hz 2:s 3:days) accuracy in %

1 1 10 20 ; options : sampling rate (in Hz, index <0 for a range [min, step, max])

/\* Environmental Sensing Service, Bluetooth Service Specification

0x00: Unspecified 0x01: Air 0x02: Water 0x03: Barometric 0x04: Soil 0x05: Infrared

0x06: Map Database 0x07: Barometric Elevation Source 0x08: GPS only Elevation Source

0x09: GPS and Map database Elevation Source 0x0A: Vertical datum Elevation Source

0x0B: Onshore 0x0C: Onboard vessel or vehicle 0x0D: Front 0x0E: Back/Rear 0x0F: Upper

0x10: Lower 0x11: Primary 0x12: Secondary 0x13: Outdoor 0x14: Indoor 0x15: Top 0x16: Bottom

0x17: Main 0x18: Backup 0x19: Auxiliary 0x1A: Supplementary 0x1B: Inside 0x1C: Outside

0x1D: Left 0x1E: Right 0x1F: Internal 0x20: External 0x21: Solar 0x22-0xFF:Reserved for future use

; Physical\_Unit = (A x Raw\_input\_sample + B)

; Full\_Scale\_Digital = 1.0 / 32767 for samples in fp32 / q15

;

17 ; rfc8428\_V unit = volt (PEAK)

3 0.9 0.5 0.11 ; A options to analog Volt input

3 0.2 0.1 0.0 ; B options

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; analog\_out

0 ; time-stamp (none)

;----------------------------------------------------------------------------------------------------------------------

; rtc

0 ; time-stamp (none)

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; user\_interface\_in

0 ; time-stamp (none)

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; user\_interface\_out

0 ; time-stamp (none)

/\*================================ STREAM ARITHMETICS DATA/TYPE ====================================================\*/

/\* types fit in 6bits, arrays start with 0, stream\_bitsize\_of\_raw() is identical \*/

enum stream\_raw\_data

{

#define STREAM\_DATA\_ARRAY 0 /\* see stream\_array: [0NNNTT00] 0, type, nb \*/

#define STREAM\_S1 1 /\* S, one signed bit, "0" = +1 \*/ /\* one bit per data \*/

#define STREAM\_U1 2 /\* one bit unsigned, boolean \*/

#define STREAM\_S2 3 /\* SX \*/ /\* two bits per data \*/

#define STREAM\_U2 4 /\* XX \*/

#define STREAM\_Q1 5 /\* Sx ~stream\_s2 with saturation management\*/

#define STREAM\_S4 6 /\* Sxxx \*/ /\* four bits per data \*/

#define STREAM\_U4 7 /\* xxxx \*/

#define STREAM\_Q3 8 /\* Sxxx \*/

#define STREAM\_FP4\_E2M1 9 /\* Seem micro-float [8 .. 64] \*/

#define STREAM\_FP4\_E3M0 10 /\* Seee [8 .. 512] \*/

#define STREAM\_S8 11 /\* Sxxxxxxx \*/ /\* eight bits per data \*/

#define STREAM\_U8 12 /\* xxxxxxxx ASCII char, numbers.. \*/

#define STREAM\_Q7 13 /\* Sxxxxxxx arithmetic saturation \*/

#define STREAM\_CHAR 14 /\* xxxxxxxx \*/

#define STREAM\_FP8\_E4M3 15 /\* Seeeemmm NV tiny-float [0.02 .. 448] \*/

#define STREAM\_FP8\_E5M2 16 /\* Seeeeemm IEEE-754 [0.0001 .. 57344] \*/

#define STREAM\_S16 17 /\* Sxxxxxxx.xxxxxxxx \*/ /\* 2 bytes per data \*/

#define STREAM\_U16 18 /\* xxxxxxxx.xxxxxxxx Numbers, UTF-16 characters \*/

#define STREAM\_Q15 19 /\* Sxxxxxxx.xxxxxxxx arithmetic saturation \*/

#define STREAM\_FP16 20 /\* Seeeeemm.mmmmmmmm half-precision float \*/

#define STREAM\_BF16 21 /\* Seeeeeee.mmmmmmmm bfloat \*/

#define STREAM\_Q23 22 /\* Sxxxxxxx.xxxxxxxx.xxxxxxxx 24bits \*/ /\* 3 bytes per data \*/

#define STREAM\_Q23\_32 23 /\* SSSSSSSS.Sxxxxxxx.xxxxxxxx.xxxxxxxx \*/ /\* 4 bytes per data \*/

#define STREAM\_S32 24 /\* one long word \*/

#define STREAM\_U32 25 /\* xxxxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx UTF-32, .. \*/

#define STREAM\_Q31 26 /\* Sxxxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx \*/

#define STREAM\_FP32 27 /\* Seeeeeee.mmmmmmmm.mmmmmmmm.mmmmmmmm FP32 \*/

#define STREAM\_CQ15 28 /\* Sxxxxxxx.xxxxxxxx Sxxxxxxx.xxxxxxxx (I Q) \*/

#define STREAM\_CFP16 29 /\* Seeeeemm.mmmmmmmm Seeeeemm.mmmmmmmm (I Q) \*/

#define STREAM\_S64 30 /\* long long \*/ /\* 8 bytes per data \*/

#define STREAM\_U64 31 /\* unsigned 64 bits \*/

#define STREAM\_Q63 32 /\* Sxxxxxxx.xxxxxx ....... xxxxx.xxxxxxxx \*/

#define STREAM\_CQ31 33 /\* Sxxxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx Sxxxx..\*/

#define STREAM\_FP64 34 /\* Seeeeeee.eeemmmmm.mmmmmmm ... double \*/

#define STREAM\_CFP32 35 /\* Seeeeeee.mmmmmmmm.mmmmmmmm.mmmmmmmm Seee.. (I Q) \*/

#define STREAM\_FP128 36 /\* Seeeeeee.eeeeeeee.mmmmmmm ... quadruple precision \*/ /\* 16 bytes per data \*/

#define STREAM\_CFP64 37 /\* fp64 fp64 (I Q) \*/

#define STREAM\_FP256 38 /\* Seeeeeee.eeeeeeee.eeeeemm ... octuple precision \*/ /\* 32 bytes per data \*/

#define STREAM\_TIME16 39 /\* ssssssssssssqqqq q14.2 1 hour + 8mn +/- 0.0625 \*/

#define STREAM\_TIME16D 40 /\* qqqqqqqqqqqqqqqq q15 [s] time difference +/- 15us \*/

#define STREAM\_TIME32 41 /\* ssssssssssssssssssssssssssssqqqq q28.4 [s] (8.5 years +/- 0.0625s) \*/

#define STREAM\_TIME32D 42 /\* ssssssssssssssssqqqqqqqqqqqqqqqq q17.15 [s] (36h, +/- 30us) time difference \*/

#define STREAM\_TIMESTMP 43 /\* ssssssssssssssssssssqqqqqqqqqqqq q20.12 [s] (12 days, +/- 0.25ms) \*/

#define STREAM\_TIME64 44 /\* \_\_\_\_ssssssssssssssssssssssssssssssssqqqqqqqqqqqqqqqqqqqqqqqqqqqq q32.28 [s] 140 Y +Q28 [s] \*/

#define STREAM\_TIME64MS 45 /\* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm ms \*/

#define STREAM\_TIME64ISO 46 /\* \_\_\_..YY..YY..YY..YY..MM..MM..DD..DD..SS..SS.....offs..MM..MM..MM ISO8601 signed offset 2024-05-04T21:12:02+07:00 \*/

#define STREAM\_WGS84 47 /\* <--LATITUDE 32B--><--LONGITUDE 32B--> lat="52.518611" 0x4252130f lon="13.376111" 0x4156048d - dual IEEE754 \*/

#define STREAM\_HEXBINARY 48 /\* UTF-8 lower case hexadecimal byte stream \*/

#define STREAM\_BASE64 49 /\* RFC-2045 base64 for xsd:base64Binary XML data \*/

#define STREAM\_STRING8 50 /\* UTF-8 string of char terminated by 0 \*/

#define STREAM\_STRING16 51 /\* UTF-16 string of char terminated by 0 \*/

#define LAST\_RAW\_TYPE 64 /\* coded on 6bits RAW\_FMT0\_LSB \*/

};

/\* ==========================================================================================

IO\_DOMAIN physical types and tuning

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\*/

/\* IO\_DOMAIN\_DATA\_IN : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

#define STREAM\_SUBT\_GENERAL\_COMP195X 0 /\* compressed byte stream following RFC1950 / RFC1951 ("deflate") \*/

#define STREAM\_SUBT\_GENERAL\_DPCM 1 /\* compressed byte stream \*/

#define STREAM\_SUBT\_GENERAL\_JSON 2 /\* JSON \*/

#define STREAM\_SUBT\_GENERAL\_XFORMAT 3 /\* SensorThings MultiDatastream extension \*/

/\* IO\_DOMAIN\_DATA\_OUT : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* IO\_DOMAIN\_AUDIO\_IN : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

#define STREAM\_SUBT\_AUDIO\_IN 0 /\* no subtype\_units : integer/ADC format \*/

#define STREAM\_SUBT\_AUDIO\_MPG 0 /\* compressed byte stream \*/

/\* tuning of PLATFORM\_AUDIO\_IN \*/

//const float audio\_settings [] = {

///\* [stream\_units\_physical\_t, scaling to full-scale] \*/

//unit\_pascal, 1.0f,

///\* nb of bits \*/

///\* 3 nchan \*/ 3, 1, 2, 8,

///\* 4 FS \*/ 2, 16000.0f, 48000.0f,

///\* 2 framesize [s] \*/ 2, 0.01f, 0.016f,

///\* 1 option = "fixed in HW and this is the setting" \*/

///\* 0 option = "fixed in HW, and it depends" \*/

///\* 4 PGA gain + digital gain option [dB]\*/ 0,

///\* 2 hpf set at 20Hz \*/ 1, 20.0f,

///\* 1 agc option \*/ 0,

///\* 2 router to MIC, LINE, BT, LOOP \*/ 0,

///\*14 bits remains \*/

//IO\_REC\_STREAM\_SETTING

// \_UNUSED\_MSB 31

// \_UNUSED\_LSB 16

// AGC\_MSB 15

// AGC\_LSB 15 /\* O6 AGC on/off \*/

// HPF\_MSB 14

// HPF\_LSB 14 /\* O5 HPF on/off \*/

// PGA\_MSB 13

// PGA\_LSB 10 /\* O4 16 analog PGA + digital PGA settings [dB] \*/

// DBSPL\_MSB 9

// DBSPL\_LSB 9 /\* O3 2 max dBSPL options \*/

// FRMSIZE\_MSB 8

// FRMSIZE\_LSB 7 /\* O2 4 frame size options, in seconds \*/

// FS\_MSB 6

// FS\_LSB 3 /\* O1 16 sampling rates options \*/

// NCHAN\_MSB 2

// NCHAN\_LSB 0 /\* O0 8 nchan options \*/

/\* IO\_DOMAIN\_AUDIO\_OUT : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* tuning of PLATFORM\_AUDIO\_OUT \*/

#define STREAM\_SUBT\_AUDIO\_OUT 0 /\* no subtype\_units : integer/DAC format \*/

//const int32\_t audio\_out\_settings [] = {

///\* nb options nbbits \*/

///\* 8 3 nchan \*/ 3, 1, 2, 8,

///\* 16 4 FS \*/ 2, 16000, 48000,

///\* 4 2 framesize [ms] \*/2, 10, 16,

///\* 8 3 mVrms max \*/ 2, 100, 700,

///\* 16 4 PGA gain \*/ 0,

///\* 4 2 bass gain dB \*/ 4, 0, -3, 3, 6,

///\* 2 1 bass frequency \*/2, 80, 200,

///\* 4 2 mid gain \*/ 4, 0, -3, 3, 6,

///\* 2 1 mid frequency \*/ 2, 500, 2000,

///\* 4 2 high gain \*/ 4, 0, -3, 3, 6,

///\* 2 1 high frequency \*/2, 4000, 8000,

///\* 2 1 agc gain \*/ 0,

///\* 4 2 router \*/ 0, /\* SPK, EAR, LINE, BT \*/

///\* 2 bits remains \*/

/\* IO\_DOMAIN\_GPIO\_IN : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* IO\_DOMAIN\_GPIO\_OUT : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

#define STREAM\_SUBT\_GPIO\_IN 0 /\* no subtype\_units \*/

#define STREAM\_SUBT\_GPIO\_OUT 0 /\* no subtype\_units \*/

/\* tuning of PLATFORM\_GPIO\_IN / OUT \*/

//const int32\_tgpio\_out\_0\_settings [] = {

/\* nb options nbbits \*/

//State : High-Z, low, high, duration, frequency

//type : PWM, motor control, GPIO

//PWM duty, duration, frequency (buzzer)

//Servo motor control -120 .. +120 deg

//keep the servo position

/\* IO\_DOMAIN\_MOTION\_IN : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

#define STREAM\_SUBT\_MOTION\_A 1

#define STREAM\_SUBT\_MOTION\_G 2

#define STREAM\_SUBT\_MOTION\_B 3

#define STREAM\_SUBT\_MOTION\_AG 4

#define STREAM\_SUBT\_MOTION\_AB 5

#define STREAM\_SUBT\_MOTION\_GB 6

#define STREAM\_SUBT\_MOTION\_AGB 7

/\* IO\_DOMAIN\_2D\_IN : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* IO\_DOMAIN\_2D\_OUT : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\*

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; 2d\_in SPECIFIC (mixed signal setting)

2 0.05 0.0 -0.05 ; relative position to the center of the light reference

2 0.05 0.0 -0.05 ; relative position to the center of the lens focus point

\*/

/\*======================================= 2D DOMAINS \*/

#define STREAM\_SUBT\_YUV420P 1 /\* Luminance, Blue projection, Red projection, 6 bytes per 4 pixels, reordered \*/

#define STREAM\_SUBT\_YUV422P 2 /\* 8 bytes per 4 pixels, or 16bpp, Y0 Cb Y1 Cr (1 Cr & Cb sample per 2x1 Y samples) \*/

#define STREAM\_SUBT\_YUV444P 3 /\* 12 bytes per 4 pixels, or 24bpp, (1 Cr & Cb sample per 1x1 Y samples) \*/

#define STREAM\_SUBT\_CYM24 4 /\* cyan yellow magenta \*/

#define STREAM\_SUBT\_CYMK32 5 /\* cyan yellow magenta black \*/

#define STREAM\_SUBT\_RGB8 6 /\* RGB 3:3:2, 8bpp, (msb)2B 3G 3R(lsb) \*/

#define STREAM\_SUBT\_RGB16 7 /\* RGB 5:6:5, 16bpp, (msb)5R 6G 5B(lsb) \*/

#define STREAM\_SUBT\_RGBA16 8 /\* RGBA 4:4:4:4 32bpp (msb)4R \*/

#define STREAM\_SUBT\_RGB24 9 /\* BBGGRR 24bpp (msb)8B \*/

#define STREAM\_SUBT\_RGBA32 10 /\* BBGGRRAA 32bpp (msb)8B \*/

#define STREAM\_SUBT\_RGBA8888 11 /\* AABBRRGG OpenGL/PNG format R=lsb A=MSB ("ABGR32" little endian) \*/

#define STREAM\_SUBT\_BW1B 12 /\* Y, 1bpp, 0 is black, 1 is white \*/

#define STREAM\_SUBT\_GREY2B 13 /\* Y, 2bpp, 0 is black, 3 is white, ordered from lsb to msb \*/

#define STREAM\_SUBT\_GREY4B 14 /\* Y, 4bpp, 0 is black, 15 is white, ordered from lsb to msb \*/

#define STREAM\_SUBT\_GREY8B 15 /\* Grey 8b, 0 is black, 255 is white \*/

/\* IO\_DOMAIN\_ANALOG\_IN \*/

sensitivity / PGA

detection threshold

detection attack time

detection release time

aging control

/\* IO\_DOMAIN\_ANALOG\_OUT \*/

// aging option (usage counter, time)

//

// Physical\_Unit = (A x Raw\_input\_sample + B)

// Full\_Scale\_Digital = 1.0 / 32767 for samples in fp32 / q15

// 17 ; rfc8428\_V unit = volt (PEAK)

// 3 0.9 0.5 0.11 ; A options to analog Volt input

// 3 0.2 0.1 0.0 ; B options

// aging option (usage counter, time)

// /\* int16\_t format \*/ /\* int32\_t format \*/

//unit\_linear, /\* PCM and default format \*/ /\* PCM and default format \*/

//unit\_decibel, /\* Q11.4 : 1dB <> 0x0010 Q19.12 : 1dB <> 0x0000 1000 \*/

//unit\_percentage, /\* Q11.4 : 1 % <> 0x0010 Q19.12 : 1 % <> 0x0000 1000 \*/

//unit\_meter, /\* Q11.4 : 10 m <> 0x00A0 Q19.12 : 10 m <> 0x0000 A000 \*/

//unit\_g = 20, /\* Q11.4 : 1g <> 0x0010 Q19.12 : 1g <> 0x0000 1000 \*/

/\*======================================= ANALOG SENDOR DOMAINS SUBTYPE\_FMT1 \*/

//enum stream\_unit\_physical

//{

// RFC8428 Symbol Description

#define STREAM\_SUBT\_ANA\_ANY 0 /\* any \*/

#define STREAM\_SUBT\_ANA\_METER 1 /\* m meter \*/

#define STREAM\_SUBT\_ANA\_KGRAM 2 /\* kg kilogram \*/

#define STREAM\_SUBT\_ANA\_GRAM 3 /\* g gram\* \*/

#define STREAM\_SUBT\_ANA\_SECOND 4 /\* s second \*/

#define STREAM\_SUBT\_ANA\_AMPERE 5 /\* A ampere \*/

#define STREAM\_SUBT\_ANA\_KELVIB 6 /\* K kelvin \*/

#define STREAM\_SUBT\_ANA\_CANDELA 7 /\* cd candela \*/

#define STREAM\_SUBT\_ANA\_MOLE 8 /\* mol mole \*/

#define STREAM\_SUBT\_ANA\_HERTZ 9 /\* Hz hertz \*/

#define STREAM\_SUBT\_ANA\_RADIAN 10 /\* rad radian \*/

#define STREAM\_SUBT\_ANA\_STERADIAN 11 /\* sr steradian \*/

#define STREAM\_SUBT\_ANA\_NEWTON 12 /\* N newton \*/

#define STREAM\_SUBT\_ANA\_PASCAL 13 /\* Pa pascal \*/

#define STREAM\_SUBT\_ANA\_JOULE 14 /\* J joule \*/

#define STREAM\_SUBT\_ANA\_WATT 15 /\* W watt \*/

#define STREAM\_SUBT\_ANA\_COULOMB 16 /\* C coulomb \*/

#define STREAM\_SUBT\_ANA\_VOLT 17 /\* V volt \*/

#define STREAM\_SUBT\_ANA\_FARAD 18 /\* F farad \*/

#define STREAM\_SUBT\_ANA\_OHM 19 /\* Ohm ohm \*/

#define STREAM\_SUBT\_ANA\_SIEMENS 20 /\* S siemens \*/

#define STREAM\_SUBT\_ANA\_WEBER 21 /\* Wb weber \*/

#define STREAM\_SUBT\_ANA\_TESLA 22 /\* T tesla \*/

#define STREAM\_SUBT\_ANA\_HENRY 23 /\* H henry \*/

#define STREAM\_SUBT\_ANA\_CELSIUSDEG 24 /\* Cel degrees Celsius \*/

#define STREAM\_SUBT\_ANA\_LUMEN 25 /\* lm lumen \*/

#define STREAM\_SUBT\_ANA\_LUX 26 /\* lx lux \*/

#define STREAM\_SUBT\_ANA\_BQ 27 /\* Bq becquerel \*/

#define STREAM\_SUBT\_ANA\_GRAY 28 /\* Gy gray \*/

#define STREAM\_SUBT\_ANA\_SIVERT 29 /\* Sv sievert \*/

#define STREAM\_SUBT\_ANA\_KATAL 30 /\* kat katal \*/

#define STREAM\_SUBT\_ANA\_METERSQUARE 31 /\* m2 square meter (area) \*/

#define STREAM\_SUBT\_ANA\_CUBICMETER 32 /\* m3 cubic meter (volume) \*/

#define STREAM\_SUBT\_ANA\_LITER 33 /\* l liter (volume) \*/

#define STREAM\_SUBT\_ANA\_M\_PER\_S 34 /\* m/s meter per second (velocity) \*/

#define STREAM\_SUBT\_ANA\_M\_PER\_S2 35 /\* m/s2 meter per square second (acceleration) \*/

#define STREAM\_SUBT\_ANA\_M3\_PER\_S 36 /\* m3/s cubic meter per second (flow rate) \*/

#define STREAM\_SUBT\_ANA\_L\_PER\_S 37 /\* l/s liter per second (flow rate)\* \*/

#define STREAM\_SUBT\_ANA\_W\_PER\_M2 38 /\* W/m2 watt per square meter (irradiance) \*/

#define STREAM\_SUBT\_ANA\_CD\_PER\_M2 39 /\* cd/m2 candela per square meter (luminance) \*/

#define STREAM\_SUBT\_ANA\_BIT 40 /\* bit bit (information content) \*/

#define STREAM\_SUBT\_ANA\_BIT\_PER\_S 41 /\* bit/s bit per second (data rate) \*/

#define STREAM\_SUBT\_ANA\_LATITUDE 42 /\* lat degrees latitude[1] \*/

#define STREAM\_SUBT\_ANA\_LONGITUDE 43 /\* lon degrees longitude[1] \*/

#define STREAM\_SUBT\_ANA\_PH 44 /\* pH pH value (acidity; logarithmic quantity) \*/

#define STREAM\_SUBT\_ANA\_DB 45 /\* dB decibel (logarithmic quantity) \*/

#define STREAM\_SUBT\_ANA\_DBW 46 /\* dBW decibel relative to 1 W (power level) \*/

#define STREAM\_SUBT\_ANA\_BSPL 47 /\* Bspl bel (sound pressure level; log quantity) \*/

#define STREAM\_SUBT\_ANA\_COUNT 48 /\* count 1 (counter value) \*/

#define STREAM\_SUBT\_ANA\_PER 49 /\* / 1 (ratio e.g., value of a switch; [2]) \*/

#define STREAM\_SUBT\_ANA\_PERCENT 50 /\* % 1 (ratio e.g., value of a switch; [2])\* \*/

#define STREAM\_SUBT\_ANA\_PERCENTRH 51 /\* %RH Percentage (Relative Humidity) \*/

#define STREAM\_SUBT\_ANA\_PERCENTEL 52 /\* %EL Percentage (remaining battery energy level) \*/

#define STREAM\_SUBT\_ANA\_ENERGYLEVEL 53 /\* EL seconds (remaining battery energy level) \*/

#define STREAM\_SUBT\_ANA\_1\_PER\_S 54 /\* 1/s 1 per second (event rate) \*/

#define STREAM\_SUBT\_ANA\_1\_PER\_MIN 55 /\* 1/min 1 per minute (event rate, "rpm")\* \*/

#define STREAM\_SUBT\_ANA\_BEAT\_PER\_MIN 56 /\* beat/min 1 per minute (heart rate in beats per minute)\*/

#define STREAM\_SUBT\_ANA\_BEATS 57 /\* beats 1 (Cumulative number of heart beats)\* \*/

#define STREAM\_SUBT\_ANA\_SIEMPERMETER 58 /\* S/m Siemens per meter (conductivity) \*/

#define STREAM\_SUBT\_ANA\_BYTE 59 /\* B Byte (information content) \*/

#define STREAM\_SUBT\_ANA\_VOLTAMPERE 60 /\* VA volt-ampere (Apparent Power) \*/

#define STREAM\_SUBT\_ANA\_VOLTAMPERESEC 61 /\* VAs volt-ampere second (Apparent Energy) \*/

#define STREAM\_SUBT\_ANA\_VAREACTIVE 62 /\* var volt-ampere reactive (Reactive Power) \*/

#define STREAM\_SUBT\_ANA\_VAREACTIVESEC 63 /\* vars volt-ampere-reactive second (Reactive Energy)\*/

#define STREAM\_SUBT\_ANA\_JOULE\_PER\_M 64 /\* J/m joule per meter (Energy per distance) \*/

#define STREAM\_SUBT\_ANA\_KG\_PER\_M3 65 /\* kg/m3 kg/m3 (mass density, mass concentration) \*/

#define STREAM\_SUBT\_ANA\_DEGREE 66 /\* deg degree (angle)\* \*/

#define STREAM\_SUBT\_ANA\_NTU 67 /\* NTU Nephelometric Turbidity Unit \*/

// Secondary Unit (rfc8798) Description SenML Unit Scale Offset

#define STREAM\_SUBT\_ANA\_MS 68 /\* millisecond s 1/1000 0 1ms = 1s x [1/1000] \*/

#define STREAM\_SUBT\_ANA\_MIN 69 /\* minute s 60 0 \*/

#define STREAM\_SUBT\_ANA\_H 70 /\* hour s 3600 0 \*/

#define STREAM\_SUBT\_ANA\_MHZ 71 /\* megahertz Hz 1000000 0 \*/

#define STREAM\_SUBT\_ANA\_KW 72 /\* kilowatt W 1000 0 \*/

#define STREAM\_SUBT\_ANA\_KVA 73 /\* kilovolt-ampere VA 1000 0 \*/

#define STREAM\_SUBT\_ANA\_KVAR 74 /\* kilovar var 1000 0 \*/

#define STREAM\_SUBT\_ANA\_AH 75 /\* ampere-hour C 3600 0 \*/

#define STREAM\_SUBT\_ANA\_WH 76 /\* watt-hour J 3600 0 \*/

#define STREAM\_SUBT\_ANA\_KWH 77 /\* kilowatt-hour J 3600000 0 \*/

#define STREAM\_SUBT\_ANA\_VARH 78 /\* var-hour vars 3600 0 \*/

#define STREAM\_SUBT\_ANA\_KVARH 79 /\* kilovar-hour vars 3600000 0 \*/

#define STREAM\_SUBT\_ANA\_KVAH 80 /\* kilovolt-ampere-hour VAs 3600000 0 \*/

#define STREAM\_SUBT\_ANA\_WH\_PER\_KM 81 /\* watt-hour per kilometer J/m 3.6 0 \*/

#define STREAM\_SUBT\_ANA\_KIB 82 /\* kibibyte B 1024 0 \*/

#define STREAM\_SUBT\_ANA\_GB 83 /\* gigabyte B 1e9 0 \*/

#define STREAM\_SUBT\_ANA\_MBIT\_PER\_S 84 /\* megabit per second bit/s 1000000 0 \*/

#define STREAM\_SUBT\_ANA\_B\_PER\_S 85 /\* byteper second bit/s 8 0 \*/

#define STREAM\_SUBT\_ANA\_MB\_PER\_S 86 /\* megabyte per second bit/s 8000000 0 \*/

#define STREAM\_SUBT\_ANA\_MV 87 /\* millivolt V 1/1000 0 \*/

#define STREAM\_SUBT\_ANA\_MA 88 /\* milliampere A 1/1000 0 \*/

#define STREAM\_SUBT\_ANA\_DBM 89 /\* decibel rel. to 1 milliwatt dBW 1 -30 0 dBm = -30 dBW \*/

#define STREAM\_SUBT\_ANA\_UG\_PER\_M3 90 /\* microgram per cubic meter kg/m3 1e-9 0 \*/

#define STREAM\_SUBT\_ANA\_MM\_PER\_H 91 /\* millimeter per hour m/s 1/3600000 0 \*/

#define STREAM\_SUBT\_ANA\_M\_PER\_H 92 /\* meterper hour m/s 1/3600 0 \*/

#define STREAM\_SUBT\_ANA\_PPM 93 /\* partsper million / 1e-6 0 \*/

#define STREAM\_SUBT\_ANA\_PER\_100 94 /\* percent / 1/100 0 \*/

#define STREAM\_SUBT\_ANA\_PER\_1000 95 /\* permille / 1/1000 0 \*/

#define STREAM\_SUBT\_ANA\_HPA 96 /\* hectopascal Pa 100 0 \*/

#define STREAM\_SUBT\_ANA\_MM 97 /\* millimeter m 1/1000 0 \*/

#define STREAM\_SUBT\_ANA\_CM 98 /\* centimeter m 1/100 0 \*/

#define STREAM\_SUBT\_ANA\_KM 99 /\* kilometer m 1000 0 \*/

#define STREAM\_SUBT\_ANA\_KM\_PER\_H 100 /\* kilometer per hour m/s 1/3.6 0 \*/

#define STREAM\_SUBT\_ANA\_GRAVITY 101 /\* earth gravity m/s2 9.81 0 1g = m/s2 x 9.81 \*/

#define STREAM\_SUBT\_ANA\_DPS 102 /\* degrees per second 1/s 360 0 1dps = 1/s x 1/360 \*/

#define STREAM\_SUBT\_ANA\_GAUSS 103 /\* Gauss Tesla 10-4 0 1G = Tesla x 1/10000 \*/

#define STREAM\_SUBT\_ANA\_VRMS 104 /\* Volt rms Volt 0.707 0 1Vrms = 1Volt (peak) x 0.707 \*/

#define STREAM\_SUBT\_ANA\_MVPGAUSS 105 /\* Hall effect, mV/Gauss millivolt 1 0 1mV/Gauss \*/

/\* IO\_DOMAIN\_RTC : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* tuning of PLATFORM\_RTC\_IN \*/

/\* a FIFO is filled from RTC on periodic basis : \*/

//const int32\_t timer\_in\_settings [] = {

// /\* nb options nbbits \*/

// /\* 8 3 unit : Days Hours Minutes Seconds 1ms

// /\* Flexible bit-fields implementation-dependent

// /\* period Q8.4 x [unit]

// /\* offset (Q8) from the start of the day (watering)

// use-case = periodic comparison of ADC value, periodic activation of GPIO

// one FIFO is trigered by unit: days one other by minutes, a script can

// implement the state machine to read sensors or activate watering

/\* IO\_DOMAIN\_USER\_INTERFACE\_IN : subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* IO\_DOMAIN\_USER\_INTERFACE\_OUT: subtypes and tuning SUBTYPE\_FMT1 and SETTINGS\_IOFMT2 \*/

/\* tuning of PLATFORM\_USER\_INTERFACE\_IN / OUT \*/

/\* a FIFO is filled from UI detection of a button \*/

/\* one FIFO per button to ease the routing to specific nodes \*/

/\* Default implementation using SYSTICK

Time format - 40 bits - SYSTICK 1ms increments, global register

GLOBALS : G\_INCTICK (64bits), INV\_RVR (32bits), G\_SYST0 (32bits) interval in Q32 second

G\_INCTICK : incremented in the SYSTICK interrupt, SYST0=1ms or 10ms

FEDCBA987654321 FEDCBA987654321 FEDCBA987654321 FEDCBA9876543210

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq with 1ms increment => 35 years (32bits gives only 50 days)

SYST\_CVR (current value), SYST\_CALIB (reload value for 10ms), SYST\_RVR (reload value), INV\_RVR = 0x10000.0000/SYST\_RVR

Time sequence : G\_INCTICK=>T0 CVR=>C0 G\_INCTICK=>T1 CVR=>C1

Algorithm : if T0==T1 (no collision) then T=T0,C=C0 else T=T1,C=C1 endif

the fraction of SYST0 is (RVR - C) x INV\_RVR = xx...xxx

the time (64bits Q16) is (T<<16) + (((RVR - C) x INV\_RVR) >> 16) => used for time-stamps

FEDCBA987654321 FEDCBA987654321 FEDCBA987654321 FEDCBA9876543210

\_\_\_\_\_\_\_\_qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqXXXXXXXXXXXXXXXX

\*/